

Binge eating as a consequence of unfulfilled basic needs: The moderating role of implicit achievement motivation

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Abstract The present study hypothesized that unfulfilled basic needs for autonomy, competence and relatedness (SDT, Deci and Ryan, *Psychol Inq* 11:227-268, 2000) are associated with the impulse to eat and with binge eating. In addition, we assumed that individuals with a high achievement motive, who are characterized by high self-control competences, have the same impulse to eat when confronted with unfulfilled basic needs, but are better able to control the impulse to binge eat than individuals with a low achievement motive. In accordance with these hypotheses, unfulfilled basic needs significantly positively predicted the impulse to eat as well as binge eating behavior. As also expected, the achievement motive did not moderate the effect of unfulfilled needs on the impulse to eat, but did influence the effect of unfulfilled needs on binge eating. The results are discussed in terms of a broader debate about the interaction between basic needs and implicit motives.

Keywords Self-determination theory · Implicit achievement motivation · Motive disposition theory · Eating disorders

Introduction

Eating is usually a source of pleasure, for example when enjoying a tasty meal with friends and family. However, it

is also a source of physiological and psychological problems. For example, overeating can result in overweight and obesity which in turn play a dominant role in the development of cardiac problems, diabetes and gastric disorders (Lavie et al. 2009; McCann and Bovbjerg 1998; VanItallie and Lew 1992) and are linked to psychological impairments such as reduced well-being, low self-esteem and depression (Heatherton 1993; Wott and Carels 2010). Problematic eating can result in eating disorders such as bulimia, anorexia nervosa or the binge eating disorder (Downe et al. 2009; Marchi and Cohen 1990).

The present research focuses on binge eating, which is often a symptom of the binge eating disorder but also appears in non-clinical populations. In the classification of mental disorders, binge eating is subsumed under the non-specific eating disorders (e.g., DSM-IV, APA 1994; for diagnostic criteria see also Nangle et al. 1994) being characterized by episodes of eating in which individuals rapidly consume an excessive amount of high-energy food. Another characteristic is that binge eaters experience a loss of control over their eating behavior regarding the amount and the kind of food they eat. The present research analyzed unfulfilled basic needs according to self-determination theory (SDT) and the implicit achievement motive as important conditions for binge eating. The theoretical framework that leads us to this assumption is presented in the following paragraphs.

Unfulfilled basic needs and eating disorders

In the Basic Psychological Needs Theory (BPNT), which is a sub-theory of the Self-Determination Theory (SDT), Deci and Ryan (1985, 2000; see also Ryan and Deci 2008) conceptualize the psychological need for autonomy, which is the urge to self-determine one's behavior and to feel free

of being controlled by others; the need for competence, which is the desire to feel competent and master challenges effectively; and the need for relatedness, which is the desire to feel cared for and to belong to others, as innate basic requirements of all human beings. When these basic needs are fulfilled, well-being and intrinsic motivation result (Deci and Vansteenkiste 2004, p. 26). However, unfulfilled basic needs or basic need thwarting is associated with negative consequences such as impaired intrinsic motivation, well-being, health and work performance (e.g., Deci and Ryan 1985; Deci and Moller 2007; Deci and Ryan 2008; Illardi et al. 1993).

Another consequence of unfulfilled basic needs, which is directly linked to our research question, is that people often try to compensate for unfulfilled needs for autonomy, competence and relatedness by developing rigid behavior patterns such as restricted eating (Deci and Ryan 2000). By restricting their eating behavior, individuals try to gain the control over their behavior and its outcomes that they are missing in their everyday lives. A study by Strauss and Ryan (1987) showing that patients with anorexia nervosa reported a lack of autonomy and feelings of ineffectiveness supports the theoretical assumption that unfulfilled needs for autonomy and competence are associated with eating disorders. Meanwhile a series of studies supports the association between unfulfilled needs and problems associated with restricted eating (Pelletier et al. 2004; Stok et al. 2010; Thogersen-Ntoumani and Ntoumanis 2007).

Restricted eating such as dieting is discussed as a major cause of problematic eating such as binge eating and as an important precursor of eating disorders (Downe et al. 2009; Hsu 1990). Studies have shown that binge eating often follows a period of voluntary dieting in clinical (Haiman and Devlin 1999; Mitchell et al. 1985) and non-clinical individuals (Jacobi et al. 2004; Keys et al. 1950; Larsen et al. 2007). An important trigger that links restricted eating to a binge eating episode is additional emotional arousal (Macht 2008; Spoor et al. 2007). For example, people report binge eating when they feel anxious, disappointed or have to deal with uncomfortable situations (Stein et al. 2007). This is in accordance with affect regulation models of eating disorders, which assume negative affectivity to be an important reason for overeating (Hoppa and Hallstrom 1981), and with the emotional eating concept, according to which emotional eating and overeating are an inappropriate response to distress (Heatherton et al. 1991). Therefore, individuals eat to provide comfort and compensate for negative emotions.

In the present paper we have assumed that the shift from restricted eating, due to unfulfilled needs, to uncontrolled eating starts with the individual's attempt to establish or re-establish feelings of competence and control by controlling their body (restricted eating) (Deci and Ryan 2000). But

then they fail to maintain the high level of self-control required for restricted eating, for example due to additional emotional strain (Macht 2008). As a result of the breakdown of self-control they cannot resist the temptation to eat and start to binge eat. This interpretation is supported by the fact that binge eaters often feel a sense of uncontrollability in connection with stopping eating (Stein et al. 2007).

Implicit achievement motive as moderator

If reduced self-control is part of the process that links unfulfilled needs to binge eating, the effects of unfulfilled needs should be less pronounced for individuals characterized by dispositional high self-control competences. One such group is individuals with a high achievement motive. The achievement motive is defined as the desire to surpass personal standards of excellence and the capacity to derive satisfaction from the mastery of challenging tasks (e.g., McClelland et al. 1953; Schultheiss and Brunstein 2005). The motive disposition approach assumes that individuals differ in the strength of their achievement motive due to child-rearing practices (parental push for independence) and due to early childhood experiences of the positive feelings of competence, mastery and pride when encountering and mastering challenging tasks (e.g., McClelland 1985). As adults, individuals with a high achievement motive choose medium-difficulty tasks, search for self-referenced feedback and prefer high personal responsibility for performance (for a summary see Schultheiss and Brunstein 2005). The moderate uncertainty of challenging tasks functions as an incentive that signals the positive affect of mastery which in turn "inoculates achievement-motivated individuals against the initial frustrations of working on a challenging task" (Schultheiss and Brunstein 2005, p. 44). Rather than being frustrated when confronted with challenges in goal striving, individuals with a high achievement motive exert large amounts of effort, for example by being fully concentrated and highly persistent in order to attain the desired goal (for a summary of the achievement motive see Brunstein and Heckhausen 2008). They develop high self-control competences such as resistance to temptations which would thwart goal attainment. For example, individuals with a high achievement motive have a high ability and willingness to delay gratification (Mischel 1961), which is an important component of self-control (Mischel 1973, 1996). Delay of gratification is defined as the competence "to defer immediate gratification for the sake of later but more valued outcomes" (Mischel and Gilligan 1964, p. 411).

Returning to the present research question, in the sphere of eating the delay of gratification is the ability to postpone an immediately available opportunity to satisfy an impulse (pleasure associated with eating) in favor of pursuing

challenging goals (e.g., eating healthily, dieting). We assume that individuals with a high achievement motive, who by definition have high self-control competences and can better resist temptations, may have the same strong impulses to eat, but can better control their impulses to binge eat than individuals with a low achievement motive. Thus they should react with binge eating less often when their basic needs are unfulfilled. In statistical terms, we hypothesized that the achievement motive does not influence the relationship between unfulfilled basic needs and the impulse to eat. However, it is assumed to moderate the effects of unfulfilled basic needs on binge eating. Subjects with a high achievement motive should report lower binge eating behavior due to better self-control competencies than individuals with a low achievement motive.

Present research

Binge eaters often feel ashamed and try to hide their eating behavior from others. We therefore used a web survey to address our research question in order to guarantee complete anonymity, hopefully facilitating honest answers and preventing respondents from giving socially desirable answers. To sum up the hypotheses presented above, we first assumed that unfulfilled basic needs predict the impulse to eat and binge (hypothesis 1). Whereas the effect of unfulfilled basic needs on the impulse to eat is hypothesized not to be moderated by the implicit achievement motive (hypothesis 2), the implicit achievement motive is expected to moderate the unfulfilled basic need effect on binge eating (hypothesis 3). Unfulfilled basic needs were expected to lead to binge eating only for low but not for high achievement motivated individuals.

In order to emphasize our assumption that high self-control competencies rather than other characteristics of individuals with a high achievement motive account for the moderator effect, we also examined the affiliation and power motive. The affiliation motive is the capacity to derive satisfaction from establishing, maintaining, and restoring positive relationships with others (Atkinson et al. 1958) and the power motive is defined as a preference for situations in which one has physical, mental or emotional impact on others (McClelland 1985; Schultheiss 2008). These motives share important characteristics with the achievement motive (e.g., they energize goal-directed behavior; lead to highly-motivated behavior), but differ in the critical characteristic of self-control. When confronted with unfulfilled basic needs, individuals with a high affiliation or a high power motive should not be better able to control their impulses to binge eat than individuals with a low achievement motive. Thus our fourth hypothesis stated that the affiliation and the power motive would not moderate the unfulfilled need binge eating relationship.

Method

Participants and procedure

Fifty-two male and 88 female participants with a mean age of 31.13 (SD = 10.68; range from 18 to 63) filled in a web survey. They were recruited by two different methods. First, e-mail lists kept by the second author containing the e-mail addresses of students, alumni, employees and other persons who had in the past said that would in principle be interested in participating in psychological studies, were used to advertise the present study. Of the 160 who were contacted by e-mail 46 agreed to participate. A second method of recruitment was by providing information about the study on Internet sites dealing with nutrition as their main subject of interest (e.g., dietary advice, discussion forums). Here 94 individuals volunteered to participate in the study. In both methods of recruitment, the study was described as being an examination of human eating behavior and participants were given a direct link to the web survey. To ensure self-determined participation, no incentive payments were made. In the web survey, participants first filled in the implicit motive measure and then rated items measuring basic need satisfaction. The impulse to eat and binge eating measures were then administered, followed by questions regarding the participants' body weight, height, age and gender.

Measures

Implicit motives were measured using the Picture Story Exercise (cf. McClelland et al. 1989; Schultheiss and Pang 2007). Similarly to Murray's Thematic Apperception Test (TAT) (Murray 1943), participants saw pictures and were asked to write down imaginative stories that were coded by the experimenters regarding motive imagery. We followed the suggestion of Schultheiss and Pang (2007) and used six pictures (*couple by river*, *nightclub scene*, *women in laboratory*, *ship captain*, *trapeze artists*, and *boxer*) which were shown on the screen for 8 s. Participants wrote a story about each picture directly into the web survey, after 3 min they were told to finish their story and 1 min later the next picture was presented.

In the present study we used Winter's (1994) running text scoring system, which is psychometrically well validated (Winter 1991) and allows the implicit achievement, affiliation and power motives to be coded for. In this scoring system the achievement motive is scored when participants write about a standard of excellence. This standard of excellence can be expressed by (1) adjectives that positively evaluate performance, (2) goals that are described in ways that suggest positive evaluation, (3) mentioning competing or winning, (4) mentioning failure which is associated with

negative feelings and by (5) unique accomplishments (for details see Winter 1994). The affiliation motive is scored when participants write about the establishing, maintaining or restoring friendly relations with others. The warm and friendly quality of the relationship can be expressed by (1) positive and friendly feelings toward other persons, (2) negative feelings about separation of a relationship, (3) affiliative activities which are characterized by a warm quality and (4) friendly nurturing actions (for details see Winter 1994). The power motive is scored when participants write about people who control or influence other persons. The six sub-categories are (1) strong and forceful actions which have an impact on others, (2) control or regulation, (3) attempts to influence, convince or argue in order to affect others, (4) giving help that is not elicited, (5) impressing others, for example through fame and prestige.

According to Schultheiss and Pang (2007), the objectivity of coding can be ensured by coders who have established a percentage agreement of at least 85% with training materials pre-scored by experts. In the present study, the experienced coder established percentage agreement of 98% with practice materials which were reprinted in Smith (1992). To further ensure coding objectivity, we computed the interrater reliability between two independent scorers for a subset of 10% of the whole sample. The interrater agreement was high, with 87% for the achievement motive, 88% for the implicit affiliation motive and 87% for the power motive.

The *satisfaction of the basic needs* was measured using the Basic Need Satisfaction in General Scale (e.g., Gagné 2003; Kashdan et al. 2006). This consists of seven items representing the need for autonomy scale (e.g., I feel like I am free to decide for myself how to live my life), seven items for the need for competence scale (e.g., I have been able to learn interesting new skills recently) and seven items for the need for relatedness scale (e.g., I consider the people I regularly interact with to be my friends), which were rated by participants using a rating scale ranging from 1 (not at all true) to 7 (very true). The internal consistencies of the autonomy (Cronbach Alpha = .81), competence (Cronbach Alpha = .77) and relatedness subscales (Cronbach Alpha = .77) were sufficiently high. Because we were interested in need satisfaction in general, we computed the mean of the subscales ($M = 5.29$, $SD = .63$; Cronbach Alpha = .88).

The *impulse to eat* in response to emotional arousal was assessed using five items from the *emotional eating* subscale of the Dutch Eating Behavior Questionnaire (DEBQ; van Strien et al. 1986; German Version: Grunert 1989). Participants rated their agreement with statements such as “Do you have a desire to eat when you are irritated?” and “Do you have a desire to eat when you are depressed or discouraged?” using a 7-point scale from not at all (1) to very much (7). A mean score was computed (Cronbach’s Alpha = .84).

Binge eating behavior was assessed using five items from the eating attacks subscale of Diehl and Staufenbiel’s (1994) Eating Behavior and Weight Problems Inventory (EWI). Examples include “When I start to eat I sometimes feel an almost uncontrollable urge to stuff myself” and “I sometimes give into attacks of bingeing whereby I notice that I am unable to stop eating”. Participants were asked to rate their agreement with each item on a 7-point scale with endpoints labeled not at all (1) and very much (7). A mean score was computed (Cronbach’s Alpha = .91).

The *body-mass-index* (BMI) was calculated by dividing body weight by height squared.

Results

Preliminary analyses

Preliminary analyses showed that men and women differed in their age (women: $M = 33.40$, $SD = 10.54$; men: $M = 27.29$, $SD = 9.87$, $F(1,140) = 11.52$, $p < .01$) and BMI (women: $M = 22.4$, $SD = 3.68$; men: $M = 23.66$, $SD = 2.98$, $F(1,140) = 3.91$, $p < .05$), but not in need satisfaction, implicit motives or in the eating variables.

Because the motive scores of the Picture Story Exercise were associated with the number of words in the imaginative stories (achievement: $r = .47$, $p < .01$; affiliation: $r = .55$, $p < .01$; power: $r = .60$, $p < .01$), we residualized the motive scores for word count and used the standardized residual scores for the analyses reported below (see Schultheiss and Pang 2007).

The body-mass-index in our sample ranges from 15.11 to 34.00 for women and 18.10 to 33.90 for men. In terms of the World Health Organization criteria we had nine underweight, 93 normal weight, 30 overweight and eight obese individuals in our sample.¹

Descriptive statistics and correlations

Table 1 presents the descriptive statistics of the variables and Table 2 shows the correlations between the variables. To name but a few significant correlations, need satisfaction was negatively related to impulse to eat ($r = -.38$, $p < .001$) and binge eating ($r = -.29$, $p < .001$), which is in accordance with our hypothesis that unfulfilled needs are associated with dysfunctional eating. Need satisfaction was positively correlated with the affiliation motive ($r = .36$, $p < .001$) and the achievement motive ($r = .16$, $p < .10$),

¹ According to the World Health Organization (2000), the normal range of the BMI is between 18.50 and 24.99. The definition of underweight is a BMI of less than 18.50. Overweight is defined by a BMI higher than 25.00 and the cut off criterion for obesity is a BMI higher than 30.00.

Table 1 Means and standard deviations of the variables

	<i>M</i>	<i>SD</i>
Age	31.13	10.68
BMI	22.91	2.48
Autonomy	5.20	.85
Competence	5.30	.88
Relatedness	5.54	.76
ACH	4.19	2.38
AFF	4.46	2.41
POW	4.11	2.49
Impulse	2.11	.95
Binge	2.04	1.01

BMI body mass index; *autonomy/competence/relatedness* basic need for autonomy/competence/social relatedness satisfaction; *ACH* achievement motive; *AFF* affiliation motive; *POW* power motive; *impulse*: impulse to eat; *binge* binge eating

although the latter correlation failed to reach significance. In contrast, need satisfaction was negatively associated with the power motive ($r = -.25, p < .01$).

Because the BMI was correlated with our dependent variable binge eating ($r = .31, p < .001$) we will control for the BMI in the further analyses. The BMI was also negatively related to the implicit achievement motive, indicating that participants with a high achievement motive reported a lower BMI ($r = -.18, p < .05$).

Prediction of eating variables from unfulfilled basic needs

The correlational analyses presented in Table 2 provides initial support for our assumption that unfulfilled basic needs are associated with the impulse to eat and binge eating. In order to control for the BMI, we first regressed impulse to eat on BMI (step 1 in hierarchical regression) and need

satisfaction (step 2). In accordance with hypothesis 1, need satisfaction turned out to be a significant negative predictor of the impulse to eat ($\beta = -.37, b = -.37, seb = .08, \Delta R^2 = .14, \Delta F(1, 137) = 23.00, p < .001$), (BMI: $\beta = .25, b = .25, seb = .08, p < .01$; overall model: $R^2 = .19, F(2, 139) = 15.69, p < .001$). In a second analysis (step 1: BMI; step 2: basic need satisfaction) we found that need satisfaction also predicts binge eating significantly ($\beta = -.32, b = -.32, seb = .07, \Delta R^2 = .10, \Delta F(1, 137) = 17.23, p < .001$) (BMI: $\beta = .33, b = .33, seb = .08, p < .001$; overall model: $R^2 = .20, F(2, 139) = 16.81, p < .001$).

Moderator analyses

According to hypothesis 2 the implicit motive should not influence the effect of basic need satisfaction on the impulse to eat. A hierarchical regression analysis with BMI as step 1, need satisfaction (NSat) and the implicit motive (Ach) as step 2 and the interaction of NSat and Ach as step 3 confirmed the hypothesis. No interaction effect was seen ($b = .03, seb = .08, \Delta R^2 = .00, \Delta F(1, 135) = .14$), but a main effect for basic need satisfaction ($b = -.35, seb = .08, p < .001$) was revealed (overall model: $R^2 = .19, F(4, 139) = 7.94, p < .001$).

In order to test hypothesis 3 that the effect of unfulfilled basic needs on binge eating is moderated by the implicit achievement motive, we conducted the same hierarchical regression analysis as described above with binge eating as the dependent variable (BMI as Step 1, NSat and Ach as Step 2 and the NSat × Ach interaction as Step 3). Table 3 shows that the analysis revealed a significant NSat × Ach interaction effect ($b = .18, seb = .08$) in addition to the main effect for BMI ($b = .32, seb = .08, p < .001$). The interaction pattern illustrated in Fig. 1 shows that, as expected, unfulfilled basic needs had negative effects on binge eating in individuals with a low achievement motive.

Table 2 Correlations (Pearson correlations, two tailed tested) of the variables

	1	2	3	4	5	6	7	8
1. Age	1	.28***	.21*	.15	.01	.01	.05	.04
2. BMI		1	.05	.18*	.13	.07	.20*	.31***
3. NSat			1	.16+	.36***	.25**	.38***	.29***
4. ACH				1	.19*	.07	.15	.13
5. AFF					1	.20*	.12	.09
6. POW						1	.14	.06
7. Impulse							1	.55***
8. Binge								1

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

BMI body mass index; *NSat* basic needs satisfaction; *ACH* achievement motive; *AFF* affiliation motive; *POW* power motive; *impulse* impulse to eat; *binge* binge eating

Table 3 Hierarchical regression of binge eating on need satisfaction (NeedSat) and achievement motive (ACH)

Step	Variable	ΔR^2	<i>df</i>	ΔF	β^a
1	BMI	.10	1,138	14.64***	.32***
2	Main effects	.10	2,136	8.64***	
	Need satisfaction (NeedSat)				.25**
	Achievement motive (ACH)				.02
3	NeedSat \times ACH	.03	1,135	5.46*	.19*
	Cumulative R^2	.23	4,139	10.03***	

^a β is the standardized regression coefficient in the regression equation

* $p < .05$; ** $p < .001$; *** $p < .001$

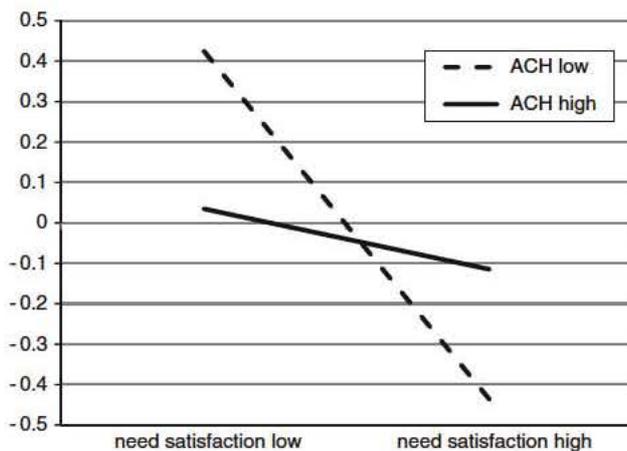


Fig. 1 Illustration of the significant interaction effect between need satisfaction and achievement motive (ACH) on binge eating

In contrast, individuals with a high achievement motive seem not to differ in their binge eating behavior depending on their need fulfillment. Supplementary post hoc analysis using the Johnson-Neyman technique (see Aiken and West 1991, p. 132) confirmed that the difference between low and high need satisfaction was significant for low achievement motivated individuals ($t(139) = -4.71$, $p < .001$) but not for high achievement motivated participants ($t(139) = -.59$, $p > .50$).

We repeated the hierarchical regression analysis twice using the affiliation motive and the power motive, respectively, as moderator variables. In accordance with hypothesis 4 neither the implicit affiliation motive (interaction: $b = .06$, $seb = .07$) nor the implicit power motive (interaction: $b = .001$, $seb = .08$) moderated the effects of unfulfilled needs on binge eating.

Discussion

The present research discussed the unfulfilled basic needs for autonomy, competence and relatedness as an important

condition for problematic eating behavior. As a contribution to previous research that already identified unfulfilled basic needs as a condition for restricted eating (for a summary see Deci and Ryan 2000), we analyzed binge eating. We assumed that individuals compensate for unfulfilled basic needs through restricted eating (see Deci and Ryan 2000) which often results in binge eating (Haiman and Devlin 1999; Jacobi et al. 2004). In accordance with our first hypothesis, unfulfilled basic needs significantly predicted binge eating. In addition, we assumed that binge eating results as a consequence of the breakdown of self-control, for example due to additional emotional stress (anxiety, disappointment) with which restricted eaters cannot cope (Macht 2008). However, we assumed, and confirmed through our data, that individuals with a high achievement motive, who are characterized by high self-control competencies such as the ability to delay gratification (Mischel 1961), have a similarly strong impulse to eat in response to emotional pressure as individuals with a low achievement motive, but can still control themselves when faced with emotional stress and thus did not binge eat.

By showing that unfulfilled needs are associated with the impulse to eat in response to emotional strain (for the link between emotional strain and eating impulse see for example Heatherton et al. 1991), which can be interpreted as a strategy to compensate for negative affect, we support the SDT assumption that unfulfilled basic needs have universal negative effects on individuals' well-being (Deci and Ryan 1985, 2000; Ryan and Deci 2008). It is also in accordance with Sheldon and Schüler's (2010) findings that implicit motives did not interact with basic need satisfaction to predict subjective well-being. Thus the effects of basic need satisfaction or unfulfilled basic needs on general well-being and ill-being, respectively, seem to be universal and unaffected by motives developed through learning processes in early childhood (McClelland 1985).

However, in the present research the implicit achievement motive does interact with basic need satisfaction to predict concrete behavior, namely binge eating. This moderating effect is in line with Schüler, Sheldon and Fröhlich's (2010) and Schüler and Brandstätter's (2010) findings that the effects of need satisfaction on the energization of concrete behavior, such as intrinsic motivation and flow experience in sports, are influenced by the strength of implicit motives. For example, individuals with a high achievement motive experience more flow in sports when their need for competence is satisfied than individuals with a low achievement motive (Schüler et al. 2010; Schüler and Brandstätter 2010). Here we argue that a high achievement motive is based on preferences for feelings of competence learnt in early childhood (McClelland 1985) and therefore results in an energization of behavior (intrinsic motivation, flow) when

corresponding incentives occur in the future. And, with reference to the present research, a high achievement motive leads to the development of behavioral competences, such as a high self-control, which might prevent binge eating even though basic needs are not fulfilled. Bringing the results from the various studies together, we conclude that the consequences of unfulfilled needs on affective responses, such as subjective well-being and the impulse to eat, are universal and not moderated by implicit motives. By contrast, the energization of behavior (e.g., experiencing flow) and behavioral competences (e.g., not binge eating due to high self-control) are not directly linked to basic need satisfaction but are influenced by early childhood learning processes which shape dispositional motives.

In summary, our data suggest that individuals may not be able to free themselves from the negative effects of unfulfilled needs on subjective well-being, but may influence the effects through their implicit motives, which inter alia lead to the development of “buffering” competences. As one might say in terms of SDT, individuals with high and low achievement motives have more or less autonomy with respect to the effects of their innate needs on (the energization of) behavior.

Beside the result concerning the current research question, our analyses revealed interesting relationships that are in accordance with goal content theory within SDT (Deci and Ryan 2000; Sheldon et al. 2010). Here it is supposed that intrinsic goals, such as those for emotional intimacy and affiliation, directly satisfy basic psychological needs and thereby lead to well-being, whereas extrinsic goals, such as image and fame, do not directly satisfy basic needs and thus lack the positive consequences for well-being or even lead to impairment of well-being (Kasser and Ryan 1996). The present study showed that basic need satisfaction was positively associated with the affiliation motive and the achievement motive, and negatively related to the power motive. Referring to the definition of motives as dispositional preferences for certain kinds of goals (McClelland 1985), individuals with a high affiliation or achievement motive chronically strive for goals such as close relationships or personal development, respectively, which SDT theorists would classify as intrinsic goals. In contrast, the power motive is associated with goals aiming at having an impact and influence on others, for example by demonstrating prestige and fame. Thus, the positive correlation between basic need satisfaction and the affiliation and achievement motives, and the negative correlation of need satisfaction and the power motive indirectly support the assumption of goal content theory that the content of goal pursuit matters for the fulfillment of basic needs.

The results of the present study inspire us to continue the line of argument outlined in the present paper further and to

extend it by means of further empirical studies. For example, it would be interesting, for theoretical and practical reasons, to examine whether not only binge eating but also excessive drinking, drug abuse and excessive playing are associated with unfulfilled basic needs and whether these effects are moderated by the achievement motive.

A direct and more differentiated test of self-control abilities (e.g., a delay of gratification test or a self-control questionnaire with different subscales) could be employed in order to figure out the exact mechanism which protects some people from some negative effects of unfulfilled basic needs.

Furthermore, future research could integrate very recent conceptual and measurement developments in basic need research. For example, Bartholomew et al. (2010a) argue that the absence of basic need satisfaction cannot automatically be equated with the presence of basic need thwarting and suggest a conceptual differentiation. They support their theoretical assumption by studies in youth sport contexts (Bartholomew et al. 2010a) which show that controlling environments in sports (basic need for autonomy thwarting) were only moderately correlated with autonomy supportive environments (unfulfilled basic need for autonomy) and by developing a basic need thwarting scale that only partly overlaps with a basic need satisfaction scale (Bartholomew et al. 2010b). Therefore, whether the thwarting of basic needs (rather than unfulfilled basic needs) leads to compensatory behavior and whether their negative effects on health and well-being can be buffered by high self-control competences are still open research questions.

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