



The complexity of self-regulating food intake in weight loss maintenance. A qualitative study among short- and long-term weight loss maintainers

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ABSTRACT

Rationale: Whether self-regulation of food intake in weight loss maintenance (WLM) differs between being a short-term maintainer (having maintained without regaining less than 12 months) and a long-term maintainer (having maintained without regaining at least 12 months) is under-researched.

Objective: The aim of this study was to explore the self-regulatory strategies and self-efficacy beliefs applied by short- and long-term maintainers to the complex set of behaviours comprising food intake in WLM, and to obtain a better understanding of their challenges in the various food-intake processes in WLM.

Method: Individual interviews (14 female/4 male) were conducted with nine Danish short- and nine long-term weight loss maintainers. The Health Action Process Approach (HAPA) was applied post-hoc to organise data and support analyses, since the approach focuses on both the cognitions (e.g., self-efficacy, the nature of which differs depending on the phase of behaviour change) and self-regulatory strategies (e.g., action planning and coping planning) involved in behaviour change.

Results: Self-regulatory strategies and self-efficacy beliefs varied between the food-related behaviours and between short- and long-term maintainers. Consistent with the progression suggested by HAPA, with repeated use of action and coping planning, long-term maintainers had formed habitual routines, not only allowing them more flexibility, but also providing them stronger self-control in the behaviours related to WLM such as buying and storing food, and eating at social gatherings. The short-term maintainers often displayed a 'weight loss mindset.' The short-term maintainers focused on the avoidance of certain behaviours, showed less self-regulatory flexibility, and exhibited more detailed action planning, but their interviews also inferred that they had ambitions to build strong WLM-habits, maintenance, and recovery self-efficacy.

Conclusion: The contribution of this study is a more comprehensive view on food intake as an outcome of a set of complex behaviours, revealing insights into the differences in cognitions and strategies applied to the task of WLM, between short- and long-term maintainers.

1. Introduction

The worldwide prevalence of obesity has more than doubled between 1980 and 2014, resulting in approximately 13 percent of the world's adult population being obese, and 39 percent being overweight (WHO, 2016). Being overweight increases the risk of cardiovascular disease (Field et al., 2001), type 2 diabetes (Stein and Colditz, 2004),

and some types of cancer (Calle et al., 2003). Weight loss (WL) resulting in a healthy range body mass index (BMI) (18.5–24.9 for adults) is desirable, as is the long-term maintenance of such weight loss.

Successful long-term weight loss maintenance (WLM) has been defined as losing at least 10 percent of initial body weight and keeping it off for at least six months (Elfhag and Rössner, 2005) or one year (Wing and Hill, 2001). After weight loss, there is a considerable risk of

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regaining weight (e.g., Anastasiou et al., 2015; Elfhag and Rössner, 2005; Jeffery et al., 2000; Reyes et al., 2012). Over-strict dietary regimes during WL (Wing and Hill, 2001) and difficulties breaking unhealthy habits (Cleo et al., 2017) have been associated with unsuccessful WLM. In addition, a recent review of qualitative studies on WLM explains that the behavioural changes needed to maintain weight loss creates a psychological ‘tension’ due to the need to override existing habits (Greaves et al., 2017). This study's investigation of various food-related behaviours in WLM is a way of exploring this tension and trying to understand whether this tension gets somewhat resolved as the duration of WLM increases.

The focus of this study was on the self-regulatory behavioural strategies related to food intake in WLM, since food intake is one of the two main factors (together with physical activity) having an impact on WL and WLM (e.g., Franz et al., 2007; Teixeira et al., 2015). In this study, food intake was considered as a personal food system (Sobal and Bisogni, 2009), where food intake is an outcome of a complex set of food-related behaviours, such as planning, shopping, storing and cooking food, and dealing with impulses, cues, and social norms in different situations.

To understand long-term WLM, it is relevant to explore self-regulatory strategies used in food intake. By contrasting self-regulatory strategies and self-efficacy beliefs between long-term weight loss maintainers (maintained a weight loss for at least 12 months) and short-term maintainers (maintained a weight loss less than 12, but more than two, months), the aim of this study was to obtain a better understanding of short- and long-term maintainers' challenges in the various food-intake processes in WLM.

1.1. Previous studies on food intake self-regulation in WLM

Self-regulation has been defined as an individual's ability to exercise self-control and purposively override a short-term goal (e.g., pleasure) to act consistently with a long-term one (e.g., weight control), and furthermore, the ability to employ effective self-regulatory strategies (e.g., self-monitoring) to evaluate the success in attaining the goal (Carver and Scheier, 1998). Previous studies on self-regulation of food intake have positively associated WLM with frequent self-monitoring of body weight and food intake, regular physical activity, eating a low-fat diet, and in general, being able to self-regulate behaviour (Burke et al., 2009; Chambers and Swanson, 2012; Elfhag and Rössner, 2005; Hindle and Carpenter, 2011; Karfopoulou et al., 2013; Wing and Hill, 2001). Yet, these studies seem to merely define food intake as lower energy intake, rather than the outcome of a set of complex, interactive behaviours related to food intake that are embedded in people's daily routines and social activities.

In addition, previous qualitative studies among weight loss maintainers have focused on comparing successful maintainers to those who relapse in the behaviours needed for successful WLM (Byrne et al., 2003) or to those who regain (Chambers and Swanson, 2012; Christensen et al., 2017; Reyes et al., 2012). Hence, this study contributes with insights into WLM. Focusing on differences between short- and long-term maintainers has the potential to further existing understanding.

1.2. Conceptual framework for analysis

With the aim of this study in mind, The Health Action Process Approach (HAPA) was found most useful for post-hoc organisation of the collected data and supporting the analysis. Other models, such as The General Model of Preventive and Interventive Self-Control (Hofmann and Kotabe, 2012), Integrating Components of Self-Control (Kotabe and Hofmann, 2015) and The Situational Strategies for Self-Control (Duckworth et al., 2016), were also considered, but rejected due to the narrower focus on self-control. HAPA distinguishes between a pre-intentional motivation phase, where pre-action self-efficacy, risk

perception, and outcome expectancies influence behavioural intentions, and a post-intentional volitional phase, where actions are planned, controlled, and maintained, considering the individual's perceived barriers and resources (Schwarzer, 2008). *Planning* is a prospective self-regulatory strategy where mental simulations link concrete responses to future situations. Planning can be further categorised as action planning and coping planning, where *action planning* refers to the process whereby goal-directed behaviours are linked to certain environmental cues (e.g., Gollwitzer, 1993) specifying when, where, and how to act. In turn, *coping planning* refers to the mental simulation of overcoming anticipated barriers (Snihotta et al., 2005).

Different self-efficacy beliefs are required to master the various tasks in the different phases successfully (Schwarzer, 2008). *Maintenance self-efficacy* refers to the perceived capability to maintain a newly adopted behaviour, develop routines, and cope with unexpected barriers in the maintenance phase (Luszczynska and Schwarzer, 2003), while *recovery self-efficacy* is the perceived capability to deal with lapses. Individuals high in maintenance self-efficacy respond to difficulties with more effort, persistence, and confidence to overcome hurdles (Snihotta et al., 2005), and if experiencing setbacks, individuals high in recovery self-efficacy manage to control the damage and get back on track relatively quickly (Schwarzer, 2008). Although not a self-regulatory theory per se, HAPA provides a framework for understanding both the motivation processes that lead to a behavioural intention (about WLM) and the post-intentional volition processes that lead to the actual health behaviour (the self-regulatory strategies).

2. Method

2.1. Sampling and participants

Individual semi-structured interviews were carried out with 18 adults (14 females, four males) in Denmark between August and December 2015. Since both short- and long-term maintainers should take part in the study, several purposeful sampling strategies were used to recruit participants: *Physical advertisements* were put up in supermarkets, libraries, and other public places allowing this sort of advertisement (five were recruited). *Online adverts* were posted in closed Facebook groups on weight loss and weight loss maintenance (three were recruited). The first author also contacted three *general practitioners* across Denmark, who pointed eligible patients' attention to the study (three participants). *Snowball sampling* was also applied by asking participants whether they knew of others fulfilling the criteria who would be interested in participating (seven were recruited).

Eligibility criteria included being 18 years or more, a BMI before weight loss above 25 kg/m², a clinically significant weight loss (> 10%) with no more than two kg regain (taking into account normal weight fluctuations) and a stable weight for at least two months. Potential participants were asked to fill in a short pre-interview screening questionnaire at home covering age, height, current weight (in order to compute BMI), lowest and highest adult weight, duration of last WL attempt and amount lost and length of maintenance period. Eight out of 26 potential participants did not meet the eligibility criteria (five had not lost 10%, one had an initial BMI lower than 25 kg/m² and two had regained more than 2 kg (5 and 7 kg, respectively) during the WLM period), which resulted in 18 participants taking part in the study. Table 1 describes background characteristics of the participants.

Nine short-term maintainers (mean age = 39.8 years, SD = 19.9) and nine long-term maintainers (mean age = 43.2 years, SD = 12.7) participated in the study. Their self-reported pre-weight loss BMIs were between 26.6 and 66.8 kg/m² (mean = 38.7 kg/m², SD = 11.7 kg/m² for short-term maintainers and mean = 31.9 kg/m², SD = 3.2 kg/m² for long-term maintainers). They reported to have lost between 10 and 41.7% of their bodyweight (with means of 21.3% for short-term maintainers and 25.8% for long-term maintainers). In addition, they reported to have maintained their weight for periods ranging from 2 to

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