Running head: SDT AND EATING REGULATION

Motivational Dynamics of Eating Regulation:

A Self-Determination Theory Perspective

Joke Verstuyf*

Ghent University

H. Dunantlaan 2

9000 Ghent, Belgium

Joke.Verstuyf@UGent.be

Heather Patrick, PhD

National Cancer Institute

6130 Executive Boulevard

Rockville, MD 20852-7335 USA

patrickha@mail.nih.gov

Maarten Vansteenkiste, PhD

Ghent University

H. Dunantlaan 2

9000 Ghent, Belgium

Maarten.Vansteenkiste@UGent.be

Pedro Teixeira, PhD

Faculty of Human Kinetics, Technical University of Lisbon

Estrada da Costa

1495-688 Cruz Quebrada, Portugal

pteixeira@fmh.utl.pt

* corresponding author

Abstract

Within Western society, many people experience problems in adequately regulating their eating behaviors and weight. Although the literature on eating regulation is vast, little attention has been given to motivational dynamics involved in eating regulation. Grounded in Self-Determination Theory (SDT), the present contribution aims to provide a motivational perspective on eating regulation. The role of satisfaction (versus thwarting) of basic psychological needs for autonomy, competence, and relatedness is introduced as a mechanism to (a) explain the etiology of body image concerns and disordered eating and (b) understand the optimal regulation of ongoing eating behavior for healthy weight maintenance. An overview of empirical studies on these two research lines is provided. In a final section, the potential relevance and added value of SDT for prevailing theoretical models in the domain of eating regulation are discussed. Although research on SDT and eating regulation is still in its infancy and more research is clearly needed, this review suggests that the application of SDT to the domain of eating regulation is promising, as it allows for a more thorough understanding of the motivational processes involved in eating regulation and associated problems.

Word count: 8,656

Motivational Dynamics of Eating Regulation:

A Self-Determination Theory Perspective

During the past half-century, the Western world has witnessed an intriguing paradox in the domain of eating regulation: an increase in body image concerns and restrictive eating [1-2] has occurred in conjunction with a dramatic rise in overweight and obesity [3]. Although somewhat ironic, this is not entirely surprising given the proliferation of conflicting advertisements for foods that are rich in calories and fat and images of extraordinarily thin models in fashion and movies [4-5]. Failures in eating regulation culminate in a variety of physical and mental health risks. For instance, body image concerns are associated with more unhealthy weight control behaviors and lower well-being [6]. Problems in weight management, such as overweight and obesity, are associated with lower self-esteem and greater health risks (e.g., coronary heart disease) [7-8]. Disordered eating, such as more extreme forms of restrictive or disinhibited eating, and unhealthy weight behaviors such as purging or use of laxatives or diuretics, are associated with a variety of psychological (e.g., low self-esteem) and health (e.g., heart failure) risks [9-10].

As a consequence of the high prevalence of problematic eating regulation and the psychological and physical health costs associated with these behaviors, several public health efforts have been launched to prevent and reduce these eating regulation problems. Further, in the academic arena, a number of theoretical models have been developed to study factors that contribute to or maintain these behaviors. Some models, like the Thin-Ideal Internalization Model [2] and Self-Objectification Theory [11] attempt to explain the etiology of body image concerns, while other models, such as the Dietary Restraint Theory [12] and the Self-Control Model [13], focus on the dynamics involved in failures of eating regulation.

Eating regulation encompasses a range of behaviors, such as healthy food choice, restrictive restraint, weight management and disordered eating. Research has remained somewhat divided across these diverse areas of eating behaviors, with different researchers investigating different problems in eating regulation, publishing their work in different outlets for fairly different audiences and adopting different theoretical perspectives [14]. Although specific mechanics are involved in these diverse aspects of eating regulation, one perhaps more common factor is the role of motivational dynamics. Because eating regulation draws on our limited regulatory resources, it requires an understanding of the motivational processes involved. However, motivational processes involved in eating regulation have been underemphasized at the theoretical level and, as a result, understudied at the empirical level.

Here, we draw on Self-Determination Theory [SDT; 15-16], a general theory of optimal human motivation and personality development, to gain insight into the motivational processes involved in eating regulation and to understand how social-contextual factors (e.g., family or cultural pressures) impact on individuals' (poor) eating regulation. In contrast to the models and theories developed within the eating regulation literature, most of which address dynamics involved in one specific manifestation of eating regulation, SDT offers a broader perspective as it is implemented in a wide variety of contexts, such as education, exercise, work, relationships, psychopathology and psychotherapy [17-18], and can serve as framework to understand the myriad behaviors involved in eating regulation. At the heart of SDT is the notion of basic psychological need satisfaction, which has important implications for our understanding of motivational dynamics in eating regulation at a more distal (e.g. etiology of disordered eating) and at a more proximal level (e.g. optimal motivation for eating regulation). We begin with a discussion of the basic theoretical tenets of SDT and describe their relevance for eating

regulation. We then briefly discuss the potential relevance and added value of SDT for some prevailing theoretical models in the domain of eating regulation.

The Crux of Self-Determination Theory: Basic Psychological Need Satisfaction

As a meta-theory of human motivation, SDT begins with two key assumptions. First, SDT assumes that humans have an innate tendency toward psychological growth and integration [16]. Second, SDT acknowledges that, despite this innate tendency, characteristics of the social context may support or thwart optimal growth and integration. Thus, SDT integrates both the role of the person – their inner resources and capacity for growth– and the role of the social context in human motivation. SDT has also placed primary importance on psychological needs. Within the SDT framework, basic psychological needs are defined as the psychological nutriments necessary for growth and integration [16]. Using this definition, SDT has identified three basic needs: competence, relatedness, and autonomy. Competence reflects the need to feel efficacious and capable of achieving desired outcomes, and is consistent with many other theories of human motivation that have been applied to the study of eating regulation (e.g., social cognitive theory). Relatedness involves the need to feel close to and valued by important others, to have a sense of belonging with peers, family, and community. Finally, autonomy is the experience of volition and psychological freedom in carrying out an activity. Just as the satisfaction of one's physiological needs (e.g., hunger) is critical for one's physical survival, the satisfaction of one's basic psychological needs is critical for psychological thriving and well-being [15].

Beyond theoretical conjecture, an impressive body of research conducted in various cultures with individuals across the lifecourse has demonstrated the importance of need satisfaction for physical and mental health including higher well-being (e.g., life satisfaction,

vitality), less ill-being (e.g., depression, anxiety), and better health [17-18]. Such findings have been reported at the interindividual level [19] and at the intrapersonal level, with diary studies demonstrating that daily well-being fluctuations co-vary with daily variation in the satisfaction of one's basic psychological needs [20].

The concept of psychological needs is a good candidate for more clearly elucidating the dynamics involved in eating regulation as it can be used to understand (a) the etiology of disordered eating and (b) the optimal regulation of eating behaviors. Further, although the three basic needs stipulated within SDT are *psychological* in nature, they are directly implicated in the effective regulation of one's *physical* needs, including our need for food [15]. Thus, the SDT framework provides the opportunity to examine the dynamic interrelations between individuals' psychological and physiological needs, which are rarely studied together.

Etiology of Disordered Eating: The Role of Need Substitutes and Rigid Behavioral Patterns

The satisfaction versus thwarting of psychological needs is involved in the etiology of psychopathology in general and eating regulation problems in particular [21]. When people chronically do not have these basic psychological needs met, they develop strategies to deal with this psychological deficit. Two maladaptive coping responses discussed within SDT involve the development of *need substitutes* and the adoption of *rigid behavior patterns* [15,21; see paths A and B in Figure 1].

Need substitutes are defined as behaviors or goals that people engage in to compensate for a lack of experienced need satisfaction [15]. The types of goals that one pursues represent a particular type of need substitute [22]. SDT has distinguished between extrinsic goals, such as popularity, physical attractiveness, and money, and intrinsic goals, such as personal growth, contributing to the community, personal relationships, and health. Extrinsic goals are very salient

in a consumer culture, where fame, money, and the 'perfect body' [23-24] are portrayed as signs of success [25]. The appeal of such goals lies mainly in the anticipated power, social approval, or sense of worth that individuals expect from attaining them [26-27]. Although such goals or behaviors hold the promise of being satisfying and rewarding in the short term, they may interfere with genuine need satisfaction and therefore typically fail to yield long-term well-being benefits. The experience of repeated need thwarting results in susceptibility to cultural messages touting that the pursuit and attainment of extrinsic goals brings happiness. Indeed, repeated need thwarting has been associated with feelings of insecurity and a resulting quest for external indicators of worth, which align with SDT's conceptualization of extrinsic goals [21]. Children raised in a social environment deprived of need support and nurturance are more likely to pursue extrinsic, relative to intrinsic, goals [28]. Also, children who feel unaccepted by their peers experience more peer pressure to have the right 'stuff' and a stronger endorsement of materialistic values [29]. Importantly, not all extrinsic goals studied within SDT may be relevant in the context of eating regulation and body image concerns. Physical appearance and body image as need substitutes seem particularly relevant to eating regulation. For instance, people who adopt the thin-ideal, which represents a more extreme and socially prescribed form of physical attractiveness, experience more body image concerns and report more restrictive and problematic dietary behaviors [2].

A second coping response proposed within SDT to handle need thwarting is the development of *rigid behavior patterns*. People engage in such behaviors to obtain a sense of structure, predictability, and security in their lives. However, because people regulate their behavior in an inflexible and sometimes compulsive fashion, they likely direct attention away from the deeper causes of their experienced need thwarting. In addition, they are prone to

experience ill-being when they are unable to persist in their rigid functioning. An example of rigid behavioral patterns involves setting high, perfectionist standards. When confronted with the repeated failure to fulfill basic psychological needs an individual might turn toward the pursuit of perfectionist standards in an attempt to prove one's worth to both oneself and one's surroundings. These high standards are pursued in a rigid fashion and are typically accompanied by dichotomous or "black-white" thinking [30]. Even a small failure to achieve these high standards gives rise to intense feelings of guilt, inferiority, and self-criticism. Instead, experiences of success are short-lived and are typically attributed to external and unstable causes (e.g., luck). Following success, individuals who hold perfectionist standards therefore typically increase their standards, thereby further reinforcing their relentless pursuit of perfection [30-32].

In the context of eating regulation, rigid behavior patterns may be characterized by extreme restriction with respect to portion sizes, calories and food types (e.g., eliminating or severely limiting a particular macro-nutrient such as carbohydrates). Flexibility is not tolerated and even a small deviation from one's stringent eating routines gives rise to feelings of inferiority. Often when people subscribe to such restrictive eating practices, small deviations can quickly spiral into full-blown binges [33]. Consistent with this reasoning, both clinical accounts and empirical studies have provided strong and consistent evidence for an association between perfectionism and eating disorder pathology [34].

Need substitutes and rigid behavioral patterns often get intertwined in practice. For example, someone may rigidly stick to an extremely low-calorie diet (thereby engaging in a rigid behavioral pattern) with the aim of achieving the perfect body (thereby adopting a need substitute). In line with this idea, perfectionist strivings and the pursuit of the thin-ideal have been found to be interrelated [Boone, Soenens, & Braet, unpublished manuscript].

Although both the engagement in rigid behaviors and the attainment of need substitutes, such as extrinsic goals, may engender some derivative satisfaction, such feelings are short-lived because they fail to provide satisfaction of basic psychological needs [35-36; see paths A' and B' in Figure 1]. For instance, although individuals might derive a sense of effectiveness from strictly following a low-calorie diet, to the extent that they feel pressured to do so (either by themselves or others) their basic need for autonomy would be thwarted and their rigid attitude might even create relational tension. Furthermore, the sense of competence is highly unstable as failures to stick to the diet will be accompanied by strong feelings of ineffectiveness. Similarly, the attainment of the perfect body might provide one, at least temporarily, with a sense of competence (e.g. when having lost weight), but the pursuit of this ideal is likely to be fairly stressful and to provoke social comparison processes, which might be autonomy thwarting and socially alienating. Further, in the long-run people are unlikely to feel competent because they will likely continue to increase their standards, creating an ever-moving target that one is never quite able to reach. The pursuit of need substitutes and engagement in rigid behaviors is thus assumed to interfere with genuine need satisfaction [15,21], such that individuals get caught within an aggravating and negative cycle of need thwarting and eating pathology.

Until now we have described the effects of need thwarting on body image and disordered eating through the development of need substitutes and rigid behavioral patterns. However, it is also important to consider the benefits of need satisfaction – and not just the detriments of need thwarting. When basic needs are satisfied, people develop a more self-determined general orientation toward themselves and their social surroundings (see path C in Figure 1). General self-determination reflects the degree to which people function on the basis of their own interests, values and goals whereas people who are less self-determined tend to be oriented more

toward pressure and social expectations in their environment [18]. General self-determination can function as a buffer against sociocultural pressures to be thin and adopting the thin-ideal which constitute risk factors for body image concerns and disordered eating [37,2] . Further, people who are generally self-determined are more likely to engage in activities or goals that reflect their own interests and values, which in turn creates more opportunities for need-satisfying experiences (see path C' in Figure 1).

Optimal Regulation of Eating Behaviors

In addition to playing an important and relatively distal role in the etiology of risk factors for eating disordered behaviors and attitudes (e.g., body image concerns and perfectionism), processes of need satisfaction and need thwarting may also be more proximally involved in people's day-to-day regulation of food intake and weight. The underlying motivational dynamics of eating regulation can be based on one's own values (see path F in Figure 1), but can also be based on need substitutes and rigid functioning (see path D and E in Figure 1). This will affect (a) individuals' motivational regulation of eating behavior and (b) individuals' goals behind eating regulation. Furthermore, the motivational basis of eating regulation will be critical to how people regulate their eating behaviors which can engender diet-specific need satisfaction or thwarting (see path G in Figure 1).

Motivational Regulation of Eating Behavior. In its focus on motivational quality, SDT has conceptualized the types of motives underlying one's eating regulation [15]. Early research on motivation focused on the distinction between behaviors that are intrinsically versus extrinsically motivated [38]. Intrinsic motivation refers to undertaking an activity for its inherent interest and enjoyment, whereas extrinsic motivation refers to engaging in an activity to achieve an outcome separable from the activity. The concept of intrinsically motivated activities is

embedded strongly within the view that people are inherently active organisms with a natural tendency toward growth and development. However, not all behaviors are inherently interesting or pleasurable. This might especially be the case in the context of eating regulation, where perhaps few individuals restrict their food intake or adopt a different eating pattern because they find it inherently enjoyable to do so. Changing one's eating behaviors often involves some degree of physical and/or psychological discomfort and although some individuals might develop an interest in their daily eating pattern or might perceive changing their eating behavior as a challenge [17,39], many individuals might not be intrinsically motivated to regulate their eating behaviors. Indeed, because most attempts to change eating patterns are directed toward some separable outcome – whether that is to improve health, lose weight, or attain a more desirable physique – they are by definition extrinsically motivated. However, there exists considerable variability in the extent to which the reasons underlying one's extrinsically motivated behavioral change are self-endorsed, that is, internalized within people's broader goals and values. SDT has thus distinguished different types of extrinsic motivation that fall along a continuum of increasing autonomy and volition [16]. Behaviors that are more controlled are carried out with a sense of pressure and coercion whereas those that are more autonomously regulated are characterized by a sense of personal endorsement and internal consistency [15,40].

The most controlled form of regulation is external. External regulation refers to carrying out an activity to conform to other people's demands. The behavior is oriented toward attaining positive outcomes, like others' approval or a promised reward, or to avoid negative outcomes, like criticism or threatening punishments. The second controlled form of regulation is introjected regulation whereby behavior is regulated based on internal pressure such as feelings of guilt, shame or contingent self-worth [15]. For instance, a man trying to lose weight may reduce the

amount of fat in his diet because he wants his wife to stop nagging about his eating (external regulation) and/or because he would feel guilty if his continued weight gain resulted in a severe medical health condition (introjected regulation). Likewise, a woman struggling with anorexia may attempt to increase her caloric intake because the people at the treatment facility she is at are pressuring her (external regulation) and/or because she would feel bad about worrying her family when not gaining weight (introjected regulation). For both external and introjected regulation, the behaviors are accompanied by feelings of pressure and obligation.

Identified and integrated regulation represent two relatively more autonomous forms of regulation [15-16]. Identified regulation refers to carrying out a behavior because one understands and values the importance of this behavior. Integrated regulation involves not only valuing the behavior but viewing it as part of one's identity or as something that is consistent with one's other goals and values. For example, a girl may try to improve the quality of her food intake (e.g., more fruit and vegetables, lower saturated fat) because she personally believes it is important (identified regulation) and/or because it is consistent with her view of herself as a healthy and active person (integrated regulation). In both cases, the individual will have the feeling of 'wanting' to eat healthily instead of feeling pressured or coerced. Further, because the desire to regulate eating behaviors comes from the person's own values rather than from an internal or external demand, she might also better relate to others and feel more supported (i.e. high relatedness) and is more likely to persist in eating behavior changes, thus deriving a sense of success (i.e. high competence). This exemplifies how an autonomous, relative to a controlled, regulation of one's eating behavior is more likely to engender diet-specific need satisfaction (see path G in Figure 1).

The motivation continuum has been used to predict a range of outcomes, including performance, persistence, and psychological well-being, across several domains, including work [41], education [42], sports and exercise [43], psychotherapy [44], and health care [40].

Goals Behind Eating Regulation. Conistent with the differentiation between intrinsic and extrinsic aspirations at the global level, described above, people can pursue intrinsic or extrinsic goals when regulating their eating patterns. For example, someone may attempt to change his eating habits mainly to obtain a desirable physique (extrinsic goal) or mainly for the purposes of becoming healthier and more fit (intrinsic goal). Although in practice both goals might be present to some extent, the relative importance attached to these two types of goals will yield a different relationship with eating behaviors. Appearance- versus health-focused eating regulation will induce a different approach toward eating behaviors which in turn will engender diet-specific need satisfaction or thwarting [18; see path G in Figure 1]. For instance, a strong focus on having an attractive appearance, rather than on being healthy and fit, might induce a more contingent approach toward one's eating regulation in which one's self-worth heavily covaries with the extent to which one believes that this more attractive appearance has been achieved. As a result, one might feel more pressured with respect to eating regulation (i.e. low autonomy) and engage in more social comparisons with others about one's eating behavior and appearance, which create relational tension (i.e. low relatedness) and, given the engagement in upward comparisons, feelings of incompetence. In contrast, aiming for improved health and fitness may be viewed as a more fluid, less rigid outcome. Accordingly, an individual making eating changes in pursuit of health goals may feel less internal pressure and may experience optimal challenge in identifying and enjoying new foods, preparing new meals, and so forth [39].

To summarize, the experience of basic need satisfaction versus thwarting is central to SDT and is implicated in (1) the etiology of eating problems, that is, through the development of need substitutes, rigid behavioral patterns, and general self-determination and (2) optimal regulation of one's eating behavior, that is, in the underlying motives and goals of eating regulation and subsequent diet-specific need satisfaction or thwarting. We now turn to a discussion of research that provides evidence for the role of need satisfaction and need thwarting in eating regulation.

The Empirical Basis of the Self-Determination Theory

Chronic Need Thwarting as an Antecedent of Body Image Concerns and Disordered Eating

A growing number of studies suggest a possible role of need satisfaction in the etiology of adoption of the thin ideal, body image concerns, and subsequent eating disorder-related symptoms. For instance, Pelletier and colleagues [37,45] found that young women's general disposition to act in a self-determined way, which results from the experience of need satisfaction, protects them against the adverse effects of sociocultural pressure to be thin and is negatively predictive of their tendency to endorse the thin-ideal. As a consequence, those who function in more generally self-determined ways were found to be less likely to engage in disordered eating behaviors (e.g. bulimic symptoms) and more likely to engage in healthy eating behaviors (e.g. amount of vegetables eaten). These studies suggest that need satisfaction can play a buffering role against the development of a disregulated eating patterns, whereas need thwarting predicts a greater probability of pursuing need substitutes such as the thin-ideal. Consistent with these findings, another study showed that adolescent athletes who experienced more thwarting of their psychological needs during sport activities reported more eating disorder symptoms [46].

Thøgerson-Ntoumani, Ntoumanis and Nikitaras [47] tested the link between need satisfaction and body image concerns, such as the drive for thinness. Specifically, parental need support was associated positively with need satisfaction which, in turn, was associated with fewer body image concerns (e.g., body dissatisfaction, drive for thinness). Also, body image concerns were predictive of unhealthy weight behaviors [e.g., skipping meals, purging; 47]. Although longitudinal research is needed to examine how need substitutes, such as the pursuit of the thin ideal and body image concerns, are rooted in a socialization history of repeated need thwarting, the path model of Thørgersen-Ntoumani, et al. [47] suggests that parental need thwarting positively influences unhealthy weight behaviors via their impact on body image concerns.

Other studies have focused on need thwarting within the family context as an antecedent to rigid behavior patterns and disordered eating. For instance, Soenens and colleagues [48] studied the associations between psychologically controlling parenting, perfectionism, and eating disorder outcomes in a nonclinical sample and a clinical sample of eating disorder patients. Psychologically controlling parenting involves the manipulation of the parent-child bond through the use of intrusive practices such as guilt-induction, shaming, and conditional regard [49]. In the context of controlling parenting practices, children's basic psychological needs are likely to be thwarted, as parents force their children to comply with their agenda (autonomy-thwarting), as children feel unable to meet parents' expectations (competence-thwarting), and as the use of psychological control creates distance and coldness in the parent-child relationship [relatedness-thwarting; 50]. Soenens et al. [48] showed that this need-thwarting parenting style was associated with more maladaptive perfectionism which, in turn, predicted drive for thinness, body dissatisfaction and bulimic symptoms in both the clinical and nonclinical samples. Further,

the clinical sample reported experiencing more paternal psychological control relative to the non-clinical sample. In another study, Soenens and colleagues [51] demonstrated that parental psychological control is not only associated with more rigid and self-critical functioning (as indexed by maladaptive perfectionism) concurrently, but also predicts an increase in such functioning over time, which, in turn, predicts a rise in depressive symptomatology. Together then, this body of work suggests that, as the result of being exposed to a critical, pressuring, and cold parenting climate, individuals may become increasingly self-critical, such that they rigidly stick to high standards for thinness and physical attractiveness.

Although the empirical body of work on need thwarting, need substitutes, rigid behavioral patterns and eating pathology is in its infancy, the results obtained are promising. Of course, many issues remain to be addressed in future research, including the necessity to examine the role of need thwarting in the development of need substitutes, rigid behavioral patterns, and eating regulation problems over time. Further, these variables might be reciprocally related to each other such that the pursuit of need substitutes and the engagement in rigid behavioral patterns will be predictive of more need thwarting over time which in turn is predictive of an increasing focus on need substitutes and rigid behavioral patterns.

Basic Need Satisfaction and Optimal Regulation

Aside from their role in the development of need substitutes and rigid behavioral functioning, basic psychological needs are also important for the quality of individuals' ongoing regulation of food intake and weight. Pelletier and Dion [37] found that general self-determination (arising from need satisfaction) is positively associated with more autonomous regulation of eating behaviors and negatively associated with more controlled eating regulation. In general, an autonomous relative to controlled regulation and a health-focused relative to an

appearance-focused goal orientation reflect a more optimal motivational basis for regulating eating behaviors as these will engender greater diet-specific need satisfaction and, as a result, provide the necessary energy and vitality to optimally regulate one's eating behaviors [52].

Motivational Regulation of Eating Behavior. Several studies have provided evidence for associations between autonomous (versus controlled) regulation of eating behaviors and healthy (versus unhealthy or even disordered) eating patterns. Pelletier and colleagues [53; study 1 and 2) found that autonomous eating regulation was associated with more healthy eating (e.g. eating more vegetables and fruits) and fewer bulimic symptoms. In contrast, controlled eating regulation was associated with less healthy eating and more bulimic symptoms. Interestingly, autonomous eating regulation was associated with being concerned with what one eats (i.e., quality of one's food), whereas controlled eating regulation was associated with being concerned with how much one eats (i.e., quantity of food) [see also 37]. Further, an autonomous eating regulation significantly predicted a reduction in percentage of calories from total and saturated fats over a 26 week period [53; study 3].

Other research has examined the processes through which autonomous and controlled eating regulations affect eating behaviors. These studies are interesting as they might provide more insight into why an autonomous, relative to a controlled, regulation is experienced as more need satisfying. For instance, Otis and Pelletier [54] found that autonomous eating regulation is associated positively with approach food planning (i.e. planning to eat more healthy foods), whereas controlled eating regulation is associated positively with avoidance food planning (i.e avoiding too many calories, certain kinds of foods). Both approach and avoidance food planning were shown to be significant mediators of the associations between autonomous or controlled regulation and healthy eating behaviors, with approach food planning being positively predictive

and avoidance food planning being negatively predictive of healthy eating behaviors. Further, it was found that highly controlled, relative to highly autonomous, dieters displayed more extreme and rigid dieting behaviors across a 5-month period [55]. Also, flexible restrained eating has been shown to predict successful weight control, especially in the long-term, more consistently than rigid restraint [56]. Finally, Hagger, Chatzisarantis and Harris [57] found that having a relatively more autonomous motivation for dieting predicts a more positive attitude toward dieting and more perceived behavioral control. Collectively, then, this set of studies suggests that having an autonomous, relative to a controlled regulation of one's eating behavior is associated with a different approach towards one's eating behavior (i.e. approach versus avoidance and rigid versus flexible). This, in turn, may engender diet-specific need satisfaction or thwarting. For instance, an avoidance-orientation in goal pursuit has been found to predict less competence and autonomy while regulating behavior to achieve these goals [58]. These ideas await further empirical testing in the context of eating regulation.

Further, a few studies have investigated the effects of an autonomous, relative to a controlled, motivation for changing one's eating behavior in the context of treatment. For instance, Williams and colleagues [59] found in a sample of obese adults that being autonomously motivated to enter a weight management program was associated with greater program attendance and greater weight loss at the end of the intervention. Also, in a sample of overweight and obese women autonomous treatment motivation was associated positively with improvements in eating self-efficacy and cognitive restraint and was associated negatively with disinhibition, emotional, and external eating [60], while it was also observed that controlled regulation to enter obesity treatment was associated with poorer body image and lower psychological well-being [61]. Similar findings were found in a study investigating 1-year

changes in weight loss treatment motivation and change in psychological well-being in overweight women [62]. Also, some studies have found that increasing autonomous motivation for changing eating behaviors during treatment results in a more effective intervention. For instance, a motivational intervention to increase autonomous motivation for dieting results in more weight loss for those who had a controlled motivation for dieting at baseline in comparison to those for whom the motivational intervention was not included [63]. Further, creating a more need supportive context in a residential setting for patients with an eating disorder resulted in greater treatment engagement and less treatment drop-out [64]. These studies suggest that considering the motivational dynamics underlying eating behavior change and creating a need-supportive context is important in treatment for eating regulation as well. Motivational interviewing can offer more insights into how to work with clients to become more self-determined in treatment [65]. The emphasis on personal choice, empathy and reinforcement can contribute to a sense of (diet-specific) need satisfaction which in turn yields more energy to sustain or improve healthy eating behaviors.

Eating Regulation Goals. In addition to the motives for eating regulation (i.e., autonomous versus controlled), the nature of individuals' eating regulation goals is likely to yield different motivational dynamics as well. However, to date very little research has examined intrinsic and extrinsic goals in the context of eating. Two studies have demonstrated that the pursuit of a slender and physically attractive body through dieting is associated with more diet-specific need thwarting and unhealthy weight behaviors (e.g. purging, skipping meals, bulimic symptoms), while the pursuit of a healthy and fit lifestyle is associated with less diet-specific need thwarting and unhealthy weight behaviors [47; Verstuyf, Soenens, & Vansteenkiste, unpublished data]. Similarly, in the context of sports and exercise, those individuals exercising to

attain a more physically appealing body report more exercise-specific need thwarting [66], more body anxiety [67-69], and less perseverance in exercise behaviors [70] compared to those exercising to become healthier.

Together, these studies suggest that it is important to consider the motivational basis for eating regulation as this is of critical importance in the success or failure of eating regulation with regard to weight loss and the emergence of disordered eating behaviors. In line with the tenets of SDT, autonomous, versus controlled eating regulation, and the pursuit of health versus physical attractiveness, have been associated with more adaptive outcomes such as less diet-specific need thwarting, more healthily and less disordered eating, and improved psychological wellbeing. Future research is needed to more clearly elucidate the processes through which these motivational variables influence eating regulation. Also, an important hypothesis that remains unaddressed is that, across time, the quality of motivation for eating regulation (regulatory styles and goals), diet-specific need thwarting, and unhealthy eating behaviors affect each other in a reciprocal and mutually reinforcing fashion.

SDT in Relation to Current Perspectives on Body Image Concerns and Eating Regulation

Although little research to date has examined motivational dynamics in eating regulation, many extant and intensively examined models of eating regulation have conceptual overlap with some of the basic tenets within SDT. In the following section, we discuss SDT in relation to some of the prevailing perspectives on body image concerns and eating regulation, thereby focusing on how SDT-based constructs and processes may add to an understanding of the motivational dynamics in the context of eating and weight regulation. It is not our aim to exhaustively review and discuss the wide variety of models developed in the context of eating regulation [see 14 for an overview), but rather to selectively discuss those models where the

motivational perspective of SDT can contribute to a more thorough understanding. Furthermore, because the models are mainly discussed in relation to SDT, they are only briefly summarized.

Thin-Ideal Internalization Model

Various scholars [e.g. 2] have emphasized the critical role of sociocultural influences in the adoption of the thin-ideal, which represents a risk factor for the development of body dissatisfaction and disordered eating regulation. In much of Western society and other parts of the developed world, people (particularly women) are bombarded with images of thin and attractive models through advertisements and mass media [24]. When exposed to such images, people feel pressured to adopt the thin-ideal as a personal goal. Cross-sectional, longitudinal and experimental studies have provided evidence for this effect, demonstrating that individuals who experience sociocultural pressure to be thin are more likely to aspire to the thin-ideal and to experience body image concerns [71,6].

Although SDT and the Thin-Ideal Internalization model use different terminology, there is considerable overlap between the concept of extrinsic goals within SDT, and more specifically physical appearance, and the concept of adoption of the thin-ideal. We can consider pursuing the thin-ideal to be a more extreme variation of pursuing physical attractiveness, in which the norm for physical appearance is socially prescribed and more difficult to attain. Both SDT and the Thin-Ideal Internalization model acknowledge the flimsy promise that achieving attractiveness will result in increased well-being, control, and freedom [72-73,14] SDT explains the fleetingness of this promise with its conceptualization of extrinsic goals, which may result in temporary satisfaction when the ideal is achieved but creates a very unstable form of well-being, with escalating standards and increasing success required for well-being resulting from extrinsic goal attainment to be sustained over time.

Different from the thin-ideal internalization model, SDT also provides an alternative to this less-fulfilling extrinsic goal in the form of intrinsic goals and aspirations. From the perspective of SDT, people may pursue weight management and eating regulation in less functional ways – by striving for unattainable ideals propagated by images in popular media – or in more adaptive ways – by pursuing health and physical fitness. Because SDT provides this positive alternative in the form of intrinsic goals, it also incorporates more positive indicators of well-being [e.g., positive affect, vitality; 22]. This is in contrast to traditional perspectives such as the thin-ideal internalization model whose outcomes are typically body dissatisfaction and disordered forms of eating [e.g., 6].

Another similarity between the thin-ideal internalization model and SDT is that both emphasize the critical role of the social environment in the adoption of the thin-ideal. When individuals are repeatedly exposed to images and messages that the pursuit of the 'perfect body' yields happiness, they may model their own behavior and aspirations accordingly. One intriguing question is whether some individuals are more susceptible to the experience of sociocultural pressure and to the subsequent pursuit of the thin-ideal compared to others. SDT's perspective on need satisfaction and need thwarting may offer some insights in this regard. When people's basic needs have been chronically thwarted, they might feel more insecure which, in turn, may lead them to pursue need substitutes in an attempt to compensate for thwarted needs. One possibility is that when individuals experience need thwarting, they may seek out distractions in the form of television, fashion magazines, and other forms of media that expose them to advertisements promoting the thin-ideal [59]. This increased exposure to sociocultural norms for thinness may make them more susceptible to these messages. An alternative possibility is that both need-thwarted and need-satisfied individuals are equally exposed to such media, but that need-

thwarted individuals interpret the message as more pressuring and controlling. A third possibility is that need-thwarted and need-satisfied individuals interpret the same ads as equally pressuring, but that need-satisfied individuals cope differently with these pressures. Need-satisfied individuals might more easily question the message spread by the mass media and may reflect on whether the pursuit of thinness fits with their own preferences and goals. In contrast, need-thwarted individuals might more readily accept the "truth" of these messages and, as a result, endorse the thin-ideal more strongly. Future research is needed to better clarify the role of need satisfaction in susceptibility to and endorsement of the thin-ideal.

Importantly, the adoption of cultural messages such as the thin-ideal might also interfere with the potential to experience future need satisfaction. The pursuit of physical attractiveness and the thin-ideal in particular promote an outward orientation, such that individuals hinge their self-worth and value upon achieving this ideal. This kind of goal pursuit creates intrapersonal pressure (lack of autonomy) and may lead these individuals to engage in stressful and potentially socially-alienating social comparisons (lack of relatedness). Failure to achieve the unattainable goals set up by social norms and pursuit of the thin-ideal often results in feelings of inferiority stemming from an inability to reach one's goals (lack of competence). More research is needed to identify how need satisfaction and thwarting function as both antecedents to and consequences of adoption of the thin-ideal. Future research incorporating elements of both SDT and the thin-ideal internalization model is important for further clarifying the potential overlap of and distinction between these two perspectives as they relate to body satisfaction and eating regulation.

Self-Objectification Theory

Another model that elaborates on the role of sociocultural influences in body image concerns and eating disorders is *Self-Objectification Theory* [11]. Within this theory, girls and women are said to measure their self-worth by evaluating their physical appearance against the sexually objectifying and often unrealistic standards of beauty that prevail in Western society. Western culture is said to socialize girls and women in such a way that they take a third-person or observer perspective toward their own body which makes them preoccupied with their appearance and leads them to objectify their own body. Consistent with the theory, several studies have shown that trait self-objectification is associated with depression, body shame, bulimic and restrictive eating disorders [74,11]. In addition to these more stable interpersonal differences in self-objectification, certain situations (e.g. trying on a swimsuit) can trigger self-objectification. Such primed self-objectification yields an array of negative consequences, including body shame, restrained eating [75] and impaired performance [76].

Although self-objectification theory and SDT have different points of origin (the feminist perspective and motivational psychology, respectively), there are some interesting conceptual similarities that are worth noting. For instance, both theories state that a preoccupation with physical appearance will have negative effects for people's general (e.g., depression) and domain-specific (e.g., body shame, unhealthy weight behaviors) functioning. Notably, in both frameworks, the relative importance of physical appearance compared to other goals is emphasized. The measurement of trait self-objectification [77] requires individuals to rank order a set of 12 body attributes, half of which reflects a preoccupation with physical appearance and half of which reflects a focus on physical competence, such as health, energy level and physical fitness. Similarly, in SDT, the Aspiration Index [22] assesses both individuals' extrinsic and intrinsic goals and in many empirical studies a relative importance composite score is created.

Additionally, both frameworks emphasize the adverse role of objectification. Within SDT, the concept of objectification has been proposed as a mediating mechanism between extrinsic, relative to intrinsic, goal pursuits and need satisfaction [23,25]. Specifically, the adoption of an objectifying stance toward others and one's own body can be characterized as dehumanizing [78] because others and one's own body are reduced to objects and are, subsequently, approached instrumentally. The target of this objectification process might be different depending on the specific nature of the extrinsic goal, with others being objectified if someone strongly values materialism, power or fame and with one's own body being objectified if someone strongly values physical appearance and slenderness [25]. At a broader level, the adoption of an objectifying stance reflects a conditional approach to others' or one's own body. An example from another domain may serve to illustrate this point. People who strongly value money and power may appreciate others only to the extent that they can help them in achieving their extrinsic ideals. Similarly, people who strongly pursue physical attractiveness may appreciate and value their body only when they meet the expectations of being attractive, but feel ashamed of their body and disappointed in themselves when they fail to meet this objective.

Next to the instrumental and conditional approach to others (e.g. other-objectification) or one's own body (e.g. self-objectification), (self-)objectification also precludes a full investment in the regulatory activity at hand. Consistent with the experimental work within Self-Objectification Theory [76], Plant and Ryan [79] demonstrated that dispositional and experimentally induced public self-consciousness, which reflects individuals' tendency to be aware of themselves as objects of others' observation, yielded deleterious effects on individuals' enjoyment of the activity. More recently, the framing of an activity to achieve an extrinsic goal (e.g., physical appearance), relative to an intrinsic goal (e.g., health), has been found to disrupt

conceptual learning, because extrinsic goals put pressure on individuals and forego a task-involved approach of the learning activity [42]. A similar explanation has been provided within Self-Objectification Theory: the negative effects associated with the induction of state self-objectification are said to result from the constant monitoring of one's body which is said to interfere with full absorption in other activities [e.g., work; 11]. From the SDT-perspective, continual distraction from the activity will likely undermine the satisfaction of one's basic psychological needs for autonomy, competence and relatedness, such that the energetic resources needed for the ongoing eating regulation are more easily eroded.

Despite of these similarities, there are also some differences between the SDT framework and self-objectification theory. First, whereas self-objectification theory explicitly focuses on self-objectification in the context of appearance, SDT considers pursuing physical attractiveness as one of more potential extrinsic goals that have adverse effects on people's functioning and well-being. Further, within SDT self- or other-objectification is considered a potential consequence of pursuing extrinsic goals, whereas self-objectification theory posits that self-objectification is the cause of preoccupation with appearance. A third important difference is that SDT explains the harmful effects of objectification in terms of its association with basic psychological need satisfaction. In light of the similarities between self-objectification theory and SDT, it would be interesting for future research to directly examine whether self-objectification could play an explanatory role in the relationship between goals on the one hand and diet-specific need thwarting and maladaptive eating behaviours on the other hand.

Dietary Restraint Theory

Advertisements and the media strongly emphasize the idea that the 'thin-ideal' can be achieved by dieting [14]. Given the positive meaning attached to the thin-ideal, it is not

surprising that the dieting industry has boomed [14] and that the majority of adolescent girls [81] and adult women [82] indicate they have dieted or are currently dieting to lose weight. Unfortunately, it is uncertain whether dieting has the expected positive effects on individuals' weight and body size. This is because many people who start dieting fail to control their food intake adequately [83]. For instance, several diet programs have been unsuccessful in promoting long-term weight loss [84-85]. According to *Dietary Restraint Theory* [12], dieting can even be a causal factor contributing to overeating and bulimic symptoms. Much research attention has been devoted to this issue but results are mixed and it remains unclear whether dietary restraint should be recommended or discouraged to improve body image and regulation of eating behaviors [86]. SDT may provide some useful insight into when and why dieting is more likely to fail.

According to the Dietary Restraint Theory [12], dietary restraint can have adverse effects on food intake and result in overeating. When body-dissatisfied, people start dieting to change their body shape and weight. Heightened attention to food intake can create a cognitive boundary, which replaces the intuitive regulation of food intake. This overly-cognitive focus reduces people's sensitivity toward physiological signs of satiety and hunger and instead creates a preoccupation with psychological, cultural, or social signs to eat [87]. In line with this claim, experimental research [88] showed that individuals high in dietary restraint were more likely to indulge in overeating after having violated their cognitive rules about food intake (e.g., after eating a small amount of high caloric food). The process whereby dieters lose control over their food intake is known as the "disinhibition effect" [88]. The dietary restraint hypothesis has been incorporated within the Dual Pathway Theory [6] as one of the pathways toward the development of bulimic symptoms, particularly bingeing.

Although the Dietary Restraint Theory does not explicitly focus on motivational dynamics underlying dieting efforts, some processes that have been proposed to understand the disinihibition effect can be linked to one's motivation for eating regulation. For instance, some dieters display a shift in cognitions, vacillating from restrictive restraint to giving in to their urge to eat or even actively rebelling against self-imposed dieting rules [87,89]. Research within SDT has shown that a breakdown in one's self-regulatory activities and rebellious actions against (self)-imposed rules are more likely to result from a controlled, rather than autonomous, regulation [21, Vansteenkiste, Soenens, & Van Petegem, unpublished data). Second, the all-or-nothing approach to dieting ('I'm useless because I can't control my food intake') described in dietary restraint theory as the abstinence-violation effect [90] can be linked to a controlled regulation of one's behaviors hinging one's self-worth on a regulatory activity or goal (i.e. introjected regulation). Third, the rebound-effect [91], which is the increase in thoughts about eating [92] and eventually eating [93] after having suppressed thoughts about 'forbidden' foods, is most likely to occur in dieters with a controlled regulation for dieting. That is, dieters with a controlled motivation for eating are more likely to use avoidance strategies (e.g., avoiding foods that are high in fat) to change their eating behaviors [54]. Dieters with a more autonomous eating regulation will more often use approach goals such as eating more healthy foods.

In sum, although dietary restraint theory maintains that dietary restraint can result in a disinhibited eating style, research has shown this it is not always the case. Although motivational dynamics are not explicitly discussed in this model, the processes that are found in dietary break-down are more closely connected to a controlled eating regulation. Future research could more explicitly investigate motivational dynamics underlying dietary restraint and investigate whether

the differentiation between several types of motivation (goals and regulatory styles) can promote more insight into when and why dietary restraint is likely to fail.

Self-Control Theory

Self-Control Theory [13] hypothesizes that eating regulation will fail over time. Based on their self-regulation or self-control model, Baumeister and Heatherton [13] argued that people's self-control capacity is a limited resource or strength that gets depleted over time (i.e. ego-depletion). Self-control is defined as "the use of cognitive and attentional resources to override, inhibit, or alter impulses in the service of attaining personal goals or satisfying motives" [94:214]. Although there is individual variation in people's resources available for self-control, according to self-control theory, self-control is a limited resource that can be used up. From the self-control perspective, eating regulation can be considered as one form of behavioral control [95]. According to self-control theory, behavior control is psychologically demanding and, hence, will use up people's self-regulation resources. This implies that dieters would be successful in regulating their eating pattern as long as they have sufficient resources available for self-control. However, resources for eating regulation would become depleted when people need to regulate for longer periods of time or when situational demands challenge their self-regulation efforts. Consistent with this reasoning, research has shown that dieters ate more high caloric food when they had already consumed their self-regulatory resources on a previous (even unrelated) task [95-96].

SDT concurs with self-control theory that eating regulation involves effort and is likely to be both psychologically and physically draining. Although for some people changing the eating behaviors is perceived as a challenge, it is probably for most an extrinsically motivated behavior in the service of attaining a separable goal (e.g., losing weight, becoming more attractive,

increasing fitness). An important difference between both frameworks is that, according to SDT, the ego-depleting character of eating regulation will be dependent upon the motivational basis for eating regulation. Whereas controlled and appearance-focused eating regulation will engender more diet-specific need thwarting, an autonomous and health-focused eating regulation will contribute to diet-specific need satisfaction. Because of this differential relationship with the three needs, a controlled and appearance-focused eating regulation is more likely to be ego-depleting [97-98]. In contrast, autonomous and health-focused eating regulation is less likely to be resource-depleting, and the fulfillment of psychological needs is likely to be resource-restorative. Thus the reciprocal role of need satisfaction in both contributing to and resulting from relatively more intrinsic goals (e.g., health) and more autonomous eating regulation may attenuate ego-depletion in the context of self-regulatory challenge.

Indeed, research has demonstrated a positive link between autonomous self-regulation and subjective vitality (i.e. experiencing psychological energy). For instance, severely obese patients who enter treatment with a more autonomous motivation for behavior change, report higher levels of subjective vitality at 2-year follow-up [99; study 5]. Also, persistence in ego-depleting activities, such as elite swimming, is higher amongst autonomously motivated individuals [100]. Further, experimental studies have shown that the magnitude of ego-depletion after exerting self-regulation is much larger for those in a controlling environment compared to those in an autonomous environment [98]. Also, Moller et. al. [97] replicated the ego-depleting effect of making choices in a controlled condition, but found that such ego-depleting effect was absent in an autonomous choice condition. In both sets of experiments, it was shown that the effects of an autonomous versus controlled regulation on subsequent self-regulation tasks was mediated by self-reported feelings of vitality ([98; study3,97;study 3).

Together, these studies demonstrate that the ego-depleting effects of self-regulation depend on the underlying motives for regulation. Less research has been conducted regarding the role of underlying goals in self-regulation. One study found that appearance-focused, relative to health-focused eating regulation was associated with more diet-specific need thwarting, which in turn predicted more bulimic symptoms (Verstuyf, et. al., unpublished data). Also, appearance-focused exercising predicted more exercise-specific need thwarting and, in turn, was related to less perseverance of the exercise behaviors [66]. More research is needed to investigate whether the ego-depleting effects of eating regulation is dependent upon the motivational basis for eating regulation and, to investigate whether diet-specific need thwarting can explain why eating regulation is energy-draining. Further, although research demonstrated the differential effects of underlying motives for regulation on ego-depletion, future research needs to examine more directly the impact of goals underlying self-regulation on ego-depletion.

Conclusion

Eating regulation encompasses a wide variety of behaviors and has been extensively studied by many scholars. Although specific processes are involved in different manifestations of eating regulation, one more common factor are the motivational dynamics underlying one's eating regulation. In this contribution, we applied SDT to the context of eating regulation and highlighted the central role of basic psychological needs in a) the etiology of disordered eating and b) the optimal regulation of eating behaviors. It was proposed that need thwarting can contribute to disordered eating at a more distal level through the development of need substitutes (such as the thin-ideal) and rigid behavioral patterns (such as perfectionism). Further, basic need satisfaction versus thwarting can play a more proximal role in eating regulation by inducing a different motivational basis for eating regulation (i.e. autonomous versus controlled eating

regulation and health-focused versus appearance-focused eating regulation). This motivational

basis in turn engenders or hinders diet-specific need thwarting. Research towards these

hypothesis is promising, but still in its infancy. More longitudinal research is needed to further

understand the role of motivational concepts in the context of eating regulation.

Figure caption

Figure 1: Motivational Dynamics of Eating Regulation: A Self-Determination Theory

Perspective. The role of basic psychological need satisfaction versus thwarting in a) the etiology

of disordered eating and b) the optimal motivational basis for eating regulation

References

[1] Boutelle K, Neumark-Sztainer D, Story M, Resnick M: **Weight control behaviors among obese, overweight, and nonoverweight adolescents.** *Journal of Pediatric Psychology* 2002, **27**:531-540.

[2] Thompson JK, Stice E.: **Thin –Ideal Internalization: Mounting Evidence for a New Risk Factor for Body-Image Disturbance and Eating Pathology**. *Current directions in psychological science* 2001, **10**:181-183.

[3] Ogden CL, Yanovski SZ, Carroll MD, Flegal KM.: **The epidemiology of obesity.** *Gastroenterology* 2007, **132**:2087-2102.

[4] Polivy J, Herman C: **Sociocultural idealization of thin female body shapes: An introduction to the special issue on body image and eating disorders**. *Journal of Social and Clinical Psychology* 2004, **23**:1-6.

[5] Wolf N: *The Beauty Myth: How Image of Beauty are Used Against Women.* London: Vintage; 1990.

[6] Stice E: **A prospective test of the dual-pathway model of bulimic pathology: Mediating effects of dieting and negative affect.** *Journal of Abnormal Psychology* 2001, **110**:124-135.

[7] Bray GA: **Effects of obesity on health and happiness.** In *Handbook of Eating Disorders: Physiology, Psychology, and Treatment of Obesity, Anorexia and Bulimia.* Edited by Brownell KD and Foreyt JP. New York: Basic Books; 1986.

[8] World Health Organization (WHO Europe): **Obesity: Preventing and managing the global epidemic.** In *Geneva: World Health Organization.* Report of a WHO Consultation on Obesity. Geneva, June 3-5, 1997.

[9] Halmi KA: **Current concepts and definitions**. In *Handbook of Eating Disorders: Theory, Treatment, and Research. Edited by Szmukler G, Dare C, and Treasure J*. London: Wiley, 1995; 29-42.

[10] Treasure J, Szmukler GI: **Medical complications of chronic anorexia nervosa**. In *Handbook of Eating Disorders: Theory, Treatment, and Research.* Edited by Szmukler G, Dare C, and Treasure J. London: Wiley, 1995; 197-220.

[11] Frederickson BL, Roberts TA: **Objectification theory: Toward understanding women's lived experiences and mental health risks.** *Psychology of Women Quarterly* 1997*,* **21**:173-206.

[12] Polivy J, Herman C: **Dieting and binging: A causal analysis**. *American Psychologist* 1985*,* **40**:193-204.

[13] Baumeister RF, Heatherton TF: **Self-regulation failure: An overview**. *Psychological Inquiry* 1996*,* **7**:1-15.

[14] Ogden J: *The Psychology of Eating: From Healthy to Disordered Behavior*. Malden, MA: Blackwell; 2010.

[15] Deci EL, Ryan RM: **The 'what' and 'why' of goal pursuits: Human needs and the self determination of behavior.** *Psychological Inquiry* 2000, **11**:227-268.

[16] Ryan RM, Deci EL: **Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being.** *American Psychologist* 2000*,* **55**:68-78.

[17] Ryan RM, Deci EL: **From ego-depletion to vitality: Theory and findings concerning the facilitation of energy available to the self**. *Social and Personality Psychology Compass* 2008, **2**:702-717.

[18] Vansteenkiste M, Niemiec C, Soenens B: **The development of the five mini-theories of self-determination theory: An historical overview, emerging trends, and future directions**. In *Advances in Motivation and Achievement, vol. 16: The decade ahead.* Edited by Urdan T & Karabenick S. UK: Emerald Publishing; 2010; 105-166.

[19] Van den Broeck A, Vansteenkiste M, De Witte H, Soenens B, Lens W: **Capturing autonomy, relatedness and competence at work: Construction and initial validation of the work-related basic need satisfaction scale.** *Journal of Occupational and Organisational Psychology* 2010*,* **83**: 981-1002.

[20] Ryan RM, Bernstein JH, Brown KW: **Weekends, work, and well-being: psychological need satisfactions and day of the week effects on mood, vitality, and physical symptoms.** *Journal of social and clinical psychology* 2010*,* **29**: 95-122.

[21] Ryan RM, Deci EL, Grollnick WS, LaGuardia, JG: **The Significance of Autonomy and Autonomy Support in Psychological Development and Psychopathology**. In *Developmental psychopathology, Vol 1: Theory and method*. Edited by Cohen DJ. Hoboken, US: John Wiley & Sons Inc.; 2006: 796-841.

[22] Kasser T, Ryan RM : **Further examining the American dream: Differential correlates of intrinsic and extrinsic goals.** *Personality and Social Psychology Bulletin* 1996**, 22:** 280-287.

[23] Kasser T, Kanner AD: *Psychology and consumer culture: The struggle for a good life in a materialistic world.* Washington, DC: American Psychological Association; 2004.

[24] Dittmar H: **The costs of consumer culture and the "cage within": The impact of the material "good life" and "body perfect" ideals on individuals' identity and well-being.** *Psychological Inquiry* 2007*,* **18**: 23-59.

[25] Vansteenkiste M, Soenens B, Duriez B: **Presenting a positive alternative to strivings for material success and the thin-ideal: Understanding the effects of extrinsic relative to intrinsic goal pursuits.** In *Positive psychology: Exploring the best in people – volume 4*. Edited by Lopez SL. Westport, CT: Greenwood Publishing Company; 2008; 57-86.

[26] Kasser T, Ryan RM, Couchman CE, Sheldon KM: **Materialistic values: Their causes and consequences.** In *Psychology and consumer culture: The struggle for a good life in a materialistic world.* Edited by Kasser T & Kanner AD. Washington, DC: American Psychological Association, 2004; 11–28.

[27] Sheldon KM, Gunz A, Nichols CP, Ferguson Y: **Extrinsic value orientation and affective forecasting: Overestimating the rewards, underestimating the costs.** *Journal of Personality* 2010, **78**: 149-178.

[28] Kasser T, Ryan RM, Zax M, Sameroff AJ: **The relations of maternal and social environments to late adolescents' materialistic and prosocial values.** *Developmental Psychology* 1995, **31**: 907-914.

[29] Banerjee R, Dittmar H: **Individual differences in children's materialism: The role of peer relations.** *Personality and Social Psychology Bulletin* 2008, **34**: 17-31.

[30] Shafran R, Mansell W: **Perfectionism and psychopathology: A review of research and treatment.** *Clinical Psychology Review* 2001, **21**: 879-906.

[31] Blatt SJ: **The Destructiveness of Perfectionism - Implications for the Treatment of Depression.** *American Psychologist* 1995, **50**: 1003-1020.

[32] Frost RO, Marten PA: **Perfectionism and Evaluative Threat**. *Cognitive Therapy and Research* 1990, **14**: 559-572.

[33] Shafran R, Cooper Z, Fairburn CG: **Clinical perfectionism: A cognitive-behavioural analysis.** *Behaviour Research and Therapy* 2002, **40**: 773-791.

[34] Bardone-Cone AM, Wonderlich SA, Frost RO, Bulik CM, Mitchell JE, Uppala S, Simonich H: **Perfectionism and eating disorders: Current status and future directions**. *Clinical Psychology Review* 2007, **27**: 384-405.

[35]. Kasser T, Ryan RM: **Be careful what you wish for: Optimal functioning and the relative attainment of intrinsic and extrinsic goals**. In *Life goals and well-being.* Edited by Schmuck P & Sheldon K. Gottingen: Hogrefe; 2001

[36] Van Hiel A, Vansteenkiste M: **Ambitions fulfilled? The effects of intrinsic and extrinsic goal attainment on older adults' ego-integrity and death attitudes**. *International Journal of Aging & Human Development* 2009, 68: 27-51

[37] Pelletier LG, Dion SC: **An examination of general and specific motivational mechanisms for the relations between body dissatisfaction and eating behaviors**. *Journal of Social and Clinical Psychology* 2007, 3:303-333.

[38] Deci EL. **Intrinsic motivation, extrinsic reinforcement, and inequity**. *Journal of Personality and Social Psychology* 1972, **22**:113-120.

[39] Teixeira PJ, Patrick H, Mata J: **Why we eat what we eat: The role of autonomous motivation in eating behaviour regulation**. *Nutrition Bulletin* 2011, **36**:102-107.

[40] Patrick H, Williams G (this issue)

[41] Gagne M, Deci EL: **Self-determination theory and work motivation.** *Journal of Organizational Behavior* 2005, **26**:331-362.

[42] Vansteenkiste M, Lens W, Deci EL: **Intrinsic vs. extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation**. *Educational Psychologist* 2006, **41**:19-31.

[43] Fortier (this issue)

[44] Ryan RM, Lynch MF, Vansteenkiste M, Deci EL: **Motivation and Autonomy in Counseling, Psychotherapy, and Behavior Change: A Look at Theory and Practice.** *Counseling Psychologist* 2011, **39**:193-260.

[45] Pelletier LG, Dion SC, Levesque CS: **Can self-determination help protect women against sociocultural influences about body image and reduce their risk of experiencing bulimic symptoms?** *Journal of Social and Clinical Psychology* 2004, **23**:61-88.

[46] Bartholomew K, Ntoumanis N, Ryan R, Thøgersen-Ntoumani C: **Psychological need thwarting in the sport context: development and initial validation of a psychometric scale**. *Journal of Sport and Exercise Psychology,* in press.

[47] Thogerson-Ntoumani C, Ntoumanis N, Nikitaras N: **Unhealthy weight control behaviours in adolescent girls: A process model based on Self-Determination Theory.** *Psychology and Health* 2009, **25**:535-550.

[48] Soenens B, Vansteenkiste M, Vandereycken W, Luyten P, Sierens E, Goossens L: **Perceived parental psychological control and eating disordered symptoms: Maladaptive perfectionism as a possible intervening variable.** *Journal of Nervous and Mental Disease* 2008, **196**:144-152.

[49] Barber BK: **Parental psychological control: Revisiting a neglected construct.** *Child Development* 1996, **67**:3296-3319.

[50] Soenens B, Vansteenkiste M: **A theoretical upgrade of the concept of parental psychological control: Proposing new insights on the basis of self-determination theory.** *Developmental Review* 2010*,* **30**:74-99.

[51] Soenens B, Luyckx K, Vansteenkiste M, Luyten P, Duriez B, Goossens L: **Maladaptive perfectionism as an intervening variable between psychological control and adolescent depressive symptoms: A three-wave longitudinal study.** *Journal of Family Psychology* 2008*,* **22**:465-474.

[52] Ryan RM, Huta V, Deci EL: **Living Well : a Self-Determination Theory Perspective on Eudaimonia.** *Journal of Happiness Studies* 2008, **9**:139-170.

[53] Pelletier LG, Dion SC, Slovenic-D'Angelo M, Reid R : **Why do you regulate what you eat? relationship between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment.** *Motivation and Emotion* 2004, **28**:245-277.

[54] Otis N, Pelletier LG: **Women's regulation styles for eating behaviors and outcomes: The mediating role of approach and avoidance food planning**. *Motivation and Emotion* 2008, **32**:55-67.

[55] Strong KG, Huon GF: **Controlled motivation and the persistence of weight-loss dieting** *European Eating Disorders Review* 1999, **7**:136-146.

[56] Teixeira PJ, Silva MN, Kiernan M, Coutinho SR, Palmeira AL, Mata J, Vieira PN, Carraça EV, Santos TC, Sardinha LB: **Mediators of weight loss and weight loss maintenance in middle-aged women**. *Obesity* 2010, **18**:725-735.

[57] Hagger MS, Chatzisarantis NL, Harris J: **The process by which relative autonomous motivation affects intentional behavior: Comparing effects across dieting and exercise behaviors.** *Motivation and Emotion* 2006, **30**:306-320.

[58] Elliot AJ, Sheldon KM: Avoidance personal goals and the personality-illness relationship *Journal of Personality and Social Psychology* 1998, **75**:1282-1299.

[59] Williams GC, Grow VM, Freedman ZR, Ryan RM, Deci EL: **Motivational predictors of weight loss and weight-loss maintenance.** *Journal of Personality and Social Psychology* 1996, **70**:115-126.

[60] Mata J, Silva MN, Vieira PN, Carraca E, Andrade AM, Coutinho SR, Sardinha LB, Teixeira PJ: **Motivational "spill-over" during weight control: Increased self-determination and exercise intrinsic motivation predict eating self-regulation.** *Health Psychology* 2009, **28**:709-716.

[61] Carraça EV, Markland D, Silva MN, Coutinho SR, Vieira PN, Minderico CS, Sardinha LB, Teixeira PJ: **Dysfunctional body investment versus body dissatisfaction: relations with well-being and controlled motivations for obesity treatment.** *Motivation and Emotion*, in press.

[62] Vieira PN, Mata J, Silva MN, Coutinho SR, Santos TC, Minderico CS, Sardinha LB, Teixeira PJ: **Predictors of psychological well-being during behavioral obesity treatment in women**. *Journal of Obesity,* **2011**: Article ID 936153, 8 pages.

[63] Webber KH, Gabriele JM, Tate DF, Dignan B: **The effect of a motivational intervention on weight loss is moderated by level of baseline controlled motivation.** *International Journal of Behavioral Nutrition and Physical Activity* 2010, 7:1-9

[64] Vandereycken W, Vansteenkiste M: Let eating disorder patients decide: **Providing choice may reduce early drop-out from inpatient treatment.** *European Eating Disorders Review* 2009, **17**: 177-183.

[65] Vansteenkiste M, Soenens B, Vandereycken W**: Motivation to change in eating disorder patients: A conceptual clarification on the basis of self-determination theory.** *International Journal of Eating Disorders* 2005*,* **37**:207-219**.**

[66] Sebire SJ, Standage M, Vansteenkiste M: **Examining intrinsic versus extrinsic exercise goals: Cognitive, affective, and behavioral outcomes.** *Journal of Sport and Exercise Psychology* 2009, **31**:189-210.

[67] Markland DA, Ingledew DK: **The relationships between body mass and body image and relative autonomy for exercise among adolescent males and females**. *Psychology of Sport and Exercise* 2007, **8**:836-853.

[68] Markland DA: **The mediating role of behavioural regulations in the relationship between perceived body size discrepancies and physical activity among adult women.** *Hellenic Journal of Psychology* 2009, **6**:169-182.

[69] Thogersen-Ntoumani C, Ntoumanis N: **A self-determination theory approach to the study of body image concerns, self-presentation and self-perceptions in a sample of aerobic instructors.** *Journal of Health Psychology* 2007, **12**:301-315.

[70] Edmunds J, Ntoumanis N, Duda J L: **Adherence and well-being in overweight and obese patients referred to an exercise on prescription scheme: A self-determination theory perspective.** *Psychology of Sport and Exercise* 2007, **8**:722-740.

[71] Grabe S, Ward LM, Hyde JS: **The Role of the Media in Body Image Concerns Among Women: A Meta-analysis of Experimental and Correlational Studies**. *Psychological Bulletin* 2008, **134**:460-476.

[72] Engeln-Maddox R: **Buying a beauty standard or dreaming of a new life? Expectations associated with media ideals.** *Psychology of Women Quarterly* 2006, **30**:258-266.

[73] Evans PC: **"If only I were thin like her, maybe I could be happy like her": The self-implications of associating a thin female ideal with life success.** *Psychology of Women Quarterly* 2003, **27**:209-214.

[74] Miner-Rubino K, Twenge JM, Fredrickson BL: **Trait self-objectification in women: Affective and personality correlates.** *Journal of Research in Personality* 2002, **36**:147-172.

[75] Fredrickson BL, Roberts TA, Noll SM, Quinn DM, Twenge JM: **That swimsuit becomes you: Sex differences in self-objectification, restrained eating, and math performance.** *Journal of Personality and Social Psychology* 1998, **75**:269-284.

[76] Quinn DM, Kallen RW, Twenge JM, Frederickson BL: **The disruptive effect of self-objectification on performance.** *Psychology of Women Quarterly* 2006, **30**:59-64.

[77] Noll SM, Frederickson BL: **A mediational model linking self-objectification, body shame and disorder eating.** *Psychology of Women Quarterly* 1998, **22**:623-636.

[78] Haslam N: **Dehumanization: An integrative review.** *Personality and Social Psychology Review* 2006, **10**:252-264.

[79] Plant RW, Ryan RM**: Intrinsic Motivation and the Effects of Self-Consciousness, Self-Awareness, and Ego-Involvement - an Investigation of Internally Controlling Styles.** *Journal of Personality* 1985, **53**:435-449.

[80] Vansteenkiste M, Lens W, Deci EL**: Intrinsic versus extrinsic goal-contents in self-determination theory: Another look at the quality of academic motivation.** *Educational Psychologist* 2006, **41**:19-31.

[81] Gusella J, Goodwin J, van Roosmalen E: **'I want to lose weight':Early risk for disordered eating?** *Paediatr Child Health* 2008,**13**:105-110.

[82] Jeffrey RW, French SA: **Socioeconomic status and weight control practices among 20- to 45-year-old women**. *American Journal of Public Health* 1996, **86** :1005 –1010.

[83] Field AE, Austin SB, Taylor CB, Malspeis S, Rosner B, Rockett HR, Gillman MW, Colditz GA: **Relation between dieting and weight change among preadolescents and adolescents**. *Pediatrics* 2003,**112**:900-906.

[84] Wadden TA, Phelan S: **Behavioral assessment of the obese patient**. In: *Handbook of obesity treatment*. Edited by Wadden TA, Stunkard AJ. New York: Guilford Press, 2002:186-226.

[85] Wing RR, Tate DF, Gorin AA, Raynor HA, Fava JL: **A Self-Regulation Program for Maintenance of Weight Loss.** *New England Journal of Medicine* 2006**, 355**:1563-1571**.**

[86] Groesz M, Stice E: An experimental test of the effects of dieting on bulimic symptoms: The impact of eating episode frequency**.** *Behavior Research and Therapy* 2007*,* **45**:49-62.

[87] Herman C, Polivy J: **Restrained eating**. In *Obesity.* Edited by Stunkard AJ. Philadelphia: Saunders, 1980; 208-225.

[88] Herman C, Mack D: **Restrained and unrestrained eating**. *Journal of Personality* 1975*,* **43**:647-660.

[89] Ogden J, Wardle J: **Cognitive and emotional responses to food**. *International Journal of Eating Disorders* 1991*,* **10**:297-311.

[90] Ogden J, Wardle J: **Control of eating and attributional style.** *British Journal of Clinical Psychology* 1990, **29**:445-6.

[91] Wegner: **Ironic processes of mental control**. *Psychological review* 1994, **101**:34-52.

[92] Soetens B, Braet C: **"The weight of thought": Food-related thought suppression in obese and normal-weight youngsters**. *Appetite* 2006, **46**:309-17.

[93] Erskine JA: **Resistance can be futile: Investigating behavioral rebound**. *Appetite* 2008, **50**:415-21.

[94] Heatherton TF, Vohs KD: **Why is it so difficult to inhibit behavior?** *Psychological Inquiry* 1996, **9**:212-215.

[95] Vohs KD, Heatherton TF: **Self-regulatory failure: A resource-depletion approach**. *Psychological Science* 2000, **3**:249-354.

[96] Ward A, Mann T: **Don't mind if I do: Disinhibited eating under cognitive load.** *Journal of Personality and Social Psychology* 2000, **78**:753-763.

[97] Moller AC, Deci EL, Ryan RM : **Choice and ego-depletion: The moderating role of autonomy.** *Personality and Social Psychology Bulletin* 2006, **32**:1024-1036.

[98] Muraven M, Gagné M, Rosman H: **Helpful self-control: Autonomy support, vitality, and depletion.** *Journal of Experimental Social Psychology* 2008, **44**:573–585.

[99] Ryan RM, Frederick CM: **On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being**. *Journal of Personality* 1997, **65**:529-205.

[100] Pelletier LG, Fortier MS, Vallerand RJ, Brière NM: **Associations among perceived autonomy support, forms of selfregulation, and persistence: A prospective study**. *Motivation and Emotion* 2001, **25**:279-306.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

JV, MV and HP discussed the format and scope of the manuscript. JV and HP wrote the initial draft of the manuscript. MV and PT revised the manuscript critically and contributed to the writing of the manuscript. All authors read and approved the final manuscript.

Acknowledgements

Figure 1: the role of basic psychological need satisfaction versus thwarting in a) the etiology of disordered eating and b) the optimal motivational basis for ongoing eating regulation