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RUNNING HEAD: UNHEALTHY WEIGHT CONTROL BEHAVIOURS IN ADOLESCENT
GIRLS

Unhealthy Weight Control Behaviours in Adolescent Girls: A Process Model Based on Self-
Determination Theory

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Abstract

1
2 This study used self-determination theory (Deci & Ryan, 2000) to examine predictors of body
3 image concerns and unhealthy weight control behaviours in a sample of 350 Greek adolescent
4 girls. A process model was tested which proposed that perceptions of parental autonomy support
5 and two life goals (health and image) would predict adolescents' degree of satisfaction of their
6 basic psychological needs. In turn, psychological need satisfaction was hypothesised to
7 negatively predict body image concerns (i.e., drive for thinness and body dissatisfaction) and,
8 indirectly, unhealthy weight control behaviours. The predictions of the model were largely
9 supported indicating that parental autonomy support and adaptive life goals can indirectly impact
10 upon the extent to which female adolescents engage in unhealthy weight control behaviours via
11 facilitating the latter's psychological need satisfaction.

12

13 Key words: Parental autonomy support, life goals, psychological need satisfaction, body image
14 concerns

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1 Unhealthy Weight Control Behaviours in Adolescent Girls: A Process Model Based on Self-
2 Determination Theory

3 The incessant societal emphasis on appearance, image and physical attractiveness leads many
4 young people, especially adolescent girls, to engage in unhealthy weight control behaviours
5 which they believe will help them approximate or attain these body-related ideals (French,
6 Perry, Leon, & Fulkerson, 1995). Although many adolescents consider that extreme weight
7 control behaviours are harmless to health (Grigg, Bowman, & Redman, 1996), compelling
8 evidence suggests that engagement in such behaviours might lead to outcomes as diverse as
9 nutritional inadequacy (Gibbons, Wertheim, Paxton, Petrovich, & Szmukler, 1995; Neumark-
10 Sztainer, Hannan, Story, & Perry, 2004), depression (Stice, Hayward, Cameron, Killen, &
11 Taylor, 2000), suicide ideation and suicide attempts (Neumark-Sztainer, Story, Dixon, &
12 Murray, 1998), as well as obesity (Stice, Cameron, Killen, Hayward, & Taylor, 1999). Yet,
13 unhealthy weight control behaviours are relatively common among adolescents, especially
14 females (Croll et al., 2002). For example, a large survey study showed that more than fifty
15 percent of adolescent girls in the US reported the use of unhealthy weight control behaviours
16 (e.g., fasting, skipping meals) during the previous year (Neumark-Sztainer, Story, Hannan,
17 Perry, & Irving, 2002). While the majority of research in this area has been conducted with
18 US adolescents, evidence also suggests that disordered eating attitudes are becoming more
19 evident in adolescents from Mediterranean countries. For example, 20.3 percent of Greek
20 females and 7.3 percent of males are reported to engage in disordered eating behaviours
21 (Yannakoulia et al., 2004).

22 Given that body dissatisfaction represents a substantial risk factor of disordered eating
23 (Attie & Brooks-Gunn, 1989), it is not surprising that many programmes designed to prevent
24 such behaviours in adolescent girls have featured body dissatisfaction as a key outcome
25 variable (Neumark-Sztainer et al., 2006). Indeed, empirical research has shown that restrictive

1 eating patterns are predicted by body dissatisfaction and drive for thinness (which is
2 indicative of an excessive concern with dieting, pursuit of thinness and weight preoccupation)
3 in women and men (e.g., Keski-Rahkonen et al., 2005), as well as in adolescent girls (Keery,
4 van den Berg, & Thompson, 2004). Although overweight and obese adolescents tend to
5 engage in more unhealthy weight control behaviours than their normal weight or underweight
6 counterparts (e.g., Boutelle et al., 2002; Neumark-Sztainer et al., 1999), research by
7 Neumark-Sztainer et al. (2003) showed that the relationship between Body Mass Index (BMI)
8 and unhealthy weight control behaviours in adolescents was indirect via weight-related body
9 concerns (e.g., body dissatisfaction).

10 Theory-based explanations can be particularly useful in understanding some of the
11 processes underpinning the development of body dissatisfaction and unhealthy weight control
12 behaviours. Theoretical frameworks that have already been utilised in this research area (e.g.,
13 social comparison theory; Wood, 1989) have often focused on proximal predictors of body
14 image evaluations, such as universalistic social comparisons (e.g., *When I judge how*
15 *attractive I am, I compare myself with actors/actresses/singers that I see on television or in*
16 *movies*; Morrison, Kalin, & Morrison, 2004). However, it is not clear why certain individuals
17 are more likely to engage in social comparison processes or feel more concerned about their
18 body appearance than others. Thus, it is important to examine deeper psychological
19 mechanisms that foster versus undermine personal growth and development and can lead to
20 unhealthy weight control behaviours. To this end, the purpose of the present study is to utilise
21 a self-determination theory (SDT; Deci & Ryan, 2000) which can provide an account of such
22 deeper psychological mechanisms, and thus offer a complimentary angle in the examination
23 of such important behaviours. Specifically, we use SDT to test a model (see Figure 1) that
24 examines whether enduring personal factors (i.e., psychological needs and life goals), as well

1 as contextual influences (i.e., perceptions of parental autonomy support), are implicated in
2 their presence of unhealthy weight control behaviours in a sample of adolescent girls.

3 SDT is a macro theory of human motivation which postulates that all individuals have
4 innate tendencies toward psychological growth and development. Such tendencies can be
5 facilitated by the social context via the satisfaction of three basic psychological needs, namely
6 autonomy, competence and relatedness. Autonomy reflects a desire to engage in activities of
7 one's choosing and to be the origin of one's own behaviour. Competence refers to
8 individuals' need to interact effectively with their environment and to experience a sense of
9 effectance in producing desired outcomes and preventing undesired events. Finally,
10 relatedness is the need to feel connected to and accepted by others in a social milieu.
11 Although all three psychological needs are essential, the degree to which they are satisfied
12 varies from one context to another (Deci & Ryan, 2000). According to basic needs theory, a
13 sub-theory within SDT, the satisfaction of the three psychological needs can lead to
14 psychological health, well-being and human actualisation. However, when the social context
15 undermines these three psychological needs, individuals are likely to experience ill-being and
16 non-optimal functioning.

17 More recently, SDT has been used as a theoretical framework to understand the darker
18 sides of human behaviour, for example the motivation to engage in risk behaviours
19 (Neighbors, Lewis, Fossos, & Grossbard, 2007; Williams et al., 2000). One such behaviour,
20 disordered eating, reflects body image concerns and the struggle for body control. According
21 to SDT, this struggle results from feelings of lack of psychological need satisfaction in one's
22 life. Deci and Ryan (2000) argued that the thwarting of the three basic psychological needs
23 will lead to psychological ill-being and the development of rigid or self-defeating behaviours,
24 such as abstaining from eating. Lack of autonomy need satisfaction reflects a generalised
25 perception of lack of control over one's life. An outcome of autonomy need thwarting can be

1 the struggle to control one's appearance (manifested via unhealthy weight control behaviours
2 and/or body image concerns) in an attempt to establish control over an aspect of one's life.
3 Empirical research supports indirectly this proposition. For example, women's level of
4 autonomy in their lives appears to protect against body image pressures (Pelletier & Dion,
5 2007) and is negatively associated with bulimic behaviours (Pelletier, Dion, & Lévesque,
6 2004). Further, in a sample of (mainly female) aerobics instructors, general autonomy need
7 satisfaction was found to negatively predict body image concerns (i.e., body dissatisfaction
8 and drive for thinness; Thøgersen-Ntoumani & Ntoumanis, 2007). Although such evidence is
9 cross-sectional in nature, it suggests the possibility that perceptions of control over one's life
10 may be important in protecting against the development of body image concerns.

11 The struggle for body control might also represent a compensatory activity that
12 manifests when individuals' needs for competence and relatedness are thwarted. Competence
13 need thwarting reflects generalised feelings of ineffectance in one's life. As Deci and Ryan
14 (2000) stated, not eating (or other unhealthy behaviours) can represent one domain in which
15 individuals can have control over their own behaviours and, therefore, feel effective. Lastly,
16 relatedness need thwarting reflects lack of meaningful relationships and feelings of isolation
17 in one's life. The thwarting of this psychological need can also lead to a struggle for body
18 control in an attempt to gain social acceptance and approval by meeting societal standards of
19 ideal physique standards. To our knowledge, empirical research examining the role of
20 psychological need satisfaction in predicting body image concerns and unhealthy eating
21 behaviours has not been conducted with adolescent populations. This is despite evidence
22 suggesting that body image problems and associated unhealthy weight control behaviours
23 often manifest themselves during adolescence (Levine & Smolak, 2002; Richards, Boxer,
24 Petersen, & Albrecht, 1990). Based on theoretical propositions and previous research, we
25 expected that psychological need satisfaction (a composite measure of the three needs; for a

1 similar approach see also Deci, Ryan, Gagné, Leon, Usunov, & Kornazheva, 2001) would be
2 directly and negatively linked to body image concerns (see Fig. 1; Hypothesis 1). Further,
3 given the aforementioned evidence (e.g., Keery et al., 2004) linking body image concerns and
4 unhealthy weight control behaviours, we expected a similar relationship between these
5 variables in our model (Hypothesis 2). In addition, we hypothesised that psychological need
6 satisfaction would have a negative indirect effect on unhealthy weight control behaviours
7 (Hypothesis 3).

8 According to SDT, the degree to which individuals' basic psychological needs are
9 satisfied can be partly explained by the different life goals (also referred to as life aspirations)
10 that they hold. The theory posits that life goals can be broadly categorised as intrinsic (e.g.,
11 community contribution, health, personal growth and affiliation) and extrinsic (e.g., fame,
12 image, and financial success) in nature. According to Kasser and Ryan (1996), the pursuit and
13 attainment of intrinsic life goals provides greater satisfaction of the three psychological needs
14 and is more strongly associated with psychological functioning and well-being, than the
15 pursuit and attainment of extrinsic goals. Intrinsic goals motivate individuals to act in
16 accordance with their inner values and beliefs, thus facilitating the experience of autonomy. In
17 contrast, extrinsic goals control individuals' behaviours because they are focused on obtaining
18 extrinsic rewards and social approval (Kasser, Ryan, Zax, & Sameroff, 1995). Further,
19 whereas intrinsic goals offer opportunities for meaningful interactions with others and
20 contributions to the common good, extrinsic goals often alienate individuals in their pursuit of
21 materialistic objectives. Lastly, the attainment of intrinsic goals is more likely to result in
22 deeper and more secure feelings of competence, whereas feelings of competence resulting
23 from the attainment of extrinsic goals are likely to be short-lived because individuals will
24 often set new, more difficult, goals. According to Kasser and Ryan (1996), extrinsic goals
25 reflect a sense of insecurity about oneself and lead one to engage in more stressful activities

1 with detrimental effects for their health and well-being. In support of these arguments, recent
2 empirical research within an organisational setting (Vansteenkiste, Neyrinck, Niemiec,
3 Soenens, De Witte, & Van den Broeck, 2007), has shown that the positive relationship
4 between extrinsic work value orientations (e.g., aspiring towards financial success and
5 exerting control and power over others) and negative job outcomes (e.g., emotional
6 exhaustion and turn-over intention) was largely explained by the thwarting of the needs for
7 autonomy, competence and relatedness at work. However, as yet, there is a lack of empirical
8 research examining the interrelationships between life goals, psychological need satisfaction
9 and body image concerns.

10 In the present study, based on SDT propositions and the work of Vansteenkiste et al.
11 (2007), we examined whether intrinsic and extrinsic goals could predict psychological need
12 satisfaction, and indirectly body image concerns. With regard to intrinsic life goals (i.e., self-
13 acceptance, affiliation, community contribution, and health) measured in the SDT literature
14 we focused on health as a predictor of body image concerns, because it is a life goal which is
15 very relevant to the physical domain. For the same reason, the extrinsic goal of image (as
16 opposed to other extrinsic goals such as financial success or fame) was expected to also be
17 more implicated in the development of body image concerns. Thus, and in an effort to present
18 a parsimonious model, we included only these two life goals in our model. We expected that
19 health goals would be positively related to psychological need satisfaction (Hypothesis 4),
20 while a negative or non-significant link was expected between image goals and need
21 satisfaction (Hypothesis 5). We also predicted, however, a direct positive relationship
22 between image goals and body image concerns (Hypothesis 6). While such a hypothesised
23 link is not derived from SDT, it seems reasonable to suggest given that appearance ideals for
24 adolescent girls are notoriously difficult to achieve (Levine & Smolak, 2002), and girls to

1 whom such ideals are important, are more likely to feel insecure and stressed about their
2 appearance.

3 As previously alluded to, according to SDT, the social environment can play an
4 important role in facilitating psychological need satisfaction (Deci & Ryan, 2000). One
5 contextual factor that has received a lot of empirical attention in the SDT literature is the
6 provision of autonomy support by significant others (e.g., parents). Parents are particularly
7 pertinent social agents in the lives of adolescents. According to SDT, parents can be
8 autonomy supportive towards their children by taking their children's perspectives into
9 account, by allowing them to solve problems on their own, by encouraging initiation,
10 minimising pressure, and offering choice and meaningful rationales for task engagement
11 (Grolnick, Price, Beiswenger, & Sauck, 2007). Parental autonomy support can also influence
12 the life goals that young people adopt. For example, previous research has shown that less
13 autonomy supportive mothers tend to have teenage children who value extrinsic goals (i.e.,
14 financial success) relatively highly (Kasser et al., 1995). Thus, when mothers are
15 unsupportive and distant with their children the latter are likely to adopt extrinsic goals that
16 serve to "prove worth". One limitation of this study was that the researchers did not examine
17 the role of fathers. Similarly, in a study with high school students, Williams, Cox, Hedberg,
18 and Deci (2000) showed that participants who perceived their parents to be autonomy
19 supportive valued intrinsic goals (i.e., self-acceptance, affiliation and community goals) more
20 highly and were less likely to rate as important extrinsic goals such as financial success and
21 image. Finally, a prospective study spanning twenty six years demonstrated that young adults
22 with extrinsic values had parents who were more controlling when they were children
23 (Kasser, Koestner, & Lekes, 2002). In view of this evidence, in the context of our
24 theoretically derived model we expected parental autonomy support (from both mothers and

1 fathers) to be positively related to psychological need satisfaction and the intrinsic goal of
2 health (hypothesis 7), and negatively related to image goals (hypothesis 8).

3 To the best of our knowledge, this is the first study to empirically test an SDT-derived
4 model incorporating parental autonomy support and life goals as predictors of the processes
5 underlying the development of unhealthy weight control behaviours in adolescent girls. As
6 such, the model has the potential to contribute to and expand previous literature in this area.
7 The model might also serve as an important framework for designing effective interventions
8 to reduce unhealthy weight control behaviours in this population.

9

10

Method

11 *Participants*

12 Participants were 350 adolescent girls aged 12-16 years (M age = 13.58; SD = 1.20) attending
13 recreational summer camps in and around Athens, Greece. All participants were secondary
14 school students from a low to middle class socioeconomic background. Based on Cole et al.'s
15 (2000) international cut-off criteria for body mass index for overweight and obesity in
16 children and adolescents aged 2-18, 85.70% were classified as either underweight or normal
17 weight and 14.30% as overweight or obese.

18 *Measures*

19 *Body Mass Index (BMI)*. Based on self-reported height and weight, BMI was calculated
20 using the formula kg/m^2 .

21 *Unhealthy weight control behaviours*. Adapted from similar scales previously used by
22 Neumark-Sztainer et al. (2002, 2006), participants were asked whether they had engaged in
23 any of the following behaviours in order to lose weight in the last year: "taken laxatives or
24 water pills", "taken diet pills", "skipped meals", "fasted (not eaten) for a day or more", and
25 "made yourself throw up". The participants were asked to rate the extent to which they had
26 engaged in each behaviour using a scale ranging from 1 (*never*) to 5 (*always*). For descriptive

1 purposes, the participants engaging in one or more of each behaviour “a little” (2),
2 “sometimes” (3), “a lot” (4), or “always” (5) were classified as using unhealthy weight control
3 behaviours (see Table 2). Internal reliability coefficients from past research are not available,
4 as weight control behaviours have traditionally been measured in a dichotomous fashion (e.g.,
5 Neumark-Sztainer et al., 2002, 2006).

6 *Body Image Concerns.* The Drive for Thinness (7 items) and Body Dissatisfaction (9
7 items) subscales from the Eating Disorder Inventory-2 (EDI-2; Garner, 1991) were used to
8 measure body image concerns. The drive for thinness subscale measures excessive concerns
9 with dieting, pursuit of thinness and weight preoccupation. The body dissatisfaction subscale
10 assesses dissatisfaction with a range of body parts (e.g., buttocks and hips), as well as the
11 degree to which these body parts are perceived to be too large/fat. Each item is measured on a
12 6-point scale ranging from 1 (*never*) to 6 (*always*). Garner provided evidence for the validity
13 and reliability of the EDI-2, and reported internal consistency coefficients ranging between α
14 = .80 and α = .92.

15 *Need Satisfaction.* The Basic Need Satisfaction in Life scale (Gagné, 2003) was used to
16 measure satisfaction of the needs for autonomy (7 items), competence (8 items) and
17 relatedness (6 items). The scale comprises 21 items measured on a scale from 1 (*not true at*
18 *all*) to 7 (*definitely true*). Example items are: “I feel like I am free to decide how to live my
19 life” (autonomy), “Most days I feel a sense of accomplishment from what I do” (competence),
20 and “I really like the people I interact with” (relatedness). Gagné reported alphas of .69, .86
21 and .71 for autonomy, relatedness and competence, respectively.

22 *Life goals.* The Aspirations Index (Kasser & Ryan, 1996) was adopted to measure the
23 importance of health and image goals (5 items for each goal). The participants were asked to
24 rate how important each of the life goals were to them on a scale ranging from 1 (*not at all*) to
25 7 (*very*). Example items included “to be physically healthy” (health) and “to have people

1 comment often about how attractive I look” (image). Piko and Keresztes (2006) have reported
2 high alpha reliability coefficients for the health ($\alpha = .84$) and image factors ($\alpha = .92$) in young
3 people ranging in age from 14 to 21 years.

4 *Parental autonomy support.* The Perception of Parents Scale (Grolnick, Ryan, & Deci,
5 1991) was used to measure perceptions of autonomy support provided by both parents. The
6 autonomy support scale consists of six items for each parent. The participants were asked to
7 circle the letter of one of four descriptions of a parent (mother and father, or where applicable
8 respective non-biological parents) that is most like her own. An example item is: "Some
9 mothers are always telling their children what to do *but* other mothers like their children to
10 decide for themselves what to do". Grolnick et al. presented internal reliability coefficients
11 from various samples ranging from $\alpha = .53$ to $\alpha = .70$.

12 *Procedures*

13 The study received approval from the ethics committee of a Greek University. All scales were
14 translated from English to Greek and backwards by a team of three bilingual university
15 professors. When consensus on the item content was achieved, the questionnaires were
16 distributed by trained research assistants to female participants in a recreational summer
17 camp. The participants and their parents signed informed consent forms and were reassured
18 that the responses to the questionnaires would be anonymous and confidential.

19 *Data analysis*

20 We first calculated Cronbach's alpha coefficients and descriptive statistics for all variables.
21 We also calculated frequency counts of engagement in each of the unhealthy weight control
22 behaviours. We then used structural equation modelling analysis (SEM) to test the
23 hypothesised process model. Given that we measured a variety of distinct behaviours, for
24 parsimony reasons we decided to include in the model one outcome dichotomous variable that
25 indicated whether the participants had engaged (i.e., had a frequency score of 2 or above; n

1 =128) or not (i.e., had a frequency score of 1; $n = 222$) in any of the five behaviours (for a
2 similar approach, see Neumark-Sztainer et al., 2002, 2006). We used the EQS software
3 (version 6. 1; Bentler, 2003) to perform the analysis. We employed the robust maximum
4 likelihood estimation method because the normalised estimate of Mardia's coefficient was
5 14.25, indicating departure from multivariate normality. For models containing categorical
6 variables (such as the dichotomous variable in our study), EQS uses the analytical approach
7 developed by Lee, Poon, and Bentler (1995).

8 Results

9 *Preliminary analyses*

10 Table 1 illustrates internal reliability coefficients and descriptive statistics for all variables.
11 All internal reliability coefficients were $\alpha > .70$, except the one for parental autonomy support
12 which displayed a marginal value ($\alpha = .67$). However, because of the centrality of this
13 construct within the model and self-determination theory, we retained the parental support
14 scale. The mean scores for most variables were generally in the moderate range, with the
15 exception of health goals, autonomy and relatedness need satisfaction, which were rated
16 relatively high. In contrast, the mean value for unhealthy weight control behaviour was quite
17 low. Table 2 displays frequency counts of engagement in each of the unhealthy weight control
18 behaviours. Skipping meals was a commonly adopted strategy, while fasting was adopted, at
19 least occasionally, by nearly one third of the participants. Vomiting to lose weight was a more
20 commonly adopted behaviour compared to using laxatives, water pills and diet pills.

21

22 *Testing the Hypothesised Model*

23 SEM was used to model the process by which parental autonomy support and life goals
24 predict unhealthy weight control behaviours. Body mass index and unhealthy weight control
25 were observed variables in the model. The psychological constructs in the model were tested

1 as latent factors. Body image concerns were modelled as a latent factor indexed by the
2 composite scores for drive for thinness and body dissatisfaction. Psychological need
3 satisfaction was indexed by three indicators representing the composite scores for autonomy,
4 competence and relatedness. Family autonomy support, health goals and image goals were
5 indexed by three indicators each. These indicators (also called “parcels”) represented
6 unweighted average scores created by pairing up items with the strongest loadings with items
7 with weaker loadings from the same scale (Little, Cunningham, Shahar, & Widaman, 2002).
8 Parcelling is used with unidimensional scales as a means of increasing the stability of
9 parameter estimates and keeping an acceptable ratio of sample size to estimated parameters in
10 studies involving relatively low sample sizes (Bandalos & Finney, 2001).

11 We first tested the model shown in Figure 1 having independent (but correlated)
12 mother and father autonomy support factors. However, this model did not converge and
13 produced an improper solution with many standardised parameter coefficients being greater
14 than 1 (including the correlation between the two autonomy support factors). An inspection of
15 the modification indices suggested that the residuals of their respective indicators should be
16 also correlated. Based on this finding, we collapsed the two factors into a Parental Autonomy
17 Support factor and re-tested the model. The solution converged, producing good fit indices:
18 Robust $\chi^2(97) = 176.10, p < .01$; robust NNFI = .94, robust CFI = .96, robust RMSEA = .05,
19 SRMR = .06. As shown in Figure 1, parental autonomy support negatively predicted image
20 goals and positively predicted health goals. However, the latter path was not statistically
21 significant, contrary to our expectations. Psychological need satisfaction was positively
22 predicted by parental autonomy support and health goals and negatively predicted by image
23 goals. However, contrary to our hypothesis, the prediction made by image goals was not
24 statistically significant. After controlling for body mass index, body image concerns were
25 negatively predicted by psychological need satisfaction and positively by image goals. Lastly,

1 unhealthy weight behaviours were positively predicted by body image concerns. We removed
2 the two non-significant paths and re-estimated the model, however, the fit indices and
3 parameter estimates remained essentially unchanged. The average corrected R squared
4 coefficient for these regression paths was 30%. The average item-factor loading in the model
5 was .71. Significant indirect effects ($p < .05$) on unhealthy weight behaviours were found
6 from body mass index ($\beta = .41$), psychological need satisfaction ($\beta = -.19$), parental autonomy
7 support ($\beta = -.10$), health ($\beta = -.05$) and image ($\beta = .14$) goals. The other significant indirect
8 effect in the model was from health goals to body image concerns ($\beta = -.11$)¹. We did not
9 conduct tests for mediation because there is no conceptual evidence to suggest that the
10 intervening variables are mediators (for a discussion between mediated and indirect effects,
11 see Preacher & Hayes, 2004).

12
13

Discussion

14 Drawing from Deci and Ryan's (2000) self-determination theory, the present study aimed to
15 test a model presenting socio-contextual and personal predictors of body image concerns and
16 unhealthy weight control behaviours in a sample of female adolescents. The results were
17 largely supportive of the model and our hypotheses and were aligned with previous related
18 work (e.g., Pelletier & Dion, 2007; Thøgersen-Ntoumani & Ntoumanis, 2007). Specifically,
19 we found basic need psychological satisfaction to be a direct negative predictor of body image
20 concerns (as indicated by drive for thinness and body dissatisfaction), and an indirect negative
21 predictor of unhealthy weight control behaviours (e.g., skipping meals, fasting). Further, body
22 image concerns had an independent effect on unhealthy weight control behaviours. Taken
23 together, these findings fully support our first three hypotheses. As advocated by Deci and
24 Ryan, the struggle to control one's body appearance as well as the engagement in behaviours
25 that compromise one's health and well-being are often reflective of compensatory processes
26 that are triggered by one's frustration of basic psychological need satisfaction. In contrast, when

1 the three basic psychological needs are satisfied, individuals tend to act in accordance with
2 inner resources to pursue personally meaningful activities that enhance, as opposed to
3 undermine, their psychological and physical well-being (Deci et al., 2001).

4 Given that body image pressures and associated unhealthy weight control behaviours
5 are frequently manifested during adolescence (e.g., Levine & Smolak, 2002; Richards, et al.,
6 1990), in particular in females, it is important to understand which factors predict
7 psychological need satisfaction in this population, and indirectly unhealthy weight control
8 behaviours. Again drawing from SDT, we examined two such factors in our model. These
9 were the life goals that the adolescents held and the degree to which their parents were
10 autonomy supportive. According to Kasser and Ryan (1996), the life goals or aspirations that
11 individuals hold can be broadly categorised as being intrinsic or extrinsic in nature. In this
12 study we examined two life goals that are relevant to the physical domain. The first was the
13 intrinsic goal of being physically healthy and the second goal was the extrinsic goal of an
14 attractive image. Based on Kasser and Ryan and Vansteenkiste et al.'s (2007) work, we
15 expected (hypotheses 4 and 5) that health goals would positively predict psychological need
16 satisfaction, whereas image goals would be either negatively related or unrelated to need
17 satisfaction. Both hypotheses were supported in our model. Having the goal of leading a
18 healthy lifestyle leads individuals to choices that support self-actualisation and personal
19 growth and minimise risk to physical and psychological health. Such lifestyle choices and
20 actions do not impair one's social interactions and, because they are self-concordant, they
21 attract high levels of effortful investment often resulting in goal attainment (Sheldon & Elliot,
22 1998). In contrast, extrinsic goals are not conducive to the satisfaction of the three
23 psychological needs. The goal of an attractive image usually results in the pursuit of
24 externally-defined standards of attractiveness and beauty that control one's behaviours and
25 choices, does not promote or encourage meaningful interactions with others and offers, at

1 best, short-lived feelings of personal effectance. In our study image goals were unrelated to
2 psychological need satisfaction and, as expected (hypothesis 6), were positively related to
3 body image concerns. The latter finding suggests that current stringent (and for many young
4 females unattainable; Levine & Smolak, 2002) standards of appearance ideals can result in
5 feelings of insecurity and dissatisfaction with body appearance. It is also worth noting that
6 health and image goals had significant indirect effects on unhealthy weight control behaviours
7 via body image concerns and (for health goals only) psychological need satisfaction.

8 The second factor we studied as a predictor of psychological need satisfaction, and
9 indirectly unhealthy weight control behaviours, in female adolescents was parental autonomy
10 support. Based on Deci and Ryan's (2000) theorising and previous empirical work (e.g.,
11 Williams et al., 2000), we expected that parents who support their children's initiatives, offer
12 choices, minimise pressure and do not impose their own beliefs and standards, are more likely
13 to facilitate psychological need satisfaction in their offspring and the adoption of intrinsic
14 goals (hypothesis 7), as opposed to extrinsic goals (hypothesis 8). Whereas hypothesis 8 was
15 supported, hypothesis 7 was only partly supported. Specifically, parental autonomy support
16 was a positive predictor of adolescent's need satisfaction, but was unrelated to the pursuit of
17 health goals. Whilst the link between autonomy support and psychological need satisfaction is
18 in accordance with a large body of literature (e.g., see Gronlick et al., 1991), the latter finding
19 was unexpected. It is possible that health goals, as opposed to other intrinsic goals such as
20 community contribution, are less influenced by external influences and more likely to develop
21 from personal beliefs and values. An alternative explanation is that health goals, as other life
22 goals in adolescence, are probably affected not only by parents but also by other social agents,
23 in particular peers. This might explain why the paths from parental autonomy support to both
24 life goals assessed in our study were smaller than the other paths in the model. Lastly, it is
25 interesting to note that parental autonomy support had a significant indirect effect on

1 unhealthy weight control behaviours via psychological need satisfaction and body image
2 concerns.

3 *Conclusions, Implications, Limitations and Future Research Directions*

4 Our findings indicate that many Greek adolescent females engage in unhealthy weight control
5 behaviours (primarily skipping meals and fasting for a day or more). Such behaviours reflect
6 concerns and feelings of dissatisfaction with their body image. Our results also indicate that
7 when adolescents' basic psychological needs are satisfied, they are less likely to worry about
8 the adequacy of their body appearance and engage in unhealthy weight control behaviours.
9 All three psychological needs played an important role in this study. This can be inferred by
10 the relatively similar loadings of the three psychological needs on the psychological need
11 satisfaction latent variable. Further, correlation analysis (not reported here, but available upon
12 request), showed that the correlations of each psychological need with autonomy support, the
13 two life goals, body dissatisfaction and drive for thinness were very similar. Psychological
14 need satisfaction is facilitated when adolescents pursue life goals that aim to sustain a healthy
15 lifestyle and when their parents are supportive and empowering. In contrast, pursuing life
16 goals that aim to attain societal standards of ideal physique is not conducive to psychological
17 need satisfaction and may result in worries and feelings of inadequacy about one's body
18 image.

19 Our findings have implications for parenting practices and for the promotion of life
20 goals in young people. In terms of parenting practices, the benefits of parental autonomy
21 support found in this study are aligned with a large volume of SDT literature. It should be
22 stated here that Gronlick, Deci and Ryan (1997) have made an important distinction between
23 autonomy and independence. Promoting adolescents' autonomy does not mean that parents
24 should become distant or encourage their offspring to break ties with them. Rather, autonomy
25 support implies that parents should offer emotional support, advice and guidance when

1 needed without demanding conformity; their overarching aim should be to help their children
2 take responsibility for their actions and their consequences. In contrast, it is cold, distant or
3 unreliable parenting that promotes children's independence because the latter have to learn to
4 act on their own without parental advice or guidance. According to Gronlick et al., children
5 with emotionally supportive parents display better mental health than those with detached
6 parents. In addition of being autonomy supportive or distant, parents can also be controlling in
7 their interactions by exerting pressure, demanding conformity, minimising choice and
8 applying excessive monitoring. Such controlling behaviours undermine psychological need
9 satisfaction (Deci & Ryan, 2000). It would be interesting if future research examining the role
10 of parental influence on young people's body image concerns and dysfunctional weight
11 control behaviours considered, besides autonomy support, controlling and detached parental
12 interpersonal styles.

13 The second implication of our findings concerns the life goals female adolescents
14 adopt. Our findings offer support to previous SDT-based work (e.g., Kasser et al., 1996;
15 Vansteenkiste et al., 2007) demonstrating the adaptive role of intrinsic goals, as opposed to
16 extrinsic goals, for psychological need satisfaction and optimal functioning. Whilst the extent
17 to which different goals are adopted might be to some extent dependent upon intra-psychic
18 processes and personal traits (Spence, Oades, & Caputi, 2004), SDT-based research has
19 consistently shown the influential role of the social context (Kasser et al., 1995). As alluded to
20 earlier in this discussion, parents might not be the only significant others that influence
21 adolescents' life aspirations. Thus, future research might want to examine the role of peers,
22 romantic partners, teachers and the media in shaping young people's intrinsic and extrinsic
23 aspirations and, indirectly, impacting upon their body image perceptions and weight control
24 behaviours.

1 A limitation of this study is that its design does not allow the examination of
2 reciprocal effects over time. For example, the degree of psychological need satisfaction can
3 also predict future life goals or aspirations of individuals; when psychological needs are not
4 fulfilled individuals are more likely to compensate by striving towards extrinsic goals (Deci &
5 Ryan, 2000). Also, it is possible that body image concerns can contribute to future
6 perceptions of lack of need satisfaction. These reciprocal mechanisms should be investigated
7 in the future with longitudinal designs. Our study relied on self-reports. Whereas one could
8 argue for the inclusion of independent measures of autonomy support, such measures are not
9 free from personal biases. Further, according to Deci and Ryan (1987), it is the subjective
10 perception and interpretation of the contextual influences that has a greater influence on
11 individuals' behaviour as opposed to other-source ratings of such influences. In terms of
12 unhealthy weight control behaviours, the use of non-self reports is bound to be, at best,
13 incomplete. Further, our findings indicate that a large percentage of the participants reported
14 engaging in one or more unhealthy behaviours, despite the obvious scope for social
15 desirability bias. Another limitation of this study is that it was not possible to examine the
16 independent effects of maternal and paternal autonomy support due to the high correlation
17 between these two variables. This is not uncommon in the SDT literature which has often
18 collapsed ratings of autonomy support for each parent (e.g., Soenens & Vansteenkiste, 2005;
19 Soenens et al., 2007). This is probably because the parenting style within a family tends to be
20 somewhat similar or at least perceived as such by adolescents. Further, from a theoretical
21 perspective it is not expected that parents' gender would moderate the degree to which
22 perceptions of autonomy support impact on psychological need satisfaction, weight control
23 concerns and associated behaviours. Lastly, our study is limited in that no exact response rates
24 were recorded and no information was gathered to examine the representativeness of the
25 sample. Nevertheless, it should be stated that the data collection was facilitated by the camp

1 organisers who advertised the study and actively encouraged parents and children to
2 participate. Thus, the vast majority of those approached agreed to participate in the study.
3 Further, to the best of our knowledge, our sample is representative of Greek female
4 adolescents. The participants came from a predominantly lower and middle class background
5 and were from the metropolitan region of Athens (within which about 40% of the Greek
6 population resides).

7 Our findings were obtained from a sample of female adolescents. We chose to study
8 this sample because in Western societies there is a high prevalence of unhealthy weight
9 control behaviours and disordered eating attitudes among young females (e.g., Croll et al.,
10 2002; Neumark-Sztainer et al., 2002; Yannakoulia et al., 2004). However, there is evidence to
11 suggest that young males also engage in disordered eating behaviours (e.g., Haines, Neumark-
12 Sztainer, Eisenberg, & Hannan, 2006). Thus, future research should examine whether SDT-
13 based predictors, such as those utilised in this study, could also be applied to study body
14 image concerns and unhealthy weight control behaviours in adolescent males. Further, future
15 work should attempt to integrate SDT and other theoretical frameworks in this research area
16 (e.g., social comparison theory; Wood, 1996) to test a comprehensive model outlining a
17 sequence of distal and more proximal predictors of body dissatisfaction and unhealthy weight
18 control behaviours. Lastly, future research could extend our model by investigating whether
19 unhealthy weight control behaviours impact on outcomes such as school performance and
20 likelihood of illegal substance use.

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Footnote

1. An anonymous reviewer requested that we removed the overweight and obese participants from the data set and repeat the SEM analysis to ensure that our results are not attributable to this group. We did so and the fit indices of the new model were very similar to the fit indices of the original model: Robust $\chi^2(97) = 147.62$, $p < .01$; robust NNFI = .96, robust CFI = .97, robust RMSEA = .04, SRMR = .06. Further, most path coefficients were very similar in size and direction with the exception, as one might expect, of the path coefficients from BMI to body image concerns ($\beta = .69$; $\beta = .84$ in the original model), and from body image concerns to unhealthy weight control behaviours ($\beta = .31$; $\beta = .48$ in the original model). We prefer not to exclude overweight and obese adolescents from our study and, therefore, we decided to present the original model in Figure 1.

Table 1

Cronbach's Alpha Reliability Coefficients and Descriptive Statistics for all Variables

Variables (range of scale)	α	M	SD
Parental autonomy support (1-4)	.67	2.69	.42
Image goals (1-7)	.86	4.47	1.51
Health goals (1-7)	.77	6.23	.92
Autonomy need satisfaction (1-7)	.73	5.04	.97
Competence need satisfaction (1-7)	.75	4.95	.98
Relatedness need satisfaction (1-7)	.79	5.44	.89
Drive for thinness (1-6)	.82	3.28	1.27
Body dissatisfaction (1-6)	.85	3.04	1.20
Unhealthy weight control behaviours (1-5)	.75	1.25	.47

Table 2

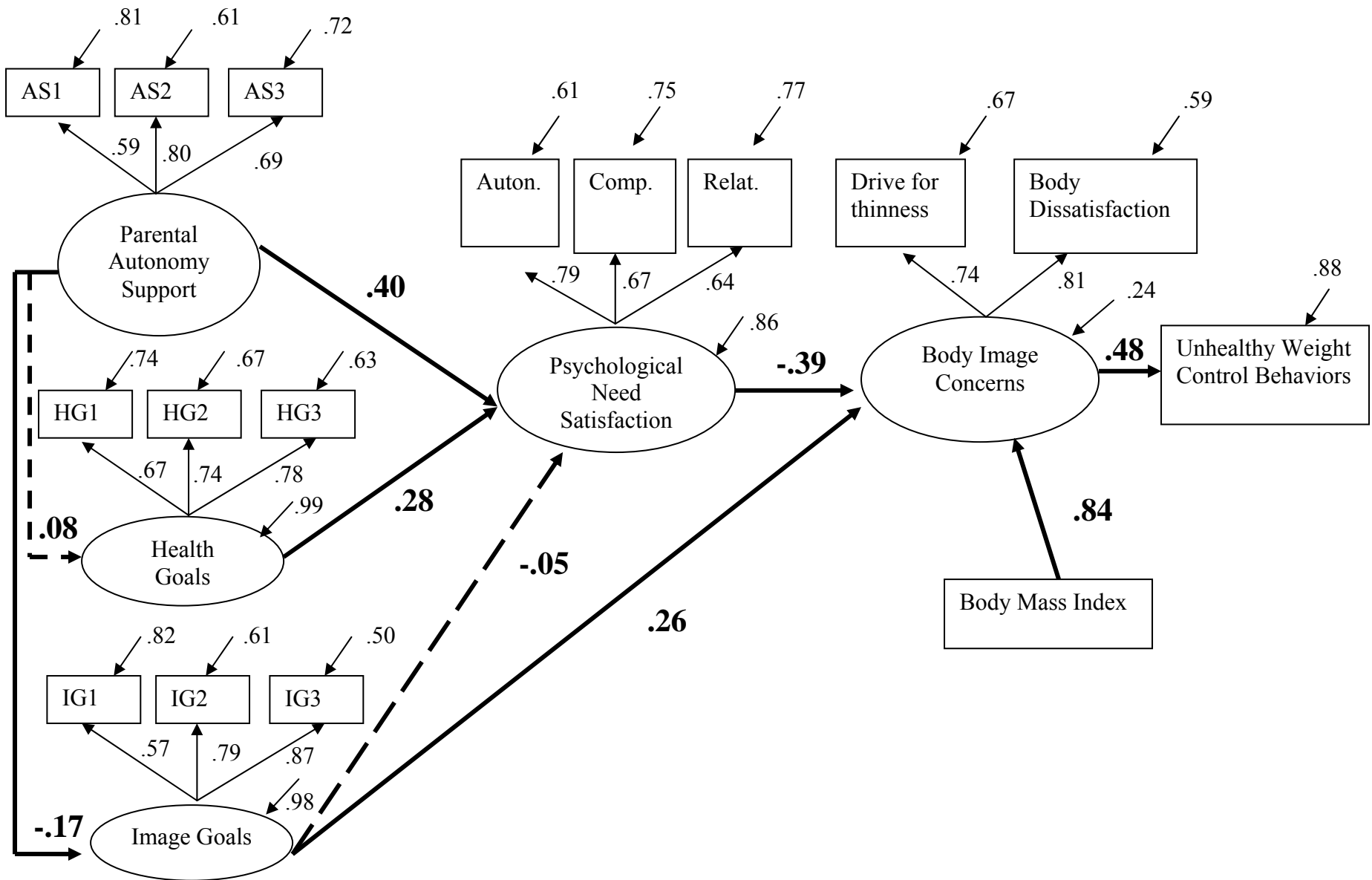
Frequency Counts of Engagement in Each Unhealthy Weight Control Behaviour During the Past Year

	<i>n</i>	<i>%</i>
Laxatives and/or water pills	12	3.40
Diet pills	11	3.10
Skipping meals	236	67.40
Fasting (for a day or more)	109	31.10
Vomiting	36	10.30

Note: Total *N*= 350

Figure Caption

Figure 1. Modelling the hypothesised process by which parental autonomy support and life goals predict unhealthy weight control behaviours



Note: The two dotted lines indicate non-significant (at $p < .05$) parameters. Ovals indicate latent factors and rectangles represent observed variables. Thicker lines indicate the major paths of interest. The residuals of health and image goals were correlated ($r = .31$).

