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# Self-regulation of weight: Basic processes and treatment implications

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## Abstract

The regulation of bodyweight is a complex process, with multiple biological, environmental and psychological factors playing a role. The primary treatment for obesity is modification of eating and exercise behavior, the success of which depends on the patient's adherence to the behavior change plan, and therefore represents a problem of self-regulation. The failure of a large percentage of individuals to achieve their weight loss goals has led a number of authors to question whether or not bodyweight is amenable to effective self-regulation. However, psychological approaches to obesity have not integrated recent theoretical developments concerning self-regulation. The present paper will present a new model of weight control, which considers weight regulation as a broadly applicable, carefully sequenced, self-regulatory process occurring in the context of other goals and challenges, in particular the management of mood states and interpersonal relations. Data relevant to our model is presented, derived from a large sample of individuals in treatment for obesity.

# Introduction

Obesity has received a great deal of scientific and popular attention in recent years. The detrimental physical and emotional effects of obesity have been well documented (Fontaine, Redden, Wang, Westfall, & Allison, 2003; World Health Organization, 1998). However, while weight loss efforts are very common among overweight individuals (Meltzer & Everhart, 1996; Serdula, Mokhad, Williamson, Galuska, Mendlein, & Heath, 1999), only a small percentage reach or maintain a healthy weight (Jeffery, Drewnowski, Epstein, Stunkard, Wilson, Wing, & Hill, 2000; Wadden, Foster, & Brownell, 2002). Nevertheless, where successful, intentional weight loss appears to have positive effects in reducing disease and mortality (Gregg & Williamson, 2002). In view of the urgent need to develop more effective treatment methods, research designed to elucidate factors responsible for successful or unsuccessful weight loss outcomes is extremely important. The present chapter addresses this issue from a "self-regulation" perspective.

## Weight Regulation

When we talk about the self-regulation of weight, how difficult is the task one is up against? How controllable is weight? As evidenced by the multitudes of perspectives and the huge amount of current research, it is clear that weight regulation is an extremely complex bio-psycho-social process. Genetic factors appear to exert a large effect, estimated to predict anywhere between 25% and 40% of actual weight (Bouchard, 1994; Price, 2002). Physiological processes influence eating by altering hunger and satiety mechanisms (Badman & Flier, 2005; Hellstrom, Geliebter, Näslund, Schmidt, Yahav, Hashim, & Yeomans, 2004). Environmental factors, including the available food and

features of the social situation, are also powerful influences on eating (de Castro, 2004; Wansink, 2004). It is apparent that genetic and environmental variables interact, such that genetic predisposition combines with an "obesogenic" environment to determine obesity prevalence (Tremblay, Perusse, & Bouchard, 2004). However, such views appear overly "deterministic" when the role of self-regulation is ignored.

An understanding of weight self-regulation requires an analysis of eating and exercise self-regulation. This is so because weight can only be controlled, or "self-regulated," by controlling eating and exercise. Of course, one could theoretically take a medication that would result in a lower weight without a change in eating and exercise, but that would not be illustrative of "self" regulation, but a direct biological manipulation. Other drugs might cause weight reduction by altering eating or exercise, but this too would not be evidence of self-regulation, but a biological change. Certainly, such a change could have an effect on self-regulation, by making the task easier (i.e. by reducing hunger, increasing satiety, or increasing the drive and ability to move and engage in activity).

As physiological and social-psychological research demonstrates, not all self-regulation is created equal – it may be more or less difficult, depending on biology and circumstances. In any case, self-regulation appears to require a certain amount of energy, or psychological resources, that may be "used up," which can lead to self-regulatory failure (Baumeister, Bratslavsky, Muraven, & Tice, 1998). In fact, several authors have declared the task of weight self-regulation so difficult that it should be abandoned as a target of obesity treatment; it has been suggested that efforts to reduce the prevalence of obesity should focus exclusively on environmental and pharmacological intervention

(Herman & Polivy, 2004; Jeffery, 2004; Lowe, 2003; Swinburn, Egger, & Raza, 1999; Wansink, 2004). In rejecting the feasibility of individual-focused intervention, these authors appear to reject the importance of self-regulation of eating, exercise and weight.

Lowe (2003) concludes that self-regulation is not up to the task of effective weight control, but rather that some of the answer to the obesity problem lies in helping people make changes in what he calls the "personal food environment." Such changes might include reducing the "energy density" of the diet (increasing fiber and water content) and reducing the amount of contact with food and the number of eating choices one has to make by relying on prepackaged meals (meal replacements and prepared meals). However, although making changes in the food that one encounters and interacts with seems like an important strategy for weight control, it should be recognized that the implementation of the strategy is dependent on self-regulation. One of the ways that effective weight controllers accomplish weight self-regulation is by making changes in their environments to facilitate self-regulation. This is good problem solving, which is of course an important part of self-regulation as well.

The pessimistic tone of recent papers about individual change efforts is not characteristic of the attitudes of clinicians more generally, however, and treatment of the obese individual is still a very important target of medical and psychological intervention. Furthermore, overweight individuals continue to purchase and utilize a huge amount of commercial weight loss products, plans and programs – people evidently *believe* that weight can be self-regulated (i.e. they display an "internal" weight locus of control – Stotland & Zuroff, 1990). In fact, people generally possess a mixture of internal and external weight locus of control beliefs (Stotland & Zuroff, 1990). Thus, people tend to

think that they have some degree of control over their weight, but that uncontrollable factors like genetics and luck also play a role. This kind of attitude means that the individual is very open to "treatments" that promise to increase self-control, or to make self-control less necessary. The paradox is that one looks to an external agent to supply internal control (see also, Polivy & Herman, 2002).

The popularity of weight control treatments indicates that individuals often do not feel they understand the problem or know how to solve it. They are reaching out for commercial or professional help to supply the answer, as well as needed support. However, recent analyses indicate that results for commercial (Tsai & Wadden, 2005) and professional (Wadden et al., 2002) treatment have been disappointing. The average weight loss over a number of years in studies that include long-term follow-up approaches zero (Wadden et al., 2002). The implications of such failures for psychological theories of obesity treatment have not been fully or adequately examined.

Early behavior therapy approaches towards obesity treatment (Stuart, 1967) were based on classical and operant conditioning principles and they attempted to modify behaviour by changing the environmental stimuli associated with maladaptive behaviour. Current behavioural programs utilize a variety of techniques derived from conditioning as well as cognitive theories (Foster, Makris, & Bailer, 2005). There is a growing consensus (Byrne, Cooper, & Fairburn, 2004; Jeffery et al., 2000) that psychological research has so far failed to provide an adequate explanation for why most people fail to maintain weight loss – this being the crucial problem in obesity treatment. The present chapter offers a self-regulation model of weight control as a framework for research and as a guide for the treatment of obesity.

Self-Regulation

Self-regulation theories have become increasingly popular in health psychology research (Maes & Karoly, 2005), but have not been well developed in relation to weight and eating. Self-regulation theories vary in emphasis, but generally include: *goal-setting, planning, self-monitoring of outcomes, self-evaluation of progress relative to expectations, emotional response to outcomes, problem-solving when progress does not meet expectations, and emotion-control strategies* (see Figure 1).

Self-regulation theories begin with the concept of "goal". The goal is the reference point from which efforts and outcomes can be judged. Of course, there are a great variety of types of goals – goals may be easy or challenging, short-term or long-term, self-chosen or given to one, important or trivial, realistic or unlikely, stressful or relaxing, supported or alone, and perhaps even conscious or unconscious (Little, 1999).

Weight self-regulation occurs in the context of other goals that the individual is pursuing simultaneously. Consequently, the goals of maintaining emotional well-being or managing interpersonal relationships may at times conflict with weight goals. This may be for two reasons, (1) focusing on other goals may interfere with weight self-regulation, and (2) eating may serve emotional or interpersonal self-regulation functions that may conflict with weight self-regulation. Thus, when an individual is depressed, eating self-regulation may be altered, as the individual is engaged in the *high priority* project of trying to feel better, and may choose to eat (or even overeat) as a means of doing so. To adequately understand eating and weight self-regulation, we need to identify how they fit into the bigger picture of self-regulation. This requires a "molar" level analysis of goals, such as the analysis of "personal action constructs" like personal projects (Little, 1999)

and current concerns (Klinger, 1975). There has not yet been a comprehensive analysis of goal constructs in relation to eating and weight self-regulation.

The weight self-regulation sequence

Weight goals may include weight maintenance, weight loss or weight gain. Research indicates that participants in weight loss programs typically have unrealistic goals – while weight loss in such programs rarely exceeds 10% (considered a good outcome from the point of view of improving health), the average weight loss goal tends to be in the range of 20 – 35 % of starting weight (Foster, Wadden, Vogt, & Brewer, 1997). Several authors have suggested that helping patients adopt more realistic weight loss goals may improve maintenance (Byrne et al., 2004), although a recent test of this hypothesis produced equivocal results (Foster, Phelan, Wadden, Gill, Ermold, & Didie, 2004).

The process of goal-setting is addressed by a number of cognitive-behaviour theories. The motivation to pursue a goal is considered to be a function of its "value" (compared to alternatives), and the "expectancy" of being able to reach it (Feather, 1982). A variety of motivational variables relevant to goal-setting have been assessed in relation to weight control, including locus of control, outcome expectancy, self-efficacy and self-determination (for a review, see Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003).

Once a goal is established, self-regulation proceeds to a *planning* phase. The act of planning in weight self-regulation consists of deciding when and what to eat and where and when to exercise. Without plans, one is more likely to be influenced by situational factors, such as the kind of food that is available. For example, if one does not bring

lunch to work and suddenly, at noon, is offered a share in the all-dressed pizza that work colleagues have ordered and that will arrive in moments, the probability of eating pizza is increased. One can learn to respond to such temptations with effective planned strategies. For instance, one could determine never to partake in fast food lunches at work, and when offered to do so, to politely decline, and to go take a walk in search of some more balanced meal. Having a specific plan, or "implementation intention" (Gollwitzer, 1993), appears to increase the probability of healthy eating behaviour (Verplanken & Faes, 1999).

The most common weight loss plan is some form of structured diet. An obvious difference between various diet plans is in the rate of weight loss. For example, we found that "very low" calorie (e.g. 600 – 800 calories per day) diets resulted in greater short-term (up to 9 months) weight loss compared to "low" calorie (e.g. 1000 – 1200) diets (Stotland & Larocque, 2005). Therefore, we were not surprised to find that when given a free choice of diets, a majority of participants chose very low calorie (60%) rather than low calorie diets (40%) (Stotland & Larocque, 2002), reflecting dieters' desire for rapid weight loss.

Goal attainment may be monitored with various methods of *self-monitoring*, such as calorie counting, following a menu plan, or more subjective judgments ("I feel like I'm following the plan"), as well as weight change. Most weight loss programs teach participants some method of monitoring eating and exercise. A number of studies have shown that better adherence to behavioural self-monitoring predicts better weight loss outcomes (Boutelle & Kirschenbaum, 1998). However, although it is a helpful strategy, most people are not very diligent in monitoring eating (Womble, Wadden, McGuckin,

Sargent, Rothman, & Krauthamer-Ewing, 2004), and quite inaccurate in reporting what they have eaten (Lichtman, Pisarska, Berman, Pestone, Dowling, Offenbacher, et al., 1992; Weber, Reid, Greaves, De Lany, Stanford, Going, Howell, & Houtkooper, 2001).

So how do people self-monitor their eating and exercise behaviour? How do we self-monitor states of hunger and fullness? How much awareness is there of "daily" consumption (i.e. not only what I've just eaten and how full I feel right now, but how much I've eaten for the day, how balanced my eating has been). Little information is currently available about how much attention people typically give to their eating, or about how such attention influences actual food intake.

The *self-evaluation* of dieting outcomes influences the motivation to continue. Weight change is the most important feedback for a dieter. Weight loss is highly rewarding and therefore rapid weight loss is a strong motivator to adhere to a diet. However, people on diets generally stop losing weight between 3 and 6 months from starting (Jeffery et al., 2000), and consequently very few reach their original weight loss goal (Foster et al., 1997). Given the undeniable logic of the energy-balance equation (Bray, 2002), it would appear that the primary reason that people stop losing weight is that they stop adhering to the diet plan, otherwise they would eventually reach (or come much closer to) their desired weight.

If one is still dissatisfied with one's weight, why do continued weight loss efforts seem to have a diminishing reward value? Why do people slip back to old habits? The more dissatisfied one is with the weight loss result the more one should be motivated to achieve the lower weight goal, yet dissatisfaction with weight loss is associated with poorer weight loss maintenance (Foster et al., 2004). Perhaps it is because, as Bandura

and Cervone (1982) showed quite some time ago, dissatisfaction is only motivating in combination with high self-efficacy. Only when one believes the goal can be achieved will one be motivated by feedback that the goal has not yet been reached. The tendency appears to be for dieters to blame themselves, attributing the poor result to a lack of effort and willpower (Polivy & Herman, 2002), which contributes to guilt feelings and a loss of self-efficacy.

Depending on the results of the earlier steps of the weight self-regulation sequence, the individual then engages in *problem solving.* Behaviour therapy programs typically include strategies for more adaptive problem solving (Foster et al., 2005). Here, one tries to figure out how to increase the probability of attaining the weight goal, and then whether the required effort is worth it. Little information is available concerning dieters' problem solving. Anecdotally, the problem solving appears to consist of a vow to "be better tomorrow," or worse, "start again on Monday." Thus, there does not seem to be an adequate analysis of the cause of dietary failure. The simple admonition to "try harder," is unlikely to produce better results.

If one feels that progress towards an important goal is too slow but success is judged to be still possible, one may feel frustrated but still motivated. On the other hand, if progress is slow and prospects are doubtful, then frustration will be mixed with anxiety, and if the poor results persist will lead to feelings of disappointment, sadness and eventually hopelessness (Carver, 2004; Vieth, Strauman, Kolden, Woods, Michels, & Klein, 2003). Dieting can have quite dramatic positive or negative effects on emotional state, depending on the weight loss outcome. Generally, problem-solving is enhanced by positive affect and disrupted by negative affect (Frederickson, 2001). Furthermore,

numerous studies have demonstrated a link between negative affect and overeating tendencies (Canetti, Bachar, & Berry, 2002; Stotland & Larocque, 2004). Thus, the need for dieters to manage emotional states is evident.

Dieting vs. lifestyle modification

The expected long-term outcome of dieting (although the dieter may not acknowledge it consciously) is "stopping the diet" – no one plans to stay on a diet forever. There is an assumption that after the diet a change will have taken place in eating and exercise habits, so that maintenance of weight loss will be assured. Yet most dieters have less confidence in maintenance than they do in the achievement of the initial weight loss (Stotland & Larocque, 2005). Weak confidence in maintenance unfortunately is an accurate reflection of the typical outcome. Problems in maintaining weight lost may be due to the lack of effort put into meaningful behaviour change during a strict diet program.

At a minimum, dieters need to understand that *maintenance is a separate goal from weight loss*. Weight maintenance requires that one learn how to balance energy intake and output, which requires a modification of one's former eating and activity patterns – this kind of behaviour change is often referred to as "lifestyle modification." Diets represent a very different type of self-regulation than lifestyle modification – in lifestyle modification the goal is "healthy eating and exercise behaviour" which is expected to result in the eventual attainment and maintenance of a "healthy weight."

An example of a specific behavioural goal in a lifestyle modification approach is learning to stop eating at a lower threshold of fullness, a goal that requires self-monitoring and learning a new standard of fullness. If we look closely at the experience

of eating less we see that the immediate result is simply *feeling less full* – the link with weight loss is delayed and must be taken on faith. Yet one can learn to *appreciate* feeling less full as a goal in of itself – this is a glass half full or half empty scenario; one may see eating less as a loss of pleasure, or feel good about eating "just the right amount."

A study of weight control motivation

We measured weight loss goals and related motivational variables in 450 women and 60 men who were participating in a medically-supervised diet program (Stotland & Larocque, 2005). A subset of these subjects (N=276) were assessed again after one month of treatment. We determined the weight loss goal by calculating the difference between current weight and desired weight, as a percentage of current weight. We then asked a series of 22 questions assessing weight control motivation (Table 1).

We defined weight control motivation as the sum of attitudes about current weight, desired weight and weight control. These attitudes reflect positive and negative outcome expectancies, self-efficacy, and response expectancy, which are central concepts in cognitive social learning theories of weight control motivation (Baranowski et al., 2003). Our objective was to create a brief scale that would be appropriate for clinical settings and research requiring repeated measures analysis, where the issue of "user friendliness" is paramount, and the length of the scale is a primary consideration.

We considered various factor analytic solutions and concluded that a 3-factor model was the most meaningful, accounting for 40.3% of the variance in the items. Factor 1 items appeared to measure self-efficacy and response expectancy, and was labeled *confidence & acceptability*. Factor 2 included items related to attitudes about current weight and expected benefits of weight loss, and was labeled *importance*. Factor

3 included items reflecting the frequency of thoughts about the goal, and was labeled *positive goal activation*.

Examination of Table 2 indicates that several motivation items showed somewhat limited variance. In particular, items related to the value of weight loss had means close to the maximum possible score. This is not surprising considering that the sample included only patients in weight loss treatment. As a consequence of the restricted range, the *importance* subscale had a somewhat low internal consistency. We would expect that evaluation of this scale in the general population, or in a non-treatment seeking obese sample would reveal more variability and higher reliability.

The three motivation scales showed an interesting pattern of correlations with other variables (Table 3). Our current research is exploring a number of unanswered questions, including changes in motivation over longer periods of time during treatment and outside of a treatment context, influences of treatment variables (e.g. therapeutic alliance measures) on motivation, and the causal relationship between motivation, other psychological variables (e.g. depression, stress) and weight changes.

Do only dieters engage in eating self-regulation?

In research on dietary restraint (Herman & Polivy, 1984; 2004; Ruderman, 1986), people are often grouped into "restrained" and "unrestrained" eaters, a categorization which is sometimes used interchangeably with "dieters" and "non-dieters." Studies have tended to focus on mapping the cognitive structure of the high restraint group (the "dieters") while ignoring those who are low on restraint (the "nondieters"). The assumption has been that unrestrained eaters regulate their eating in a much less cognitive

manner, eating in accord with hunger and taste considerations and are therefore not thought to engage in eating self-regulation.

We investigated the cognitive processes underlying the decision to eat or not eat (Stotland & Kronick, 2005) in restrained and unrestrained college females. We used a trait measure of eating restraint, the *Restraint Scale* (Polivy, Herman, & Warsh, 1978) to measure general attitudes towards dieting, and we developed the *Eating Thoughts Inventory* to measure thoughts that one might have while deciding whether or not to eat some available food. The scale includes items measuring "restraint" thoughts ("No, I don't want the cookies; I shouldn't), "disinhibition" thoughts ("Yes, I want the cookies, what the hell"), and "appetitive" thoughts ("No, I don't want the cookies, they don't appeal to me").

We found that eating thoughts were a better predictor than Restraint Scale scores of the decision whether or not to eat. Regardless of level of trait restraint, it was the combination of appetitive thoughts and restraint thoughts that predicted eating/not eating behavior. Even the unrestrained eaters reported a significant number of restraint thoughts and an even greater number of *dis*inhibitive thoughts (which, by definition must firstly involve some level of dietary inhibition). From these results, it may be concluded that what determines whether or not individuals eat is not ultimately their everyday (trait) level of restraint, but rather the actual restrained and appetitive (and disinhibitive) thoughts they are having with regards to the food placed in front of them.

We believe that such eating thoughts constitute a form of active self-regulation – one that seems to be taking place in both restrained and unrestrained eaters alike. Indeed, a robust decision making process involving caloric, diet-abiding and taste-related factors

seems to be at play, mediating food intake in all eaters. Our study thus shows that unrestrained eaters do self-regulate their eating, and are not purely driven by physical needs and desires.

Obesity treatment based on self-regulation theory

In our view, many obese patients would benefit from a better understanding of self-regulation in weight control. Individuals may need help at various stages of goal pursuit, from the *decision making* stage in which the pros and cons of beginning a weight loss attempt are evaluated and a specific weight loss goal is determined, the *planning* stage in which diet and exercise strategies are chosen, the *action* stage in which the plan is enacted, evaluated and modified, and during which one must persist despite stress and frustration, and the *maintenance* stage, with the ultimate goal of fully integrating the eating and exercise changes.

The self-regulation model describes the processes that guide the weight control process. Failure to achieve the goal may reflect problems in self-regulatory processes, or may be due to other factors interfering with self-regulation (see Figure 1). For example, metabolic adaptations to weight loss may make further weight loss more difficult (Weyer, Proatley, Salbe, Bogardus, Ravussin, & Tataranni, 2000). Negative affective states may reduce weight control self-efficacy and increase emotional eating tendencies (Stotland & Larocque, 2005). Social influences may make self-control more or less likely (Wansink, 2004). Clinicians should appreciate both the complexities of weight self-regulation and the larger context of the individual's life.

The therapeutic attitude described as "autonomy supportive" (Williams, Deci, & Ryan, 1998) encourages the patient to make her own decisions about goals and strategies.

Motivation is enhanced by emphasizing patients' awareness of their goals and encouraging discussion of the consequences of their current behavioral choices, along with optimistic collaboration in the development of plans (Rollnick & Miller, 1995). As treatment progresses, self-efficacy is strengthened by helping the patient recognize incremental progress towards the goal or the success of a plan (Bandura, 2004). This is crucial, given the tendencies for dieters to feel dissatisfied and frustrated with their rate of weight loss and to focus on weight rather than behaviour change goals. All of these strategies are important in obesity treatment, because patients often have a significant amount of negative emotional expectancies about the process (Stotland & Larocque, 2005) and treatment drop-out rates are notoriously high (Davis & Addis, 1999).

In addition to therapeutic support, there is growing interest in the use of interactive technology as self-regulation tools (Bandura, 2004), which are seen as methods to make treatment available to a much larger number of people, and add a new dimension to treatment in settings where patient-clinician contact is at a premium (e.g. primary care). In our own research we have been evaluating the usefulness of Internet-based psychological assessment in the treatment of obesity (Stotland & Larocque, 2003). The Larocque Obesity Questionnaire (LOQ; Stotland & Larocque, 2004) is an on-line questionnaire which includes subscales measuring Uncontrolled Eating, Stress Responses, Depression, Perfectionism, and the recently added motivation scales. The questionnaire is brief (requiring 10 – 15 minutes) and is immediately scored, with visual, quantitative and text-based feedback provided. Patients are strongly urged to complete the test on a monthly basis, to evaluate changes and areas of difficulty.

We believe that an on-line assessment and feedback system such as the LOQ should enhance effective self-regulation, and may therefore have value in improving treatment outcome. We liken this tool to the blood sugar measurements required for effective diabetes self-management – without some sort of objective feedback it is extremely difficult for patient and clinician to guide long-term weight control efforts. Although we have not yet tested it in a controlled experiment we have found that more frequent use of the system was associated with a lower treatment dropout rate during the first 4 ½ months of treatment (Stotland & Larocque, 2003). The potential for on-line assessment and treatment in obesity is still largely untapped (see Womble et al., 2004).

## Conclusion

According to a self-regulation model, individuals who try to reduce their weight require effective goal setting, planning, self-monitoring, self-evaluation, emotional coping and problem-solving. In previous accounts of the behavioural treatment of obesity, many of these elements have been included in treatment plans (Foster et al., 2005), but there has been a lack of theoretical integration or a model that can be used to guide efforts to improve treatment outcome.

Our model places the self-regulation of weight, eating and exercise within a broader self-regulatory perspective, considering other goals that the individual is pursuing, and also recognizing the influence that physiological and environmental variables can have on self-regulation.

A number of theories have stressed the importance of stages, or phases, or periods, in self-regulation (e.g. Schwarzer, 1999). This is nowhere more necessary than in weight control. The management of obesity is a lifelong concern, and long-term studies are

required to even begin to appreciate the changes that occur over time in behaviour, motivation and weight.

The study of obesity and its treatment require a means of measuring and tracking self-regulation processes. This is an interesting situation in which the means for one group (the patients) to improve self-regulation of weight, by providing them with information relevant to their goals, is the same means for another group (the researchers) to evaluate the causes and effects of weight self-regulation processes. Interactive technology is a means of expanding the scope and access of research and clinical intervention.

Yet again, weight self-regulation can never be totally predictable, because it is influenced by other ongoing self-regulation projects. However, as we map out the self-regulatory strategies of people showing different courses of weight change, response to diets, and adherence to treatment, we may be able to design a blueprint for more successful outcomes. A treatment model based on self-regulation maximizes patient responsibility and facilitates the doctor-patient relationship. By starting with an appreciation of self-regulatory processes, we may gain a better understanding of the difficulties that many people have with weight control, and a framework for developing a more effective treatment of obesity.

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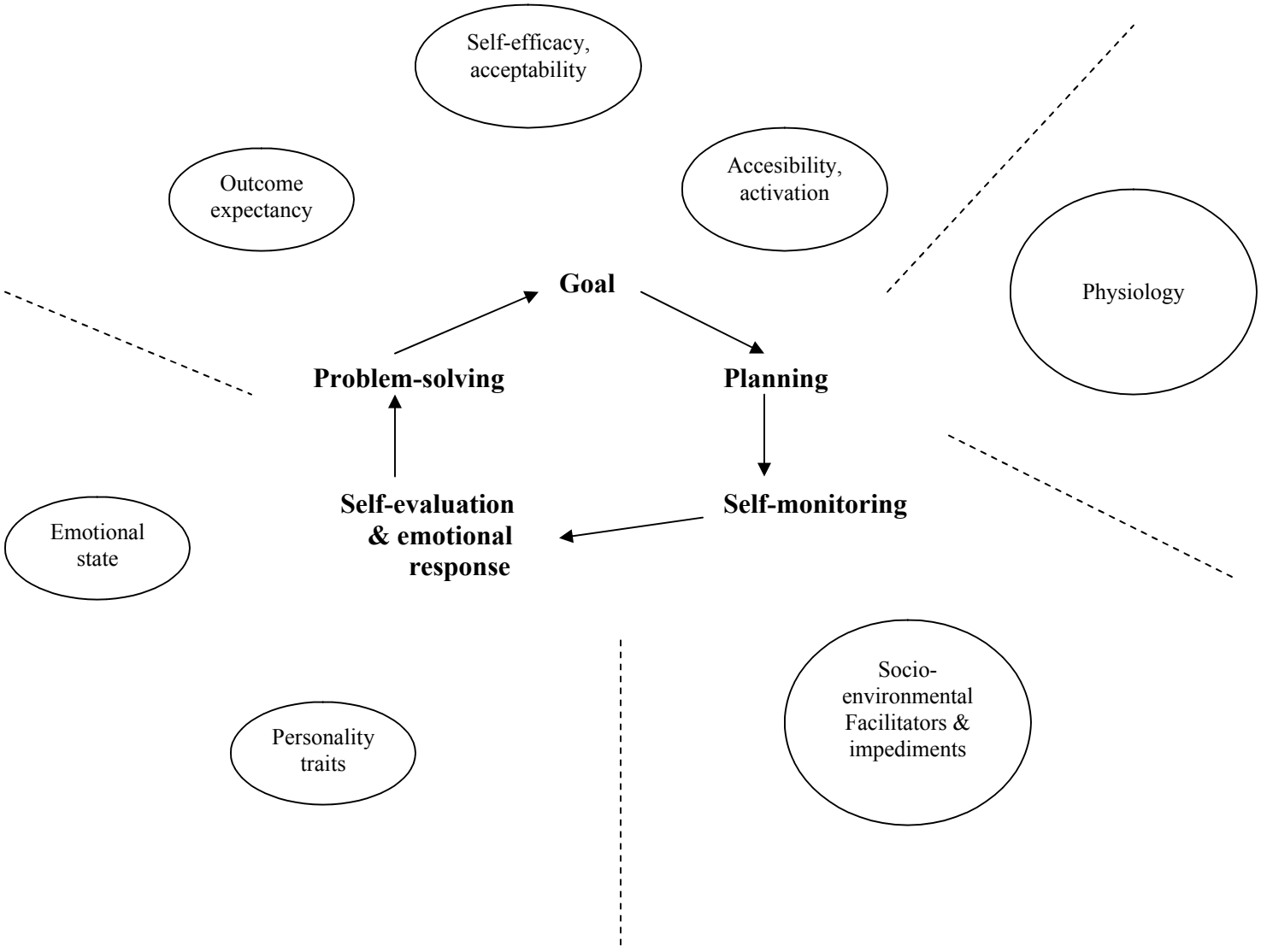


Figure 1 – The self-regulation sequence and influences

Table 1 – Weight Control Motivation Questionnaire

1. RIGHT NOW, how important is it for you to succeed in weight control?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **It's not that Important compared To other goals in my Life** | | | | | | **It's the most Important. Goal in my Life** |

2. RIGHT NOW, how much physical pain is caused by your weight?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **None** | | | | | | **A great deal** |

3. RIGHT NOW, how much emotional pain is caused by your weight?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **None** | | | | | | **A great deal** |

4. RIGHT NOW, do you believe you will be healthier if you lose weight?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **I do not Believe I Will be any healthier** | | | | | | **I believe I Will be much Healthier** |

5. RIGHT NOW, do you believe you will be happier if you lose weight?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **I do not Believe I Will be any happier** | | | | | | **I believe I Will be much Happier** |

6. RIGHT NOW, how do you feel about having to deal with weight control and trying to maintain healthy (eating and exercise) habits?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **I don't mind It at all** | | | | | | **I totally Resent it** |

7. RIGHT NOW, how much effort do you feel it will take to succeed in weight control?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **A little effort** | | | | | | **A huge effort** |

8. RIGHT NOW, how much effort are you willing to make in order to reach your desired weight?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **Hardly any** | | | | | | **Whatever it takes** |

9. RIGHT NOW, how confident are you that you will reach your desired weight?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **I'm afraid I Will fail** | | | | | | **I'm sure I Will succeed** |

10. RIGHT NOW, how confident are you that you will maintain the weight you lose?

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| **I'm afraid I Will regain All of it** | | | | | | **I'm sure I Will maintain All of it** |

**DURING THE PAST WEEK**, how often did you do each of the following:

11. Imagined myself at my desired weight.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

12. Told myself that life is short and I deserve to please myself by eating whatever I want.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

13. Felt doubtful about succeeding in weight control.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

14. Talked to someone who made me feel discouraged about losing weight.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

15. Thought about the benefits of losing weight.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

16. Felt regretful about all the things I must give up in order to lose weight (e.g., foods I like, old and comfortable habits, favorite restaurants, parties, etc.).

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

17. Read or listened (TV, radio, tapes, books and Internet) to inspiring material about weight loss.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

18. Reminded myself that I will reach my weight loss goals if I am persistent.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

19. Felt guilty about my weight (or my overeating).

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

20. Read or listened to something that made me feel discouraged about losing weight.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

21. Talked about weight loss strategies with a supportive person (friend, advisor, doctor).

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

22. Thought that trying to lose weight was too big of an effort.

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| **never** | **once or twice** | **a few times per day** | **every day** | **a few times per day** | **many times per day** |

Table 2 – Weight Control Motivation Questionnaire means, standard deviations and reliabilities at time 1 (pretreatment) and time 2 (1 month after start of treatment)

| | Time 1 | | | Time 2 | | | |
|---|---|---|---|---|---|---|---|
| Scale & Items | Mean | SD | α | Mean | SD | α | $t_{275}$ |
| Confidence & Acceptability | 56.5 | 8.8 | .79 | 64.2 | 7.8 | .82 | -15.3*** |
| 6[1] | 5.0 | 1.7 | | 5.6 | 1.4 | | -6.3*** |
| 9 | 5.2 | 1.8 | | 6.0 | 1.4 | | -7.8*** |
| 10 | 4.2 | 1.9 | | 5.3 | 1.5 | | -10.3*** |
| 12[1] | 5.0 | 1.1 | | 5.6 | 0.7 | | -7.9*** |
| 13[1] | 4.3 | 1.2 | | 5.0 | 0.9 | | -9.9*** |
| 14[1] | 5.6 | 0.8 | | 5.8 | 0.5 | | -4.9*** |
| 16[1] | 4.3 | 1.2 | | 5.0 | 0.9 | | -11.7*** |
| 19[1] | 3.5 | 1.6 | | 4.7 | 1.4 | | -11.0*** |
| 20[1] | 5.5 | 0.9 | | 5.8 | 0.5 | | -4.9*** |
| 22[1] | 5.1 | 1.0 | | 5.7 | 0.7 | | -8.1*** |
| Importance | 38.6 | 5.4 | .69 | 35.6 | 5.4 | .60 | 3.7*** |
| 1 | 5.8 | 1.1 | | 5.7 | 1.1 | | 0.6 |
| 2 | 3.0 | 2.0 | | 2.5 | 1.6 | | 4.6*** |
| 3 | 5.0 | 1.8 | | 3.9 | 1.9 | | 9.6*** |
| 4 | 6.6 | 0.9 | | 6.4 | 1.2 | | 2.1* |
| 5 | 6.3 | 1.1 | | 6.2 | 1.2 | | 1.4 |
| 7 | 5.6 | 1.5 | | 4.6 | 1.7 | | 9.6*** |
| 8 | 6.3 | 0.9 | | 6.3 | 1.0 | | 0.1 |
| Positive Goal Activation | 15.4 | 4.2 | .65 | 17.0 | 4.4 | .76 | -6.4*** |
| 11 | 3.2 | 1.4 | | 3.7 | 1.3 | | -6.1*** |
| 15 | 4.3 | 1.2 | | 4.3 | 1.2 | | 0.2 |
| 17 | 2.1 | 1.2 | | 2.4 | 1.1 | | -3.6** |
| 18 | 3.2 | 1.5 | | 3.9 | 1.3 | | -7.6*** |
| 21 | 2.6 | 1.0 | | 2.7 | 1.1 | | -1.1 |

*p< .05 **p< .001 ***p< .0001

Note – 276 of the original sample of 510 patients completed a second psychological assessment

[1] - item is reverse scored

Table 3 – Correlations between weight control motivation scales and age, body mass index and psychological variables

| Variable | Confidence & Acceptability | Importance | Positive Goal Activation |
|---|---|---|---|
| Age | .19*** | -.03 | -.06 |
| Body Mass Index | -.18*** | .36*** | .03 |
| Weight Loss Goal[1] | -.24*** | .36*** | .09 |
| Uncontrolled Eating[2] | -.58*** | .25*** | -.08 |
| Stress Responses[2] | -.37*** | .35*** | -.01 |
| Depression[2] | -.43*** | .29*** | -.01 |
| Perfectionism[2] | -.35*** | .22*** | .06 |
| Autonomous Motivation[3] | .15 | .28* | .22* |
| Controlled Motivation[3] | -.43*** | .33*** | -.03 |
| Perceived Health Threat[4] | -.30** | .34*** | .05 |
| Outcome Expectancy[4] | -.09 | .13 | .06 |
| Action Self-Efficacy[4] | .44*** | .09 | .21* |
| Coping Self-Efficacy[4] | .34*** | .19* | .13 |
| Intention[4] | .25** | .19* | .32** |

*p< .05 **p< .001 ***p< .0001

[1] – Represents desired weight loss as a percentage of starting weight
[2] – Larocque Obesity Questionnaire (Stotland & Larocque, 2004) subscale
[3] – Treatment Self-Regulation Questionnaire subscale (Williams, Grow, Freedman, Ryan, & Deci, 1996)
[4] – from Schwarzer & Renner (2000)