Motivators, barriers and strategies of weight management: A cross-sectional study among Finnish adults

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Abstract

Background: Weight management (WM) is an ongoing global challenge. The purpose of this study was to analyze motivators, barriers, and strategies of WM among Finnish adults.

Methods: Data were collected in the ‘KULUMA’ (Consumers at the Weight Management Market) project among 667 community-dwelling adults in Eastern and Central Finland (Kuopio and Jyväskylä). The self-reported questionnaire collected background information and responses to motivators, barriers, and strategy items. Principal component analysis (PCA) was used to extract components of motivators, barriers, and strategies of WM, along with K-means clustering to categorize the participants.

Results: About 55% of the respondents were aiming to lose weight. The PCA resulted in a 3-component model for motivators (functional aspects, sociological aspects, and psychosocial aspects), a 4-component model for barriers (life situations, food environment, personal issues, and resources) and a 2-component model for the strategies of WM (dietary strategies and lifestyle management strategies). The components had several relationships with demographic characteristics (especially with age) but only a few with weight-related characteristics (e.g. weight loss attempts). Three clusters of participants were formed: Struggling weight managers (WMs), Independent WMs, and Determined WMs. Barriers to WM had a key role in differentiating clusters and weight satisfaction. Determined WMs were the most satisfied with their weight, whereas Struggling WMds perceived the highest level of barriers to WM.

Conclusions: WM efforts are common among Finnish adults. Generally, weight-related activities and communication in society should focus more on barriers than merely on the motivation or strategies of WM in order to support individuals’ WM efforts.

Keywords: Barriers; Cluster analysis; Motivators; Principal component analysis; Strategies; Weight management.
1 Introduction
Excess body weight is a global public health problem, and worldwide obesity has more than doubled since 1980 (1). A 2014 population survey in Finland revealed that 60% of men and 43% of women were overweight or obese (2). In the same study, 35% of Finnish working-age women and 24% of working-age men reported trying to lose weight during the previous year (2). However, the long-term success rates of weight management (WM) are low; it is estimated that most individuals regain 33% to 100% of the lost weight within 5 years (3).
Considering the ongoing efforts for WM and low long-term success rates, more understanding is needed about the factors associated with WM and the WM practices people use in their daily routines. Among these factors, there are motivators and barriers of WM, which either facilitate or impede individuals’ adherence to WM programs, respectively. Moreover, little is still known about which strategies people use when engaging in WM practices on their own (4). Therefore, we were interested in conducting a study in a real-life setting in order to get diverse viewpoints from community-dwelling Finnish nationals who have had experience with WM.

1.1 Motivators of WM
Motivation is the energy that directs our behavior (5). Thus, anything contributing to this energy can be regarded as a motivator for behavioral change. In terms of WM, individuals declare that they know what to do to control their weight but have problems motivating themselves in the long-term (6). Several motivators of WM have been identified. For example, high intrinsic motivation, flexible cognitive restraint of eating, and exercise self-efficacy are positive predictors of successful WM (7-9). WM programs, including motivational techniques such as Motivational Interviewing (MI), which focuses on personal motivations of behavior change, may improve long-term outcomes (10).

1.2 Barriers of WM
Contrary to the motivators, barriers of WM can refer to anything that challenges individuals’ efforts toward WM. It has been shown that if one perceives barriers to lifestyle changes, this can predict negative success in WM (11). In recent studies, the enjoyment of eating food and a lack of self-discipline to control appetite, medical conditions, stress-related eating disorders, and small portion sizes, which do not necessarily satisfy an individual’s “feeling of being hungry,” have been reported as barriers to WM (12,13). In order to anticipate sustained outcomes, it is essential that WM programs address the potential barriers.

1.3 Strategies of WM
Decreasing total caloric intake and increasing physical activity are commonly recommended for healthy weight loss (14,15). In the Finnish Weight Control Registry (FWCR), individuals
who achieved successful weight loss (i.e., a weight loss of at least 10% and maintaining that
weight loss for a minimum of 2 years) smoked less, consumed less alcohol, and were more
physically active when compared with the general Finnish population (4). Among FWCR
participants, eating habits associated with successful long-term weight loss maintenance
included regular meal frequency (e.g., eating 3-5 times a day) and a reduction in the intake of
energy-dense foods, such as candies and fast food (16). In the National Weight Control
Registry (NWCR), individuals who achieved successful weight loss (i.e., achieving a weight
loss of more than 13.6 kg and maintaining that weight loss for at least 1 year) were followed
for 10 years. High levels of physical activity, low calorie and fat intake, in addition to high
levels of restraint and low levels of disinhibition of eating were reported as central behaviors
for successful WM (17).
The present study has specifically aimed to analyze motivators, barriers, and strategies of WM
among community-dwelling Finnish adults who have had experience with WM, as well as the
relationships of these factors with socio-demographic (i.e., age, gender) and weight-related
characteristics (i.e., history of previous weight loss attempts).

2 Methods
2.1 Participants and study design
The data for the present study was collected in the ‘KULUMA’ (Consumers at the weight
management market) project. A quantitative survey, including a self-reported questionnaire,
was conducted among grocery customers in two supermarkets located in Eastern and Central
Finland (Kuopio and Jyväskylä, respectively). During a four-day period, 2000 questionnaires
were randomly distributed among the customers after their normal shopping tour at the entrance
hall of the supermarket. Customers were asked to fill in the questionnaire at home and to mail
it in a prepaid envelope to the researchers within three weeks. Self-reported measures of weight
and height were used to calculate the Body Mass Index (BMI) as weight (kg) divided by height
in meters squared. Ten 20 euro-gifts were raffled among the customers completing the
questionnaire. The study had received the approval from the Research Ethics Committee of the
Northern Savo District (No. 114/2009).
Altogether 772 volunteer participants (284 men, 488 women, 38.6 % of all) returned the
questionnaire. To concentrate on the respondents with previous experience on WM, 93
participants (57 men, 36 women) were excluded from the data analysis since their response to
the question “Have you tried to lose weight during your lifetime?” was “No”. Additionally, 12
respondents who had filled out the questionnaire incompletely were dropped from the study.
Consequently, the final population for this study is 667 participants. The mean (SD) age of the
participants was 53.5 (15.4) years and the mean (SD) of BMI was 26.7 (5.2) kg/m². The study population consisted of 41% normal-weight, 39.4% overweight and 19.6% obese individuals.

2.2 Study questionnaire

The study questionnaire consisted of background questions about individuals’ socio-demographic and weight-related characteristics (gender, age, occupation, education, BMI, current aiming to lose weight, satisfaction with current weight, readiness to make WM efforts, lifetime attempts to lose weight). In addition, the authors formulated 37 items to assess the motivators, barriers and strategies of WM (motivators, 10 items; barriers, 17 items; strategies, 10 items) (see the variables in Table 1). They formulated these items based on their review of the relevant literature and experience from clinics and clinical intervention studies (18–21). The items were later supported by the findings of a qualitative study (behavioral analysis) performed among 49 overweight or obese individuals participating in a follow-up session of a weight loss and maintenance intervention (22). The respondents were asked to indicate the importance of each motivator for WM in their daily routine on a ten-point category scale (1= not at all important, 10= very important). For the barriers of WM, the respondents were asked to indicate to what extent the given barrier item made their WM difficult (1= not at all, 10=very much). For the items concerning strategies of WM, they were asked how frequently they used each strategy for their WM on a ten-point scale (1= not at all, 10 = continuously).

2.3 Statistical analyses

A principal component analysis (PCA) with varimax rotation was performed to categorize the similar items of the motivators, barriers and strategies of WM into a number of components. Eigenvalues over 1 were acceptable for factor retention (23). Items with factor loadings higher than 0.4 were included in the final analysis. Components extracted through PCA were named, based on the items loaded on them, to make the interpretation of the results easier. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy for the motivator, barrier and strategy components were 0.81, 0.88 and 0.80, respectively. We performed a K-means cluster analysis based on all of the items of the motivators, barriers and strategies of WM in order to categorize our participants. Chi-square test and subsequent follow-up tests were used to examine the difference of gender distribution between clusters. used We conducted series of univariate analysis of covariance (ANCOVA) to test for differences in sociodemographic characteristics (age, occupation, education) and weight-related characteristics (BMI, current aiming to lose weight, satisfaction with current weight, readiness to make WM efforts, lifetime attempts to lose weight) between the clusters. In ANCOVA, we adjusted the analysis for the potential confounding variables. For example, to assess the difference of age between the clusters,
gender was included as a covariate (because gender distribution was different between clusters) and for testing the difference of BMI between the clusters, the analysis was adjusted for gender, age, and all other sociodemographic and weight-related characteristics mentioned above. This adjustment procedure was consistent for assessing the difference of other sociodemographic and weight-related characteristics between the three clusters. Tuckey’s post hoc test was performed to determine which clusters were significantly different from each other. Multivariate analysis of variance (MANOVA) was conducted to examine the differences between the participants’ socio-demographic and weight-related characteristics regarding the resulting PCA components. Participants’ characteristics were considered as independent variables and PCA components as dependent variables. All statistical analyses were performed using SPSS version 21 (IBM SPSS Statistics for Windows, released 2012, Armonk, NY). P-value < 0.05 was set as a criterion for the statistical significance. However, in MANOVA analysis (Table 2), we adjusted for multiple comparisons using Bonferroni correction and set the p-value as 0.0006 (0.05/81 comparisons).

3 Results

3.1 WM behaviors

About 55% of the participants (about 53% of men and 55% of women, p > 0.05) reported that they were currently aiming to lose weight. About 73% of the respondents reported that they had tried to lose weight at least once during their lifetime. The number of weight loss attempts was different between genders (p < 0.001): about 23% of women and 35% of men reported that they had been trying to keep their weight stable in their lifetime, whereas 52% of women had tried to lose weight at least 3 times in their lifetime compared to 32% of men. Considering BMI, there was an increasing trend for the mean BMI with an increasing number of weight loss attempts during the lifetime (Fig 1).

In both genders, the highest percentage of aiming to lose weight belonged to those with BMI ≥ 30 kg/m² (83.8% in women and 76.5% in men). About 67% of the respondents (70% of women and 62% of men, p=0.024) were not satisfied with their current weight. The BMI value of individuals satisfied with their weight was significantly (p < 0.001) lower than those who were not satisfied with their weight [23.5 (3.1) kg/m² vs. 28.3 (5.4) kg/m², respectively].

3.2 Motivators, barriers and strategies of WM

The principal component analysis (PCA) models that best described our data were: a 3-component model for motivators to WM (named as functional aspects, sociological aspects and psychosocial aspects), a 4-component model for barriers to WM (named as life situations, food environment, personal issues and resources) and a 2-component model for the strategies...
of WM (named as *dietary strategies* and *life-management strategies*). The components and the items loaded onto them, factor loading of the items within the components and the percentages of variance explained by each component are presented in Table 1. Among the motivators, the component ‘functional aspects’ accounted for the highest variance explained (37.2 %). ‘Life situations’ and ‘dietary strategies’ explained the highest variances among the barrier and strategies components, respectively (37.6 % and 38.7 %).

Table 2 shows the relationships between components of motivators, barriers and strategies of WM and participants’ sociodemographic and weight-related characteristics. As a general observation, demographic characteristics, such as age, most often separated the respondents regarding the motivators, barriers or strategies of WM. For example, higher age was associated with higher scores in both strategy components, women obtained higher scores in the motivator component of “psychosocial aspects”, and higher education was associated with higher score in the strategy component of “dietary strategies”. Among the weight-related characteristics, higher number of weight loss attempts in the lifetime was associated with higher score in the barrier component “personal issues”. Interestingly, there was no association between the barrier component “food environment” and any of the background or weight-related characteristics.

### 3.3 Cluster analysis

Cluster analysis divided the respondents into three distinct clusters (Fig 2). *Struggling Weight Managers (WMs)*, comprising 42.4 % of the total participants, reported, on average, high scores to all of the items of the questionnaire. In other words, they regarded several items to be motivating, frequently used various strategies, but simultaneously perceived that there were several barriers, which made WM quite difficult. *Independent WM*s was the second largest cluster, comprising 28.4 % of the participants. This cluster had the lowest average scores in all motivators and strategies of WM. Yet, all of the barriers’ scores fell between those of the other two clusters. *Determined WM*s comprised the smallest share of the participants, 24.4 % of the total sample. They scored the motivator and strategy items, on average, relatively equivalent to the *Struggling WM*s. Although, their scores in the barrier items were the lowest among all the clusters.

Table 3 shows the differences of sociodemographic and weight-related characteristics between the three clusters after adjusting for the confounding variables. Gender distribution was significantly different between clusters (p=0.001). Follow up tests revealed significant difference in gender distribution between *Independent WM*s and *Struggling WM*s (p=0.003) and between *Determined WM*s and *Struggling WM*s (p=0.001). There were significant
differences in age (F=21.28, p < 0.001), weight satisfaction (F=12.75, p < 0.001) and readiness to make WM efforts (F=9.64, p < 0.001) between the clusters: Determined WM were the oldest and Independent WM were the youngest clusters, respectively (p < 0.001). Difference in age was also significant between Determined WM vs. Struggling WM (p < 0.001) and between Independent WM vs. Struggling WM (p < 0.001). Weight satisfaction was different between Determined WM vs. Independent WM (p < 0.001) and between Determined WM vs. Struggling WM (p < 0.001). Independent WM were less ready to make WM efforts compared to Determined WM (p < 0.001) and Struggling WM (p < 0.001).

4 Discussion

4.1 Characteristics of participants

According to our findings, weight-loss efforts are common; more than half of the respondents reported they were currently aiming to lose weight. However, it is likely that the study questionnaire had been of special interest those individuals who were already more oriented to WM and, due to the inclusion criteria, particularly included those with at least some experience with WM. Moreover, the percentage of those who were currently aiming to lose weight increased with higher BMI rates in both genders. Furthermore, the mean number of attempts to lose weight was higher in overweight/obese individuals than in normal-weight individuals. These findings are well in line with previous reports on the association between a higher number of weight loss attempts and a higher BMI (24-26). Additionally, in the previous reports, adoption of inappropriate health behaviors, such as skipping breakfast or low levels of physical activity (27), vulnerability to the hedonic appeal of unhealthy foods (28), and ineffective inhibitory control along with a strong preference for snack foods (29) have all helped to explain the positive correlation between higher number of attempts to lose weight and increasing BMI. Similarly, individuals who have not been satisfied with their weight loss results have reported resorting to skipping or consuming fewer meals as strategies for further weight loss (30).

Interestingly, the number of weight loss attempts during one’s lifetime was exclusively associated with the barrier “personal issues,” which consists of the items “not enough self-discipline,” “enjoy eating food and treats,” and “not enough motivation” (Table 2). In particular, the first two items are comparable to earlier findings (28,29). It might be that the failure to achieve one’s target weight or maintain one’s current weight is due to underlying reasons, such as an inability to resist temptations to eat, the enjoyment of eating, or lack of enough motivation. This failure may therefore lead to multiple attempts to lose weight. Additionally, it is likely that repeated unsuccessful weight loss attempts can cause a loss of motivation, which in turn can lead to an increase of unhealthy behaviors. This also highlights
the importance of individual aspects in achieving successful weight outcomes. This is consistent with previous reports on the association among some personality traits, such as impulsiveness and higher body weight (31,32). Research has also indicated that appetitive motivation, desire, craving, and temptation challenge self-control and contribute to overeating in modern environments that offer a wide variety of convenient, palatable foods (33).

4.2 Motivators of WM

Among the motivator components, as indicated by the principal component analysis (PCA), “functional aspects,” consisting of the items “health,” “well-being,” “maintaining mobility,” and “working ability,” had the highest variance (Table 1). Previous studies have reported better health, prevention of disease, increased fitness, feeling less tired, and better working ability as important motivators to healthy behaviors (11,34). Additionally, cultural beauty norms and media representations, which deem fat as unhealthy and unattractive, could provide strong motivation for weight loss (35). In our study, “psychosocial aspects,” consisting of the items “appearance,” “self-respect,” and “social relations,” were scored higher among women than among men (Table 2). This is in line with previous findings that women’s self-esteem is often more closely tied to their weight when compared to men (36).

According to cluster analysis, both Struggling weight managers (WMs) and Determined WM reported most of the above-mentioned motivators to be highly important for WM, although they differed regarding satisfaction with their current weight. Independent WM regarded all of the motivators to be less important than did the other clusters. Therefore, it seems that Independent WM would benefit more from emphasizing the value of healthy behavioral change.

4.3 Barriers of WM

Interestingly, a large number of the respondents identified with the barrier item “not enough motivation” while noting a “readiness to make effort to maintain the current weight or to reach the target weight.” The latter responses might partly be a result of emphasized optimism among the participants. Nonetheless, the results suggest that though the individuals are concerned with their weight, they have perhaps lost their motivation for WM because of several earlier ineffective attempts or other reasons. As evidence to support this suggestion, the barrier component “personal issues,” including the item “not enough motivation,” was associated with the number of weight loss attempts, highlighting the influence of previous unsuccessful weight loss attempts on the level of motivation for making efforts toward WM. In this regard, setting realistic goals can help individuals maintain motivation for continuing WM.
Although both Struggling WMs and Determined WMs shared similarly high scores for both motivators and strategies, they differed in their perception of barriers to WM (Fig. 2) and satisfaction with their current weight. These findings propose a differentiating role of barriers to WM in weight satisfaction between these two clusters. According to the results of cluster analysis, the items of the barrier component “personal issues” (i.e., “not enough self-discipline,” “enjoy eating food and treats,” and “not enough motivation”) obtained high scores among Struggling WMs, of whom 75% were women. This corresponds with the resulting overall higher scores for this barrier component among women (Table 2).

In this present age, wide varieties of foods are easily available, which may result in the making of healthy food choices even more difficult. Interestingly, despite this fact, we did not find any associations between the barrier component “food environment,” which consisted of the items “high food supply,” “large portion sizes,” “food advertisements,” “other people present at meals,” and “special occasions,” and any of the socio-demographic or weight-related characteristics. This suggests a higher importance of the individual aspects than that of the obesogenic environment in weight control, at least as can be determined from the results of self-reported questionnaire administered for this present study. On the other hand, this result could also indicate that people are not aware of the influence of their food environment on their behavior. However, it is well known that in addition to one’s intention for WM, many nondeliberative factors of one’s living environment can contribute to individual determination of behavior (37). It should also be noted that in countries such as Finland, the food environment might not be strongly influenced by the socio-demographic group and other background characteristics.

4.4 Strategies of WM

Consistent with the recommendations for healthy weight loss, participants in this study, especially those with higher levels of education, reported paying attention to their eating habits and meal regularity (Table 2). This was in line with earlier studies that reporting having at least a high school–level education was associated with utilizing recommended weight loss strategies, such as reducing fat or sweet consumption (38). However, since neither of the strategy components “dietary strategies” and “life management strategies” was associated with BMI or the number of weight loss attempts, we cannot draw a conclusion about how successful these strategies have been. On the other hand, this raises the question whether other weight control strategies, such as those related to psychosocial aspects of eating and physical activity, need to be emphasized in WM protocols in order to achieve desirable outcomes.
Although Struggling WMs and Determined WMs used the strategies of WM quite equally (Fig. 2), they differed regarding weight satisfaction. Since these clusters had relatively identical scores for the motivators, it is likely that the barriers of WM had been the main determinant of weight satisfaction between them. Determined WMs were the oldest group among the clusters. Therefore, it is possible that they had less demanding everyday responsibilities and could dedicate more time to regulating their healthy routines. Furthermore, Determined WMs scored higher for all of the WM strategies than the other clusters did. This confirms the results concerning the higher scores of strategy components among older age groups (Table 2).

According to the Health Belief Model (HBM), behavior change is likely to occur if the perceived benefits of that change outweigh the perceived barriers (39). The barrier construct of HBM is suggested to have the greatest influence on health behavior. On this basis, in the present study, Determined WMs were the most likely to change their WM behavior. With respect to this group, this probability of behavior change appeared to be due to the motivators of WM largely outweighing the barriers. However, HBM has faced some criticism in the sense that it does not take some important variables into account, such as impulsivity, self-control, and emotional processing (40). Recently, Michie et al. (2011) have developed a framework for behavior change interventions titled the Behavior Change Wheel (BCW) (41). The BCW consists of three core elements: “sources of behavior,” “interventions” influencing the sources of behavior, and “policies” enabling the interventions. One of the intervention types of BCW is enablement, which aims to reduce barriers in order to increase one’s means of success through influencing an individual’s capability, even beyond education, training, or other opportunities beyond environmental restructuring. According to these models and based on our findings regarding the important role of barriers in WM efforts of Finnish adults, we suggest future research and health programs to consider enablement interventions in order to reach desirable outcomes.

4.5 Strengths and limitations

Compiling a relatively large sample size comprised of individuals with a wide array of personal experiences with WM is the main strength of this study. This wide array of personal experience data were collected from customers of two common supermarkets in free-living conditions and by excluding respondents from the final analysis who did not have any previous experience related to WM (i.e., those who had never tried to lose weight nor those who had tried to keep it stable). Our intent was to present a study that would reflect, as much as possible, the real-life conditions of everyday Finnish adults. On the other hand, this method reduced our ability to generalize the results of the study to the whole population of Finland. Moreover, the overall
response rate was relatively low (38.6%), and only about 33% of the distributed questionnaires were included in this study. Therefore, to improve the generalization of the findings in future studies, larger sample sizes, including other regions of Finland, are needed. All the results of this study were based on self-reported data, including data on weight and height, which is of course always subject to bias even though self-reported data have been shown to be valid for determining weight status at a population level (42). Finally, the cross-sectional nature of the study does not allow for a certain direction of causality. However, despite these limitations, this study provides important understanding about WM and WM-related factors among the adult population of Finland.

5 Conclusions

The present study has shown that there is a lot of effort for WM among Finnish adults. More than half of the respondents were currently aiming to lose weight. “Functional aspects,” “life situations,” and “dietary strategies” explained most of the variance among the motivator, barrier, and strategy components, respectively. Socio-demographic characteristics, especially age, were more often associated with the motivators, barriers, and strategies of WM than those of weight-related characteristics.

Three distinct clusters were found based on the items of motivators, barriers, and strategies of WM: Struggling WMs, Independent WMs, and Determined WMs. The weight-related differences among the clusters suggest that WM-related activities and communication in society should focus more on barriers than merely on strategies or motivating factors. Furthermore, different clusters revealed different needs for WM. Determined WMs, individuals who can be called achievers, do not seem to need much extra help for their WM. Conversely, Struggling WMs may need supportive empowerment that is focused on overcoming barriers in order to advance their WM efforts, whereas Independent WMs would benefit from advice with an emphasis on boosting motivational aspects in order to become more active in their self-care and WM outcomes.

Transparency declaration

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The reporting of this work is compliant with STROBE guideline. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned (and registered with) have been explained.


25. Neumark-Sztainer D, Wall M, Guo J, Story M, Haines J, Eisenberg M. Obesity, disordered eating,


Table 1. Motivator, barrier and strategy components of weight management among study participants (n=667). Values in parentheses indicate the percentage of the variance explained by each component.

<table>
<thead>
<tr>
<th>MOTIVATORS</th>
<th>Factor loading</th>
<th>BARRIERS</th>
<th>Factor loading</th>
<th>STRATEGIES</th>
<th>Factor loading</th>
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</thead>
<tbody>
<tr>
<td>Functional aspects (37.2 %)</td>
<td></td>
<td>Life situations (37.6 %)</td>
<td></td>
<td>Dietary strategies (38.7 %)</td>
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<tr>
<td>Health</td>
<td>0.85</td>
<td>Stress</td>
<td>0.83</td>
<td>Paying attention to amount of eaten food</td>
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<tr>
<td>Wellbeing</td>
<td>0.83</td>
<td>Not enough sleep</td>
<td>0.80</td>
<td>Paying attention to timing of eating</td>
<td>0.80</td>
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<tr>
<td>Maintain mobility</td>
<td>0.80</td>
<td>Time restriction</td>
<td>0.78</td>
<td>Paying attention to type of food</td>
<td>0.79</td>
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<tr>
<td>Working ability</td>
<td>0.78</td>
<td>Situations in life</td>
<td>0.69</td>
<td>Paying attention to type of drinks</td>
<td>0.67</td>
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<td>Sociological aspects (19.5 %)</td>
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<tr>
<td>Ethical reasons</td>
<td>0.87</td>
<td>Emotions and mood</td>
<td>0.56</td>
<td>Regular meals</td>
<td>0.49</td>
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<tr>
<td>Financial matters</td>
<td>0.86</td>
<td>Food environment (11.2 %)</td>
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<td>Social acceptance</td>
<td>0.66</td>
<td>High food supply</td>
<td>0.80</td>
<td>Enough rest</td>
<td>0.83</td>
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<td>Psychosocial aspects (10.2 %)</td>
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<td>Large portion sizes</td>
<td>0.76</td>
<td>Regular life rhythm</td>
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<td>Appearance</td>
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<td>Food advertisement</td>
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<td>Self-respect</td>
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<td>Other people at meals</td>
<td>0.70</td>
<td>Monitoring body weight</td>
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<td>Social relations</td>
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<td>Special occasions, e.g.</td>
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<td>Personal issues (7.9 %)</td>
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<td>Not enough self-discipline</td>
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<td>Enjoy eating food and treat</td>
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<td>Not enough motivation</td>
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<td>Resources (6.5 %)</td>
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<tr>
<td>Poor health condition</td>
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<td>Poor economic status</td>
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<td>Not enough knowledge</td>
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<tr>
<td>Not enough support</td>
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£Components extracted by principal component analysis (PCA), cut off point for factor loading: 0.4.
Table 2. Multivariate analysis of variance for the relationship between motivator, barrier, strategy components and characteristics of the study participants (n=667). The values represent the B coefficient (standard error).

<table>
<thead>
<tr>
<th></th>
<th>Motivators</th>
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<th>Barriers</th>
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<td></td>
<td>Functional</td>
<td>Sociological</td>
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<td>41-59</td>
<td>-0.380 (0.098)***</td>
<td>-0.705 (0.093)***</td>
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<td>-0.372 (0.091)***</td>
<td>-0.553 (0.099)***</td>
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<td>-0.392 (0.085)***</td>
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<td>-0.187 (0.082)</td>
<td>-0.414 (0.089)***</td>
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<td>18-24.9</td>
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<td></td>
<td>-0.653 (0.125)***</td>
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<tr>
<td>25-29.9</td>
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<td>-0.496 (0.106)***</td>
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<td>≥ 30</td>
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<td>0.472 (0.126)***</td>
<td>-0.413 (0.113)***</td>
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<td>Middle</td>
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<td>0.360 (0.088)***</td>
<td>-0.218 (0.081)</td>
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<td>1-4</td>
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<td>-0.227 (0.151)</td>
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<td>-0.968 (0.136)***</td>
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<tr>
<td>5-7</td>
<td>-0.570 (0.079)***</td>
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<td>-0.307 (0.082)***</td>
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<td>-0.483 (0.074)***</td>
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<td>Try to keep weight</td>
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<td>-0.575 (0.114)***</td>
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<td>stable</td>
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<td>-0.353 (0.112)</td>
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<tr>
<td>≥ 3 times</td>
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<td>0.148 (0.113)</td>
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</table>

This analysis was adjusted for multiple comparisons using Bonferroni correction (0.05/81).

***Significant difference (p < 0.0006) with the reference group (0a)

a “Readiness to make weight management efforts” was measured on a scale of 1-10.
Table 3. Socio-demographic and weight-related characteristics of the participants (n=667) and the three clusters formed (n=636)

<table>
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<th>Clusters</th>
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<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Struggling WMs (n=283)</td>
<td>Independent WMs (n=190)</td>
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<td>Gender, n (%)</td>
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<tr>
<td>Female</td>
<td>444 (66.5)</td>
<td>209 (74.1)</td>
<td>116 (61.1)</td>
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<tr>
<td>Male</td>
<td>223 (33.4)</td>
<td>73 (25.9)</td>
<td>74 (38.9)</td>
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<tr>
<td>Age (years), mean (SD)</td>
<td>53.5 (15.2)</td>
<td>53 (14.8)</td>
<td>47.2 (14.1)</td>
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<tr>
<td>Weight satisfaction, n (%)</td>
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<tr>
<td>Yes</td>
<td>218 (32.6)</td>
<td>65 (23.0)</td>
<td>56 (29.6)</td>
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<tr>
<td>No, wish to lose BWb</td>
<td>444 (66.5)</td>
<td>216 (76.6)</td>
<td>131 (69.3)</td>
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<tr>
<td>No, wish to gain BW</td>
<td>4 (0.6)</td>
<td>1 (0.4)</td>
<td>2 (1.1)</td>
</tr>
<tr>
<td>Readiness to make WMc efforts, mean (SD)</td>
<td>7.4 (1.7)</td>
<td>7.5 (1.5)</td>
<td>6.8 (1.7)</td>
</tr>
</tbody>
</table>

- Of the total participants (n=667), 31 (4.6%) had missing data and were not clustered.
- Difference in gender distribution was tested using Chi-square test and follow-up tests; gender distribution was significant between Independent WMs vs. Struggling WMs (p=0.003) and between Determined WMs vs. Struggling WMs (p=0.001).
- Analysis of covariance: For the difference in age, the analysis was adjusted for gender; Determined WMs were the oldest and Independent WMs were the youngest clusters, respectively (p < 0.001). Difference in age was significant between Determined WMs vs. Struggling WMs (p < 0.001) and between Independent WMs vs. Struggling WMs (p < 0.001).
-- Difference in weight satisfaction was adjusted for gender, age, occupation, education, BMI, current aiming to lose weight and readiness to make WM efforts; Weight satisfaction was different between Determined WMs vs. Independent WMs (p < 0.001) and between Determined WMs vs. Struggling WMs (p < 0.001).
-- Difference in readiness to make WM efforts was adjusted for gender, age, occupation, education, BMI, current aiming to lose weight and weight satisfaction; Independent WMs were less ready to make WM efforts compared to Determined WMs (p < 0.001) and Struggling WMs (p < 0.001).
- "WMs: Weight Managers; "BW: Body Weight; "WM: Weight Management
- “Readiness to make WM efforts” was scored on a scale of 1-10.
Figure legends

Figure 1. The mean differences of body mass index (BMI) between categories of weight loss attempt. Respondents were categorized based on the options for the question 'Have you tried to lose weight during your lifetime?'. The mean BMI of categories designated with no common letters were significantly different (p < 0.001).

Figure 2. Average scores of the items of the motivators, barriers and strategies of weight management (WM) in three clusters. Cluster 1: Struggling WMs (n =283); Cluster 2: Independent WMs (n =190); Cluster 3: Determined WMs (n =163). WMs = Weight Managers.
No, but I try to keep my weight stable
Yes, 1-2 times
Yes, ≥ 3 times
Yes, continuously

BMI (kg/m²)

A

B

BC

C

Number of weight loss attempts in lifetime