State of the Art and New Perspectives in the Diagnosis, Prevention and Treatment of Eating Disorders

A Contribution to an Etiological Model of Eating Disorders – Sociocultural Risk Factors and the Role of Body-Related Cognitive Distortions

Dissertation zur Erlangung der Doktorwürde an der Philosophischen Fakultät der Universität Fribourg (Schweiz)

Vorgelegt von Andrea Wyssen, Heimatort Frutigen (BE)

Genehmigt von der Philosophischen Fakultät auf Antrag der Professoren Simone Munsch (1. Gutachterin) und Jennifer Svaldi (2. Gutachterin).

Fribourg, den 24.11.2015

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Erklärung der Selbstständigkeit

Ich erkläre ehrenwörtlich, dass ich meine Dissertation selbstständig und ohne unzulässige fremde Hilfe verfasst habe und sie noch keiner andern Fakultät vorgelegt habe.

Bern, 09.09.2015

Andrea Wyssen

Die vorliegende kumulative Dissertation umfasst folgende Publikationen:

Publikation 1: Hämmerli, K., Wyssen, A., Dremmel, D., Milos, G., Isenschmid, B., Trier, S. N. & Munsch, S. (2013). Leitlinien zur Diagnostik und Therapie der Essstörungen: eine Kommentierung. *Schweizerisches Medizin-Forum, 13*(43), 868–872.

Publikation 2: Wyssen, A., Bryjova, J., Meyer, A. H. & Munsch, S. (submitted). A Model of Disturbed Eating Behavior in Men: The Role of Body Dissatisfaction, Emotion Dysregulation and Cognitive Distortions.

Publikation 3: Wyssen, A., Coelho, J. S., Wilhelm, P., Zimmermann, G. & Munsch, S. (submitted). Thought-Shape Fusion in Young Healthy Females Appears after Vivid Imagination of Thin Ideals.

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Publikationen

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Contents

List of abbreviations

ED(s) = Eating Disorder(s)

BD = Body Dissatisfaction

DSM = Diagnostic and Statistical Manual of Mental Disorders

FED = Feeding and Eating Disorders

AN = Anorexia Nervosa

BN = Bulimia Nervosa

BED = Binge-Eating Disorder

ARFID = Avoidant/ Restrictive Food Intake Disorder

EDNOS = Eating Disorders Not Otherwise Specified

OSFED = Other Specified Feeding or Eating Disorder

DECB = Disturbed Eating and Compensatory Behavior

TSF = Thought-Shape Fusion

TSF-B = Thought-Shape Fusion Body

APA = American Psychiatric Association

NICE = National Institute of Clinical Excellence

AWMF = Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften

CBT = Cognitive-Behavioral Therapy

IPT = Interpersonal Psychotherapy

ACT = Acceptance and Commitment Therapy

BIT = Body Image Therapy

RCT = Randomized Controlled Trials

EMA = Ecological Momentary Assessment

SD = Standard Deviation

M = Mean

Abstract

On the basis of the German S3-guidelines, this thesis provides a comprehensive overview of the state of the art for the diagnosis, prevention and treatment of eating disorders (EDs). *Publication 1* constitutes a critical review of the guidelines regarding their applicability to the clinical practice in Switzerland. The importance of early detection and accurate diagnosis of subthreshold and threshold EDs is emphasized. Consequently, it is argued that valid screening instruments need to be developed and implemented, followed by appropriate preventive efforts. Furthermore, the guidelines provide an important source of orientation and information for evidence-based treatment. In this context the difficulty of overcoming the science-practice-gap as well as the challenge of the implementation of evidence-based interventions is discussed and the necessity for stepped-care approaches and tailored interventions is highlighted. Based on the observation that ED treatment faces multiple challenges and more effective treatments are needed, an attempt is made to develop new perspectives. A basic requirement in this regard is an elaborated understanding of factors that contribute to the development and maintenance of EDs. Due to the high prevalence of body dissatisfaction (BD) in the general population and the finding that BD poses one of the best established risk factors for EDs, a basic etiological model of EDs with a focus on sociocultural risk factors is described. In *publication 2* the proposed model is complemented with a newly introduced factor termed *Thought-Shape Fusion* (TSF) that describes the susceptibility to body-related cognitive distortions, negative emotions and dysfunctional behaviors. TSF is conceptualized as a cognitive vulnerability factor within a cognitive-behavioral framework of EDs. The main result of *publication 2* revealed that TSF partially mediates the relationship between BD and disordered eating. *Publication 3* goes a step further in demonstrating the inducibility of body-related cognitive distortions through thin-ideal imagination following a media exposure (TSF-B). This underlines the relevance of such cognitive processes in everyday settings where individuals are repeatedly confronted with media contents that promote an unattainable body ideal. It is proposed to consider TSF/ TSF-B in etiological models and new approaches in prevention and treatment of EDs.

1 Introduction: Objective and Structure of the Present Thesis

Threshold and subthreshold *Eating Disorders* (EDs) are among the most common psychiatric problems in women and to a lesser degree in men.[1] It is true for both genders that EDs are marked by chronicity and high probability of relapse and result in impaired psychosocial functioning and serious consequences for physical health. Moreover, ED pathology is associated with an increased risk for depressive, anxiety and substance abuse disorders (e.g., Preti et al., 2009; Smink, van Hoeken, & Hoek, 2012; Stice, Marti, & Rohde, 2013). The present thesis aims at providing a comprehensive overview of *the state of the art in the diagnosis, prevention and treatment* of EDs. In addition, the objective is to outline a basic etiological model with a focus on *sociocultural risk factors* and to introduce the susceptibility to *body-related cognitive distortions* as a new factor in the model. Finally, *clinical implications* of an *expanded etiological model* with regard to new perspectives in the prevention and therapy of EDs are discussed.

The *structure of the present thesis* encompasses three parts: It begins with a description of the state of the art in current practice of diagnosis and treatment of EDs. This includes a brief overview of diagnostic criteria in the fifth version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, APA, 2013) as well as a summary of key statements of the German *S3-guidelines* for the diagnosis and treatment of EDs (DGPM & DKPM, 2011). Furthermore the effectiveness of established prevention and treatment approaches is described and accompanying challenges are discussed. The second part of the thesis continues with an etiological model that focuses on *sociocultural risk factors* contributing to the development and maintenance of EDs as well as subthreshold disordered eating behavior. Emphasis is deliberately put not only on fully developed EDs but also on subthreshold forms which refer to individuals at risk. The aim of this section is to frame a basic sociocultural risk model and to complement it with a supplementary element, namely the tendency

[1] *General note:* Since EDs are more prevalent in women, disordered eating behaviors and related topics, such as media influence and body dissatisfaction, have been investigated more frequently in women than in men. This leads to a stronger emphasis on women than men within this thesis; however, both genders were included and where available, reference is made to distinct topics and results concerning men. In respect of the outlined etiological models, some of the presented factors and relationships have been solely proven for women, but it is expected that in their essential features they also apply to men.

to *cognitive distortions* regarding the perception of one's own body. In the final part of the thesis the relevance of the proposed supplementary factor will be discussed with respect to prevention, diagnosis and treatment of EDs and how it could complement contemporary clinical practice. Suggestions regarding the transfer of the described expanded etiological model to the clinical practice of prevention, diagnosis and treatment of EDs are made.

The intention of *publication 1* is to describe current guidelines for the diagnosis and treatment of EDs. The article constitutes a commentary on the evidence-based German S3-guidelines (DGPM & DKPM, 2011) and evaluates their applicability in Switzerland including reflections about diagnostic criteria according to DSM-5 (APA, 2013). In the course of revision of the fourth version of the DSM (DSM-IV-TR, APA, 2000) considerable changes have been made to the chapter on EDs: The newly published fifth version (DSM-5, APA, 2013) contains a broader range of altogether six specific ED diagnoses grouped in the chapter *Feeding and Eating Disorders* (FED). The scope of this thesis will lie on the three main EDs Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Binge-Eating Disorder (BED), and to a lesser degree on the new category *Avoidant/ Restrictive Food Intake Disorder* (ARFID). In addition to these fully developed forms of EDs according to DSM-5, disordered eating behavior and associated symptoms on a subthreshold level will also be considered. The term *subthreshold* is used broadly in this context: It covers various forms of striking or disordered eating behaviors not fulfilling the criteria of the principal DSM-5 diagnoses. That includes diagnoses which are described in the category *Other Specified Feeding or Eating Disorder* (OSFED), but also other variants of distinctive patterns such as marked eating concerns, an extremely rigid eating behavior and pronounced shape or weight concerns. In the context of this thesis, the term *subthreshold EDs* is used to describe these different forms of ED-like concerns and behaviors which may not be assigned to any of the specified DSM-5 diagnoses. The understanding, early detection and treatment of subthreshold disordered eating behaviors are thought to be particularly important since empirical findings showed that they are nevertheless characterized by significant impairments in psychological, social and physiological quality of life (e.g. social withdrawal due to marked appearance concerns or extreme time-

consuming investments in appearance).[2] Moreover the subjects pose an increased risk to develop an ED in the future (e.g., Stice, Ng, & Shaw, 2010; Touchette et al., 2011). ED symptoms in this context are seen as a continuum from absent or minimal to fully developed symptoms. These are not only disordered eating behavior such as pronounced restraint eating, repeated binge-eating and vomiting or excessive exercising, but also marked eating concerns, high body dissatisfaction (BD), cognitive distortions regarding self-perception and -evaluation (see *publication 2 and 3*) as well as exaggerated investment in appearance and frequent body-checking or body avoidance. These are all possible correlates of eating pathology which are not or only partially included in the diagnostic criteria. Nevertheless these behaviors and symptoms which are not specifically assignable to a distinct diagnosis should be taken seriously since they are very common in western society. They may be precursors of fully developed EDs or other psychological disorders such as anxiety, obsessive-compulsive or depressive disorders and are associated with a general lower quality of life and unfavorable health behavior (e.g., Fiske, Fallon, Blissmer, & Redding, 2014; Rawana, Morgan, Nguyen, & Craig, 2010). Up to 61% of men and 72% of women in representative population-based samples report substantial BD respectively the experience of a *self-ideal-discrepancy* when comparing their own body to the body of their appearance ideals. These high prevalence rates justify the designation of BD as a public health issue (Fiske et al., 2014).

Publication 2 aims at describing a risk model of disordered eating behavior, taking into account perceived social pressure to conform to a body ideal[3] and BD in the development and maintenance of disordered eating behavior. The objective of *publication 2* is to frame an expanded etiological model and to gain a deeper understanding of the close association between BD and disordered eating behavior by considering a certain cognitive vulnerability, which is described as the susceptibility to body-related cognitive distortions (termed *Thought-Shape Fusion*, TSF).

[2] Per definition that may also concern body dysmorphic disorder (BDD); however BDD is not taken into account in the present thesis. More information about the differentiation of BDD and EDs may be found elsewhere (e.g., Kollei, Brunhoeber, Rauh, de Zwaan, & Martin, 2012; Kollei, Schieber, de Zwaan, Svitak, & Martin, 2013).

[3] The term “body ideal” applies to women and men, whereas the term “thin ideal” is used specifically for women and “muscle ideal” specifically for men.

Publication 3 targets the relevance of TSF in more detail and in an elaborated context. It describes an experimental study investigating the inducibility of cognitive distortions such as TSF by confronting healthy young women with body ideals (adapted version of the original TSF concept, termed *Thought-Shape Fusion Body, TSF-B*). Conclusions are drawn about the relevance of TSF/ TSF-B as an etiological factor and considerations given to the utility of the results for preventive and therapeutic efforts.

2 State of the Art: Diagnostic and Treatment of Eating Disorders

2.1 Prevalence and Correlates of Eating Disorders

In Switzerland, prevalence of EDs has recently been assessed in a representative cross-sectional study, according to DSM-IV-TR criteria. In a community-based sample of 10`038 women and men aged 15-60 years, lifetime prevalence of any ED was 3.5%. 1.2% of women and 0.2% of men were diagnosed with AN, 2.4% respectively 0.9% with BN and 2.4% respectively 0.7% with BED. 5.3% of women and 2.9% of men were categorized as *any type of Binge-Eating Disorder* (AnyBED). This category encompasses all cases showing binge-eating at least twice a week over a period of several months; that is all cases of fully developed BN and BED as well as binge-purging type of AN and also cases of BED and BN, which did not fulfill all diagnostic criteria (Schnyder, Milos, Mohler-Kuo, & Dermota, 2012).[4] Compared to representative epidemiological data from the USA, prevalence of AN and BN was somewhat higher (especially in women), whereas prevalence of BED was remarkably lower in Switzerland: Lifetime prevalence of AN, BN and BED in a sample of 9'282 adult individuals in the USA was 0.9%, 1.5%, 3.5% among women and 0.3%, 0.5% and 2.0% among men. AnyBED was present in 4.9% of women and 4.0% of men (Hudson, Hiripi, Pope, & Kessler, 2007). In general, it can be expected that the prevalence rates of bulimic EDs (BN and BED) will turn out to be higher when applying the DSM-5 criteria, caused by the relaxation of the time- and frequency-criteria (Hudson, Coit, Lalonde, & Pope, 2012). Consequently, applying DSM-5 criteria effectively reduces the residual

[4] All of the reported values refer to lifetime prevalence rates.

category *Eating Disorders Not Otherwise Specified* (EDNOS), since the threshold for AN and BN was lowered and BED as a specific ED was added in the new diagnostic system (for details see chapter 2.2) (Smink, van Hoeken, & Hoek, 2013). According to the DSM-5 criteria, lifetime prevalence in girls at the age of 20 in a US community sample was 0.8% for AN, 2.6% for BN and 3.0% for BED. The prevalence of atypical or subthreshold forms of these disorders was even higher: 2.8% AN, 4.4% BN, 3.6% BED (Stice et al., 2013). Smink and colleagues (2014) reported higher values for AN, but lower values for BN and BES in a Dutch sample of 19 year-olds: Lifetime prevalence of AN, BN and BED was 1.7%, 0.8% and 2.3% in women and 0.1%, 0.1% and 0.7% in men (Smink, van Hoeken, Oldehinkel, & Hoek, 2014). In a representative Australian sample (aged older than 15 years) 3-months prevalence according to DSM-5 was 0.5% for AN (83% female), 0.7% BN (69% female) and 5.6% BED (57% female). Regarding demographic characteristics, individuals with an ED were very similar to the general population (e.g. household income and educational status) (Hay, Girosi, & Mond, 2015).

The presence of an ED is in 56-95% of the cases associated with other comorbid psychological disorders, most frequently mood, anxiety, impulse-control and substance use disorders. In addition, the majority of patients report significant role impairment in at least one domain (e.g. at work or in social life) (Hudson et al., 2007). Particularly AN is associated with the highest mortality rate among mental disorders. Standardized mortality ratio in AN ranges from 5 to 10, in BN and BED around 2 (Arcelus, Mitchell, Wales, & Nielsen, 2011; Smink et al., 2012). Mean age of onset is lowest in AN, ranging around 18-19 years, whereas in BN around 20-21 years and in BED around 23-25 years. As it can be seen on the basis of the above reported prevalence values, women are more frequently diagnosed with an ED than men, whereby gender difference tends to be smaller in bulimic than anorectic EDs (Hudson et al., 2007; Schnyder et al., 2012).

When interpreting the above mentioned prevalence estimations, it is important to consider that these rates may not completely capture the extent of the *public health problem* of EDs. As mentioned above, empirical evidence indicates that even if the diagnostic criteria are not met, symptoms of subthreshold EDs, such as restrictive eating, pronounced eating concerns and intensive

worries about shape and weight were associated with impairments in important areas of functioning, general well-being and quality of life (Ackard, Fulkerson, & Neumark-Sztainer, 2011; Fiske et al., 2014; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Moreover, subthreshold ED pathology was significantly associated with mood and anxiety disorders (Touchette et al., 2011). In more than 800 adolescent girls form a population-based sample (mean age 17.5 years), subthreshold EDs have been found to be quite prevalent: 3.5% showed subthreshold AN, 3.8% subthreshold BN, 10.8% subthreshold BED and 13.3% reported pronounced weight concerns with restrictive eating. Furthermore, especially dieting behavior and BD can be considered as prodromal stages of the development of EDs (Stice et al., 2010). As symptoms of disordered eating and possible precursors of fully developed EDs, high BD and pronounced dietary restraint must be taken seriously, especially because both are extremely prevalent in adolescence and young adulthood (when incidence of EDs is the highest). For example, in a population-based study among adolescents, unhealthy weight loss behavior was found in 61% of girls and 28% of boys (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011). Prevalence of BD ranges from 11-72% in women and from 8-62% in men (Fiske et al., 2014). This underlines the conclusion that dieting is close to a normative behavior and BD seems to be a normative discontent. As shown in a ten-year longitudinal study with almost 2'300 participants, unhealthy weight control or dieting is not only a problem in adolescence, but persists or even increases within young adulthood. Moreover early dieting has been found to be a predictor of unhealthy weight control behaviors ten years later (Neumark-Sztainer et al., 2011). These findings emphasize that early prevention and treatment intervention are urgently needed throughout adolescence and young adulthood (risk factors for disordered eating are described in more detail in chapter 4).

2.2 Classification of Eating Disorders from DSM-IV-TR to DSM-5: Comparison and Clinical Implications

In May 2013, the fifth edition of *the Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, APA, 2013) was released at the annual meeting of the *American Psychiatric Association* (APA). Regarding the chapter on *Feeding and Eating Disorders* (FED), several changes were made aiming to better differentiate the symptoms of affected patients. A noticeable change was the addition of conditions across different lifespans, including forms of disordered eating which have been usually first diagnosed in infancy, childhood or adolescence, namely *Rumination Disorder*, *Pica* and A*voidant/Restrictive Food Intake Disorder* (ARFID). ARFID includes *Selective Eating* (food avoidance based on e.g. sensory characteristics of food), *Functional Dysphagia* (response in anticipation of an adverse experience, e.g. vomiting) and refusal to eat with *Food Avoidance Emotional Disorder* (food avoidance associated with emotional difficulties such as anxious or depressed mood) (APA, 2013). These eating or feeding disturbances are accompanied by the persistent failure to meet appropriate nutritional needs and are associated with significant weight loss or failure to achieve expected weight as well as with nutritional deficits. Psychosocial functioning and well-being are affected by these disorders but there is no disturbance in the way body weight and shape are experienced (APA, 2013). In a questionnaire-based school-screening study in Switzerland with a total sample of 1'444 eight- to 13-year old children, 3.2% reported symptoms of ARFID (Kurz, van Dyck, Dremmel, Munsch, & Hilbert, 2015). In contrast, in a retrospective sample analysis including 2'231 patients in pediatric gastroenterology clinics in the US aged 8-18 years, 1.5% met full ARFID criteria and an additional 2.4% met at least one ARFID criteria but were not diagnosed due to a lack of information. Thus, cases meeting full criteria were relatively rare, even in a sample where eating or feeding difficulties are expected (Eddy et al., 2015). Nevertheless, the ARFID diagnosis is justifiable in that it specifically tries to capture cases of young people who show an ED with medical and psychological impairment but who do not report disturbances in the experience of body weight and shape (Fisher et al., 2014). The question whether these early EDs may be precursors of later severe EDs in adolescence and

adulthood has been discussed differently and requires further prospective longitudinal studies. However, previous studies found evidence for the predictive value of selective eating regarding later symptoms of AN or BN (Marchi & Cohen, 1990). Other studies point to the finding that early-onset restrictive eating is associated with a higher risk of a future ED (Kotler, Cohen, Davies, Pine, & Walsh, 2001). In any case, early identification of ARFID and targeted prevention and intervention efforts are essential. This is facilitated by the specific classification and description of these disorders in DSM-5.

Another substantial change in DSM-5 was the inclusion of *Binge-Eating Disorder* (BED) as a definable diagnosis. In clinical practice and research it has become more and more evident, that a great portion of patients with EDs do not fit into the categories of AN or BN and thus ended up to be classified as EDNOS. To address this lack of precision, BED was added as a distinct diagnosis. Also, the lowering of the diagnostic criteria for AN and BN contributed to a reduction of assignments to the EDNOS category (APA, 2013; Call, Walsh, & Attia, 2013). In addition, the EDNOS category in DSM-5 has been divided into two parts: *Other Specified Feeding or Eating Disorder* (OSFED; the reason why full criteria of a specific FED are not met is specified) and *Unspecified Feeding or Eating Disorder* (UFED; full diagnostic criteria are not met and the reason is not specified). OSFED encompasses specific disorders, without a detailed description of the diagnostic criteria; the aim is to stimulate further research (e.g. purging disorder, night eating syndrome).

In the following section the three main EDs Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Binge-Eating Disorder (BED) are described in more detail and the changes in the diagnostic criteria from DSM-IV-TR to DSM-5 are highlighted.

Anorexia Nervosa (AN) is primarily characterized by excessive dieting accompanied by severe weight loss. In addition, a distorted body image and a pathological fear of weight gain or becoming fat is symptomatic. Multifactorial etiological models of AN contain a developmental perspective that includes difficulties to cope with age-typical developmental steps in puberty, such as confrontation with physical maturation and change of personal body image as well as identity formation and development of an autonomous, adult self. Furthermore, social factors need to be taken into

account, such as the pressure to be thin, as well as psychological characteristics such as high perfectionism (Herzog, Friederich, Wild, Lowe, & Zipfel, 2006). Neurobiological models refer to the importance of modified brain serotonin function (5-HT) in respect to dysregulation of appetite, impulsivity and mood in anorectic and bulimic EDs. In AN restricting food intake may be reinforced by a temporary respite from dysphoric mood (Kaye, 2008).

For AN the revised criteria in DSM-5 include three main changes: first of all, formulations implicating intentional behavior have been modified. For example criterion A does no longer contain the word "refusal" in respect of weight management, but describes it as restriction of energy intake and behaviors that interfere with weight gain. Secondly, the criterion of amenorrhea was deleted, since it is not applicable to men, pre-menarchal or post-menopausal women and might be influenced by oral contraceptives. Furthermore, some patients show all symptoms of AN but still menstruate. Thirdly, in DSM-5 the specification of the subtype is judged for a limited time span of three months, since it has been recognized that transition between the subtypes were relatively common. Another new element in AN, BN and BED diagnosis is the possibility to estimate the severity of the disorder. In the case of AN, the severity can be evaluated as mild (BMI[5] ≥ 17), moderate (BMI 16-16.9), severe (BMI 15-15.9) and extreme (BMI < 15) (APA, 2013; de Zwaan & Herzog, 2011).

The main symptoms of *Bulimia Nervosa (BN)* are frequent episodes of binge-eating followed by inappropriate compensatory behavior, such as self-induced vomiting, excessive exercising, fasting, or the abuse of diuretic pills or laxatives. Bulimic eating behaviors develop as a consequence of interacting biological, psychological and sociocultural factors. Unfavorable environment conditions (e.g. violence, abuse or neglect) may foster deficits in self-worth. The attempt to reach the socially given thin ideal often leads to excessive dietary restraint resulting in a physiological deprivation and malnutrition. Binge-eating episodes may follow as a consequence to deprivation and/ or as a strategy to regulate negative affect (Stice, 2002). From a neurobiological perspective, high-carbohydrate

[5] Body Mass Index (BMI) = Body weight in kilograms divided by the square of body height in meters.

nutrition during a binge-eating episode helps to regulate stress and negative affect via the synthesis of serotonin (Kaye, 2008).

The major change concerning BN in DSM-5 is the reduction of the frequency-criterion: In DSM-5 one binge-eating episode with compensatory behavior per week over at least three months is determined as a criterion, whereas in DSM-IV-TR two episodes were required. Little empirical evidence has been found in support of the validity and utility of the DSM-IV-TR frequency criteria. It has been shown that patients with a lower frequency of binge-eating and compensatory behavior do not differ significantly in clinical characteristics from patients at or above the frequency threshold (Wilson & Sysko, 2009). In addition, impairment is not only determined by the frequency of binge-eating episodes but also by other factors such as BD and eating concerns (le Grange et al., 2006; Spoor, Stice, Burton, & Bohon, 2007). Finally, the subtyping of purging and non-purging has been dropped in the course of DSM-revision. To determine the severity of the disorder four graduations are available in DSM-5: mild (1-3 episodes/ week), moderate (4-7 episodes/ week), severe (8-13 episodes/ week) and extreme (14 or more episodes/ week) (APA, 2013; de Zwaan & Herzog, 2011).

In DSM-IV-TR, research criteria of *Binge-Eating Disorder (BED)* have been described and included in the appendix where proposed criteria of possible new diagnoses are provided for further study. Patients with BED were classified in the EDNOS category until the disorder was approved as a distinct diagnosis in DSM-5. BED is defined as recurring episodes of binge-eating, which means that food intake in a short period of time exceeds the amount most people would eat under comparable conditions. Binge-episodes are characterized by the feeling of loss of control over eating. Additional criteria are: eating very fast, eating in absence of hunger, eating up to an uncomfortable feeling of fullness, eating alone because feeling ashamed about the quantity of food, feelings of disgust and guilt as well as depressive feelings. The behavior occurs at least once a week for the period of three months. The specification of the severity is the same as in BN. In contrast to BN, patients with BED do not directly and regularly compensate their binge-eating episodes to avoid weight gain (APA, 2013). BED is often accompanied by serious physical (e.g. overweight) and psychological problems (such as

mood and anxiety disorders). Due to these characteristics, BED is clearly distinguishable from overeating, even though obesity (BMI>30) is frequently comorbid to BED (in 30-40% of BED patients) (Kessler et al., 2013). In comparison to the former research criteria in DSM-IV-TR the criteria on frequency and duration have changed from two episodes per week over the time of at least six months to one episode per week over three months (APA, 2013; de Zwaan & Herzog, 2011).

Also in BED, a variety of etiologically relevant factors have been identified. Some of them overlap with the models in BN others are more distinctive such as overweight in childhood and weight-related teasing (Stice, 2002). Weight and shape concerns have proven to be important etiological factors in BED; whereas BD and a distorted self-perception are core criteria in the classification of AN and BN, this aspect of the disorder is missing in the description of BED (Grilo, 2013). In AN criterion B describes the intense fear of gaining weight and criterion C includes the disturbance in the experience of one's own body weight and/or shape as well as a remarkable influence of body shape/ weight on self-evaluation. Similarly, in BN criterion D contains that self-evaluation is exorbitantly influenced by body shape and weight (APA, 2013). The absence of a comparable criterion in BED seems to be contradictory to the empirical finding that patients with BED suffer from marked concerns about body weight and shape, independently from their BMI. Nevertheless, the overvaluation of shape and weight as well as the excessive occupation with food intake has not been considered in the revision of the DSM (Grilo, 2013). Another critically discussed feature of the description of BED in DSM-5 is the estimation of the criteria regarding a large amount of food. In DSM-5 the following wording is used: "…an amount of food that is definitely larger than what most people would eat in a similar period of time under similar circumstances." Empirical evidence point to the fact that also *subjective binge-eating,* that is experiencing a loss of control over eating but on a normal portion of food, is associated with a comparable impairment and psychological strain as *objective binge-eating.* Thus, at least for a subgroup of those who were affected from binge-eating the amount of food seems to be less important than the experience of being out of control (Latner, Hildebrandt, Rosewall, Chisholm, & Hayashi, 2007; Mond, Latner, Hay, Owen, & Rodgers, 2010).

The overall aim of the *DSM-5 eating disorders workgroup* was to reduce the use of the EDNOS-category and to strengthen the validity of the diagnosis, since an accurate diagnosis is a first important step in providing an appropriate treatment (Keel, Brown, Holm-Denoma, & Bodell, 2011; Stice et al., 2013). First results refer to the at least partial success of the DSM revision in this regard: Using the DSM-IV-TR diagnostic criteria, up to 62% of children and adolescents (Ornstein et al., 2013) and up 68% of adults were diagnosed as EDNOS, which makes it the most common ED diagnosis (Fairburn et al., 2007; Keel et al., 2011). Recent studies comparing DSM-IV-TR to DSM-5 diagnoses confirmed that a significant number of individuals suffering from an ED, not fulfilling the criteria of either AN or BN, can be assigned to the BED diagnosis. Keel and colleagues (2011) were able to show a significant reduction of the EDNOS diagnoses in DSM-5 (53%) compared to the DSM-IV-TR (68%) (Keel et al., 2011). Another study found an even larger reduction from 73% to 44% (Machado, Goncalves, & Hoek, 2013). The revision of the DSM-5 therefore achieved its aim, mostly by adding BED as well as ARFID as discrete diagnoses, by dropping the criteria of amenorrhea in AN and by relaxing the time and frequency criteria in BN (Keel et al., 2011; Ornstein et al., 2013; Smink et al., 2013). The criteria regarding frequency and duration have been relaxed in BN, because of the awareness that subthreshold expressions of the disorder are common and related to substantial distress (Touchette et al., 2011). These findings support the focus of the present thesis which considers it important to broaden the scope to subthreshold forms of disordered eating behaviors and their associated symptoms.

2.3 Diagnosis and Treatment of Eating Disorders: the German S3-Guidelines

In 2004 the *National Institute of Clinical Excellence* (NICE, 2004) published guidelines for the diagnosis and treatment of EDs. The focus of the workgroup was on the integration of evidence-based findings from randomized controlled trials (RCT). The *American Psychiatric Association* (APA) released a revised version of their evidence-based guidelines in 2006 (APA, 2006). In 2011 the German workgroup of the *Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen*

Fachgesellschaften (AWMF) published the first evidence-based guidelines in German (DGPM & DKPM, 2011). These guidelines aimed to provide systematically developed recommendations to support practitioners (physicians, psychiatrists and psychotherapists) in their decisions about diagnosis and treatment strategies. The best possible patient care (concerns prevention, diagnosis, treatment and rehabilitation) as well as economic efficiency is pursued. The predicate *S3-Guildelines* refers to the highest level of guideline development which implies that the available empirical findings as well as structured consensus findings have been systematically integrated. The guidelines represent the state of knowledge (from controlled clinical studies and expert's knowledge) about appropriate and effective patient care (DGPM & DKPM, 2011) and thus provide an important source of information and orientation. Nevertheless it should not be neglected that the treatment needs to be centered on the individual, taking into account the unique biography and the individual etiological model of the patient. Therefore, there are inherent limits to the standardization of the treatment. Nonetheless, the guidelines support the access to the most effective treatment strategies and provide recommendations regarding important decisions such as the structure of the treatment in respect of setting (out- or inpatient), duration and intensity, promising pharmacological options, necessary medical monitoring, as well as psychotherapeutic approaches with the highest empirical evidence for success (DGPM & DKPM, 2011). More information about the effectiveness of the treatment of EDs is provided in chapter 3.2 of this thesis.

Regarding the *diagnosis of EDs,* it is highly important to be aware that mostly young people become ill. The peak of the onset of AN is around 18.0 to 18.9 years, of BN around 19.7 to 21.3 years and of BED 23.2 to 25.4 years. In AN standard deviation (SD) is relatively low (around 3.9 years) whereas in BN and BED it is much higher (around 10.2 respectively 10.5 years) (Hudson et al., 2007; Schnyder et al., 2012). Owing to these facts, early detection of EDs is essential. The onset of such a disease in adolescence or early adulthood has severe consequences on physical and psychological development and health status. Suffering from an ED at this early age has implications also for the educational and employment career. A favorable prognostic factor in the treatment of EDs is a short history of the ED

which goes hand in hand with an early and valid detection as well as an appropriate treatment of the symptomatology (Fairburn & Harrison, 2003). Importantly, the guidelines try to facilitate this process in different settings, such as in primary care (medical practices) where most patients initially present themselves. Early detection implies that attention is paid also to subthreshold forms of EDs as well as on marked weight and shape concerns. According to the S3-guidelines, the following risk factors, possibly referring to heightened risk for an ED, should be taken into account in primary care settings (among others): young age, female gender, low body weight, pronounced weight concerns in absence of overweight, disturbances in the menstrual cycle, signs of malnutrition, distinct dieting, gastrointestinal symptoms and repeated vomiting and growth retardation (DGPM & DKPM, 2011).

2.4 Publication 1: Commentary on the S3-Guidelines Regarding the Clinical Practice in Switzerland

As described in chapter 2.3, the S3-guidelines for the diagnosis and treatment of EDs summarize the current state of evidence-based knowledge and provide recommendations with a practical orientation. Certainly, the feasibility of guidelines also depends on the existing medical, psychological, and psychiatric care situation, which may vary in different countries. In *publication 1*, the German S3-guidelines were commented and discussed regarding their applicability in Switzerland. At the same time, some of the key points of the guidelines were summarized and the care situation in Switzerland was described.

According to the relative similarity of the situation in Germany and Switzerland, the review resulted in a confirmation of the applicability of the guidelines in Switzerland. It is highlighted that prevention, early detection and early treatment of EDs is crucial because of the high physiological and psychological impairment and the strong tendency to chronicity. Evidence-based guidelines pursue the target of ensuring early diagnostic identification and effective treatment.

Publication 1 is given in appendix A.

Citation: Hämmerli, K., Wyssen, A., Dremmel, D., Milos, G., Isenschmid, B., Trier, S. N. & Munsch, S. (2013). Leitlinien zur Diagnostik und Therapie der Essstörungen: eine Kommentierung. *Schweizerisches Medizin-Forum, 13*(43), 868–872.

3 Current Challenges in the Diagnosis, Prevention and Treatment of Eating Disorders

3.1 Prevention Strategies to Reduce the Incidence of Eating Disorders

The treatment of EDs is facing numerous challenges (see chapter 3.2), proactive preventive efforts to reduce the incidence of EDs are extremely important. Successful prevention is based on information regarding the appropriate timing, the target population as well as contents and goals of the interventions (for an overview see e.g., Stice & Shaw, 2004; Stice, Shaw, & Marti, 2007; Wilfley, Agras, & Taylor, 2013).

The question at what moment prevention should occur has been raised repeatedly. Often, decisions about the *timing* are based on the age of the highest incidence of EDs. That is around the age of 18 to 25 years (Hudson et al., 2007; Schnyder et al., 2012). However, one must consider that signs of disordered eating as well as pronounced BD as prodromal ED symptoms may occur much earlier. For example, in a recent study with 127 girls at the age between 7 and 11 years, 65% of the girls described an ideal body of a girl as smaller than their own body. This has been considered as an indicator of heightened BD and poses an important risk factor for dysfunctional eating behaviors. In accordance with this result, self-reports on eating behavior indicated that 55% of the girls restrict food intake to avoid weight gain and 47% have pronounced concerns about food choice (e.g. calorie content) (Evans, Tovee, Boothroyd, & Drewett, 2013). From the perspective of prevention, these results deserve attention, since prodromal ED symptoms have proven to be risk factors for the subsequent development of EDs (e.g., Stice et al., 2010).

Apart from the appropriate timing, prevention programs need to address the question of the *target population* and the *aims* of the intervention: Whereas *universal prevention* targets a whole

population (e.g. school based interventions to improve healthy eating), *selected prevention* is more focused on risk groups (e.g. interventions for girls and boys who do sports with strong emphasis on body weight and shape). Lastly, *indicated prevention* tackles individuals who show early symptoms (e.g. interventions for individuals who report a distinctive pattern of restraint eating). Regarding the *aim* of preventive efforts, specific programs can be categorized as *primary prevention* which includes strategies to prevent maladaptive behavior (e.g. interventions to promote healthy eating), as *secondary prevention*, which describes interventions to treat early signs of maladaptive behavior (e.g. psychoeducation for individuals who engage in frequent dieting) or as *tertiary prevention* which focuses on the treatment of a manifest disorder or on the reduction of related complications (e.g. outpatient treatment for individuals with BED) (Hood & Corsica, 2011).

Stice and Shaw (2004) described three main focal points of ED prevention programs: 1) Interventions which mainly consist of psychoeducational information about EDs, 2) interventions that additionally provide more specific materials regarding for example the sociocultural pressure to conform to a body ideal and 3) finally interventions that take into account risk factors in vulnerable individuals and transmit the relevant contents via interactive exercises (Stice & Shaw, 2004).

Prevention programs need to alter modifiable risk factors, such as dieting and BD. Consequently, to develop effective prevention programs, it is crucial to identify and understand the relevant risk factors that contribute to the development of EDs. This requires knowledge about a detailed etiological model including different risk pathways (see chapters 4.1 to 4.3). The aim should be to approach the question of *when* risk is highest and *who* is most vulnerable (e.g. low self-esteem as a moderating variable regarding the negative influence of media) but also about *why and how* the negative impact occurs (e.g. mediating variables such as the experience of self-ideal discrepancy following media exposure). Based on the multifactorial etiology of EDs, the design of an effective prevention program constitutes a great challenge. It demands knowledge about risk factors and risk groups respectively. Moreover, appropriate screening tools to detect individuals at risk are required.

In the next section a brief overview of prevention programs in the area of EDs is given and their effectiveness is reported.

A meta-analysis reported that 51% of prevention programs targeting ED risk factors effectively reduced those risk factors such as BD, and 29% of the programs diminish current or future eating pathology. The largest effects were found for selected (i.e. programs that consider risk factors such as pronounced thin-ideal internalization and high BD), interactive and multi-session programs (compared to universal, didactic, single-session programs) that were delivered by professionals. Another positive predictor was the inclusion of interventions that address body acceptance and dissonance reduction (Stice et al., 2007). An ED prevention program including dissonance-inducing activities to decrease thin-ideal internalization (see chapter 4.2 for more details on this topic) demonstrated efficacy in reducing risk for current and future eating pathology under controlled conditions (Stice, Marti, Spoor, Presnell, & Shaw, 2008). Moreover, in a subsequent study with 306 adolescent girls who reported body image concerns, the intervention was tested under real-world conditions (the school staff recruited the participants and delivered the program) to prove effectiveness. Girls who were randomly assigned to the dissonance intervention (four group sessions of one hour), showed a significantly larger decrease in thin-ideal internalization and BD as well as less dieting attempts and less ED symptoms from pre- to posttest in comparison with a control group receiving a psychoeducational brochure. The positive effects on BD, dieting and ED symptoms were maintained at least until the one-year follow-up measurement (Stice, Rohde, Gau, & Shaw, 2009).

Within the last years, prevention programs have been further adapted to be delivered as *online tools*. These new approaches with innovative technologies are advantageous since they are independent of time and location, can be accessed anonymously, require less implementation efforts and are often more cost-effective (less resources and infrastructure needed) than face-to-face interventions (Bauer & Moessner, 2013). For example, the prevention program "Staying Fit"™, developed in the US, focuses on students at low risk for EDs as well as on overweight and obese individuals (universal and targeted prevention). Staying fit is a ten-week program in which several strategies for weight

regulation are transmitted. The program has shown to be successful in respect of healthy eating (i.e. consumption of fruits and vegetables) as well as weight stabilization or weight reduction (Taylor et al., 2012). Another online-program termed "Student Bodies – Targeted"™ for individuals with different risk-levels to develop an ED (universal and selected prevention) was based on eight sessions with a cognitive-behavioral approach aiming at reducing body concerns and unhealthy weight control behaviors (among others). This program has proven to be successful in short- and long-term development (periods including up to 12 months follow-up) (Beintner, Jacobi, & Taylor, 2012). However, the results of these studies should be seen in the light of methodological limitations, such as that outcome measures mostly derive from self-reported questionnaire data.

Wilfley and colleagues (2013) recently described an interesting model of population-based prevention and treatment that poses an informative summary of current difficulties and future challenges in ED prevention. The authors suggest looking at ED pathology as a continuum (from absence of symptoms to fully developed clinical pictures) and emphasize the need of early identification of individuals at risk and early symptom reduction. This intention is facing several difficulties, most notably the lack of financial and personal resources. In the US, counseling centers for college students are often understaffed and overburdened. In addition, systematic universal screenings are often difficult to implement. Therefore, the authors suggest a promising *stepped care* approach including online screenings and interventions but also face-to-face interventions, ongoing symptom monitoring and to maintain interventions as well as community based changes in the sociocultural environment (Wilfley et al., 2013). It applies also to Europe that the care situation for mental disorders needs to be improved (regarding prevention and treatment). Less than one third of all cases with a mental disorder are provided with any intervention (Wittchen et al., 2011). Reflections about the care situation in psychotherapy and stepped care approaches will be picked up again in the discussion of this thesis.

To sum up, prevention in the area of EDs faces numerous challenges such as the development of reliable and valid screening instruments as well as the difficulty of their widespread accessibility.

Moreover, specific aims of preventive interventions have to be defined and appropriate outcome variables and associated assessment methods chosen. The interventions have to be adapted to the specific needs of the target population depending not only on existing risk factors or prodromal symptomatology, but also on characteristics of the target group (such the age and available resources). Finally, prevention programs need to consider sociopolitical conditions and that their implementation is constrained by limited financial resources.

3.2 The Effectiveness of State of the Art Treatments of Eating Disorders

The successful treatment of EDs is facing various challenges and the course of disorders such as AN, BN and BED is very often persistent. Schnyder and colleagues (2012) report an average illness duration of 2.23 (SD=2.69) years in AN, 5.25 (SD=5.86) years in BN and 5.79 (SD=8.45) years in BED (Schnyder et al., 2012). About 50% of patients with AN and BN reach full remission after treatment and 30% at least experience an improvement of the symptoms, whereas 20% show a chronic course. The average mortality rate in AN is high, ranging around 5% (in a 4-10 years follow-up time span); within a longer process of follow-up (>10 years) it even rises up to 9.4%. Recovery rate in this time span amounts up to 73.2%. Within a follow-up period of four to ten years, recovery rate in BN also increases, but decreases again afterwards. At the same time crossover rate to another ED rises (Steinhausen, 2002; Steinhausen & Weber, 2009). Several studies have shown that among different BED treatment approaches (e.g. Cognitive-Behavioral Therapy (CBT) and Interpersonal Therapy (IPT)) and settings (group or individual) up to 79% of the patients benefit from the therapy and show abstinence from binge-eating at the end of the active treatment (Iacovino, Gredysa, Altman, & Wilfley, 2012). A stable development, i.e. the maintenance of the therapy success in follow-up periods from 12 months up to five years, has been proven (Fischer, Meyer, Dremmel, Schlup, & Munsch, 2014; Munsch et al., 2007; Munsch, Meyer, & Biedert, 2012). Despite these encouraging results on the success of psychotherapy in BED, the care situation of patients with BED still needs to be improved. In many patients the existence of a BED in addition to overweight or obesity is not

recognized and therefore a disorder specific treatment is not provided (Kessler et al., 2013). Another challenge in the therapy of EDs is the high dropout rate, particularly in AN (up to 25% in adult patients with AN; Watson & Bulik, 2013) which is associated to a poorer long-term outcome (Campbell, 2009). In the next section, the current state of the art in the treatment of AN, BN and BED is summarized and information about outcome predictors are given.

Recent meta-analyses revealed that there exists an alarming lack of evidence about the efficacy of the treatment of AN (Hartmann, Weber, Herpertz, & Zeeck, 2011). Not only that treatment effects were low, no differences between treatment approaches were found either (Kass, Kolko, & Wilfley, 2013). The recently published ANTOP study (Anorexia Nervosa Treatment of Out Patients) confirmed these findings: in a multicenter, randomized controlled efficacy trial among adults with AN, comparing focal psychodynamic therapy, enhanced cognitive behavior therapy, or optimized treatment as usual, no specific treatment was shown to be superior (Zipfel et al., 2014). Neither has psychopharmacological treatment demonstrated significant success: Application of atypical antipsychotics as well as antidepressants such as Selective Serotonin Reuptake Inhibitors (SSRIs) cannot be recommended since no effects on weight or psychological outcomes are observed and there is no evidence for an improvement in therapeutic success (DGPM & DKPM, 2011; Watson & Bulik, 2013). However for adolescents with AN family based therapy has shown promising outcomes (Couturier, Kimber, & Szatmari, 2013).

Regarding BN and BED the situation is distinctly different: Psychotherapy is clearly the treatment of choice in both disorders. In adult patients, current data on treatment outcomes point to the effectiveness of *CBT* and *IPT*. *Guided self-help programs* have also proven their efficacy (Kass et al., 2013; Vocks, Tuschen-Caffier, et al., 2010). All of these approaches have proven to be successful in reducing binge-eating symptomatology as well as compensatory behavior. Moreover, it has been shown that the effect of psychotherapy is not limited to binge-eating but also positively influences associated symptoms such as weight, shape and eating concerns. However, body weight reduction and depressive symptomatology seems to be more resistant to change (Vocks, Tuschen-Caffier, et al.,

2010). This indicates that not only the main ED symptoms i.e. binge-eating and compensatory behavior, but also associated symptoms, such as high BD, warrant attention. A promising approach should therefore be to integrate body focused therapy modules. In experimental and treatment studies it has been shown that *Body Image Therapy* (BIT), including restructuring of dysfunctional body-related cognitions and body exposure interventions, supports treatment outcome (for an overview see Vocks & Bauer, 2015; Vossbeck-Elsebusch, Vocks, & Legenbauer, 2013; see chapter 5.3 for more information regarding BIT). Pharmacotherapy with antidepressants, especially SSRIs, has been revealed as moderately effective over the short-term in reducing binge-eating episodes and compensatory behavior when compared to a placebo control group. However, regarding the main ED symptoms, the combination of pharmacotherapy and psychotherapy is not superior to psychotherapy alone. A pharmacological treatment may be indicated if comorbid depressive symptoms exist. For BN, the use of Fluoxetine is recommended. So far no medication has been approved for the treatment of BED (off-label-use). It applies to both disorders that medication should only be considered in combination with psychotherapy (DGPM & DKPM, 2011; Kass et al., 2013).

When evaluating psychotherapeutic programs, it is important to investigate mediators and moderators of the treatment success as well as predictors of positive outcomes and failures of a program. This is a challenging task, since treatment studies are often characterized by small and heterogeneous samples as well as differing treatment approaches and outcome measures. Nevertheless, some indicators in terms of treatment prognosis are described in the next paragraph.

Since the treatment effectiveness in AN is limited, it is also difficult to make clear statements about predictors of treatment success or failure. A longitudinal study, assessing the course of AN in 103 individuals, revealed that after 12 years 7.7% of the patients were deceased; of those alive 19% still were diagnosed with AN, 9.5% with BN and 19% with EDNOS (not BED). Somewhat more than 50% no longer had an ED. The most important negative predictors of outcome in this study were symptom severity and chronicity, i.e. the outcome was worse in patients with a history of long

inpatient treatment and long ED duration. Additionally, patients who scored high on impulsivity had a poorer prognosis (Fichter, Quadflieg, & Hedlund, 2006).

In BN and BED *rapid response,* that is early change in treatment, has consistently been found as a positive predictor of short- and long-term treatment outcome. Among 220 women with BN treated with either CBT or IPT (both specific treatments for BN), Fairburn and colleagues (2004) found the early reduction in purging behavior by the fourth week of the treatment as a significant predictor of the outcome. Patients who reduced purging by at least about 50% were more likely to respond to the treatment at the end of the intervention and at the eight-month follow-up assessment. From these results the question remains, whether patients showing an early behavior change were characterized by certain attributes that predict the positive outcome, or whether the early change is detrimental for the positive outcome, or if both are true (Fairburn et al., 2004). There is conflicting evidence regarding other predictive factors such as duration of illness and age of onset. In some studies, overvaluation of weight and shape and frequency of binge-eating episodes were related to poorer outcome. Restrictive dieting on the other hand has not been constantly found to have an effect on the course of the illness. Nor has patients' characteristics such as the big five personality traits proven to be consistently related to treatment prognosis (Steinhausen & Weber, 2009).

As mentioned above, the most thoroughly investigated and confirmed predictor for treatment success in BED is, similarly to BN, the reduction of binge-eating episodes by about 65-70% within the first four treatment sessions (rapid response). In BED a negative predictor of treatment outcome is the level of psychopathology at the beginning of the treatment. The reduction of shape and weight concerns during treatment has been found to be a mediator of the treatment effectiveness. Furthermore, moderate instead of rigid dieting is associated with a better outcome (Iacovino et al., 2012). Overall, it can be concluded that in BN and BED the first weeks in treatment are very important. Consequently, greater therapeutical efforts should be made to achieve these early improvements. Moreover, patients with BN or BED, who do not benefit at an early stage in treatment

or do not show early improvements, need particular attention and additional or different therapeutic interventions (on the issue of tailored intervention see chapter 5.3).

Another issue that needs to be considered regarding ED treatment is the compatibility of interventions for men. Approximately 10% of patients with AN or BN are male; in BED the gender ratio is less skewed (around 1/3 of the patients is male) (APA, 2013). In a recent review the conclusion has been drawn that males with EDs are often misunderstood (e.g. by focusing on weight loss but not muscle gain), underdiagnosed (e.g. by misjudging excessive exercising) and as a consequence not sufficiently treated. This may be due to the fact that males show different clinical pictures in some aspects of EDs such as not engaging in vomiting but excessive exercising in the course of a BN, and that most treatment programs are designed for women. It is therefore necessary to develop more specific assessment tools and treatments for men with ED (Strother, Lemberg, Stanford, & Turberville, 2012).

As can be seen from the results described above, the treatment of EDs faces several challenges. First, and most importantly, a substantial number of non-responders to ED treatment exist, especially in AN und BN. An evident challenge in treatment of EDs is therefore the identification and handling of patient subgroups with potentially unique needs, such as non-responders but also male patients. Such subgroups may be characterized by specific maintaining factors. That requires knowledge about etiological factors, but also predictors of treatment outcome. A sophisticated understanding of mediators and moderators of the treatment effects, such as personal characteristics and contextual features is necessary. Two conclusions can be drawn: on the one hand, there is a need for basic research to differentiate etiological models (see chapters 4.1 to 4.3) and on the other hand, tailored interventions are required (see discussion chapter 5.3).

4 Contribution to a Comprehensive Etiological Model of Eating Disorders

4.1 Sociocultural Risk Factors in a Basic Etiological Model of Eating Disorders

Based on the previously discussed findings on diagnosis and treatment of EDs, it is worth going into more detail of an elaborated etiological model. The following section contains a brief overview of transdiagnostic factors that contribute to the development and maintenance of different EDs. Thereafter the main focus lies on a *sociocultural risk model* at the center of which *body dissatisfaction* (BD), as one of the best established predictors of disordered eating behavior in women and men, is discussed.

When describing etiological models of EDs, *genetics factors* need to be taken into account since twin- and adoption studies suggest moderate to high heritability of AN, BN as well as nonspecific correlates of disordered eating such as BD (approximately 50-85% of the variance in different forms of disordered eating could be explained by genetic factors rather than by shared environmental variables) (Klump, Suisman, Burt, McGue, & Iacono, 2009). Also in BED, a familial aggregation, independently of obesity, refers to a genetic transmission (odds ratio of 2.2 in first-degree relatives) (Hudson et al., 2006). These results suggest a significant genetic contribution to EDs, even though some of these studies have limiting methodological issues and some of their conclusions need to be treated with caution. Besides genetic factors, *biological and neurobiological factors* also need to be considered, for example, altered brain serotonin functions which are relevant regarding the regulation of appetite, mood and impulse control (Kaye, 2008). In addition, *individual characteristics* such as inhibitory control, perfectionism and self-esteem are fundamental parts of comprehensive etiological models. All in all, an interaction of genetic, biological, environmental, social and individual factors must be assumed (for a overview see also Keel & Forney, 2013).

The etiological model, which is described in the following section, puts emphasis on *transdiagnostic psychological and social factors* that are highly relevant for the three main EDs AN, BN and BED, but also concerning subthreshold forms of disordered eating. In this sense, the factors described may

also be seen as risk factors. In the subsequent chapter 4.2, the focus will be on the influence of body ideals in media, and associated moderating or mediating variables such as the degree of body ideal internalization. Publications 2 and 3 then introduce an ED specific cognitive distortion with respect to the perception of one's own body that is proposed as a complement to an expanded etiological model.

Focusing on *shared risk factors* of different clinical pictures of EDs, Haines and Neumark-Sztainer (2006) described four main factors, all of them profoundly supported by a broad empirical basis. First of all, *dieting* or *unhealthy weight control strategies* have been found to predict disordered eating behavior in a broad range of cross-sectional and longitudinal studies with different samples (for an overview see Haines & Neumark-Sztainer, 2006). The results of the Health Behavior in School Aged Children (HBSC) study published in 2012 by the World Health Organization (WHO) revealed that prevalence estimations for dieting (with the aim of losing weight) among children and adolescents at the age of 11-15 years range from 14-22% (girls) and 9-12% (boys) (Currie et al., 2012). Neumark-Sztainer and colleagues (2011) found even higher rates for unhealthy weight loss behaviors in adolescents (upt 61% in girls and 28% in boys). Among adults in the US, up to 46% of women and 33% of men report being on a diet to lose weight (Bish et al., 2005; Kruger, Galuska, Serdula, & Jones, 2004). Representative longitudinal data from a population based study in the US (N=14'322 adolescents; 7-8 years between pre and post measurement) confirmed that early dieting, depression and body image distortions in adolescence cumulatively predict disordered eating behavior in young adulthood (Liechty & Lee, 2013). Another population-based 5-year longitudinal study (N=2'516) referred to a significant positive association between unhealthy weight control strategies at the first survey period and increased BMI, heightened risk for loss of control eating and extreme weight control behaviors (e.g. self-induced vomiting and use of diet pills) at the second survey period five years later (Neumark-Sztainer et al., 2006). Dieting as a core etiological factor in EDs may be initiated through different processes: The most frequent were either preexisting overweight and/ or body-related teasing and/ or BD. A large proportion of patients with BED, for example, reported to have

been suffering from overweight before they decided to follow a diet and before they experienced their first binge-eating episode (Reas & Grilo, 2007). Among patients with a bulimic ED, who experience dieting before binge-eating (so called *diet-first subtype*) restrictive eating or dieting can be understood as an important etiological factor. On the other hand, patients who report no dieting experience before the first binge (so called *binge-first subtype*; one third to half of the affected persons), may experience binge-eating rather in the context of psychological distress (Bulik, Sullivan, Carter, & Joyce, 1997). Two important sources of psychological distress in this context may arise either from *appearance-related teasing* or *interpersonal difficulties*. Overweight and obesity are stigmatized in western societies; particularly in women, higher BMI is clearly regarded as undesirable. Higher BMI in women has shown to have a direct influence on BD as well as an indirect influence via experienced social pressure to be thin (Stice & Whitenton, 2002). One explanation could be that weight-related teasing results in dieting, which may lead to loss of control or binge-eating as a consequence of restrictive eating behavior. Weight-related teasing may also lead to BD and/ or depressive symptoms, which results in binge-eating (Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006). This mechanism has been explained in the *affect regulation model* (Haedt-Matt & Keel, 2011). In the context of this model, binge-eating is described as a consequence of negative affective states, such as frustration, negative self-evaluation, boredom, anxiety and shame. Particularly *interpersonal stressors* and associated moods may lead to a stronger desire for food (Ansell, Grilo, & White, 2012). Difficulties in social functioning have been repeatedly found in patients with EDs which was, among other explanations, attributed to a high sensitivity to interpersonal rejection. In an experimental study with 46 patients with a current or past ED diagnosis, an attentional bias towards rejecting facial expressions was found in individuals with a lifetime diagnosis of EDs, whereas healthy individuals turned their attention to accepting faces (Cardi, Di Matteo, Corfield, & Treasure, 2013). This vigilance to rejection may be an important etiological factor and a trigger for binge-eating.

According to the *Escape-Model* (Heatherton & Baumeister, 1991) it is assumed that binge-eating is a sort of avoidance strategy and serves as a dysfunctional way to reduce tension, which equates to a short-term negative reinforcement. Dealing with tension, stressful circumstances and negative mood states demands functional emotion regulation strategies. Individuals with poor emotion regulation strategies are prone to turn to food to escape or down-regulate their emotions, creating risk for diagnosable EDs (Munsch, Meyer, Quartier, & Wilhelm, 2012). However, the escape-model has also been critically discussed in recent years, since ecological momentary assessment (EMA) studies found that negative affectivity did not necessarily decrease after a binge-eating episode but in some cases was maintained or even intensified, due to the negative emotions such as guilt and shame that arise. In sum, a bidirectional relation between negative affect and binge-eating is assumed nowadays (Haedt-Matt & Keel, 2011).

In this context, *emotion regulation* as another central etiological factor needs to be described in more detail. Emotion regulation encompasses emotional responses to daily stressors depending on an individual's sensitivity towards emotions, the capability to accurately perceive and express emotions and the ability to regulate emotional response in an appropriate and flexible way (Thompson, 1994). Difficulties in emotion regulation have been recognized as core elements of different forms of EDs but also as a general, transdiagnostic marker of psychopathology. In a questionnaire based study including patients with AN, BN and BED, ED patients, in comparison to healthy controls, reported significantly lower emotional awareness and clarity but at the same time higher levels of emotion intensity, associated with lower acceptance of emotions as well as decreased use of functional, but increased use of dysfunctional emotion regulation strategies (Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012). The most apparent ED related behavioral correlate of emotion regulation is binge-eating as a dysfunctional strategy to cope with negative emotional states (see affect regulation model). *Body image concerns* as a source of negative self- and body-related emotions were revealed to be closely connected to bulimic symptoms, especially when individuals tend to use suppressive and avoidant emotion regulation strategies (Hughes & Gullone, 2011).

Intuitively, the concept of eating as an affect regulation strategy works for patients with BN and BED, but not for AN. However, it has been suggested that besides eating, hunger may also have an emotion regulatory function by decreasing the sensitivity to emotional stimuli. In an integrative model of AN Hatch and colleagues (2010) link restricted food intake to emotion regulation difficulties. There is evidence that beyond the more frequent use of dysfunctional and the rarer use of functional emotion regulation strategies compared to healthy controls, AN and to a somewhat lesser extent BN individuals seem to be affected by difficulties in identifying and labeling basic emotions. These problems are associated with a more frequent use of maladaptive coping strategies (Harrison, Sullivan, Tchanturia, & Treasure, 2010). Moreover, *impulsivity* respectively deficits in inhibitory control seem to foster the susceptibility for EDs (e.g., Carrard, Crepin, Ceschi, Golay, & Van der Linden, 2012).

Apart from dieting and negative affect, increased levels of *body dissatisfaction* (BD) have consistently been found to be associated with negative self-perception, mood states and unhealthy forms of weight management such as restrictive eating and bulimic behavior in cross-sectional and experimental studies (Grabe, Ward, & Hyde, 2008). In longitudinal studies, dysfunctional attitudes towards one's weight and shape are often accompanied by unhealthy forms of weight and shape management such as restrictive dieting, self-induced vomiting, abuse of laxatives, diuretics, diet pills and excessive exercise (Stice, 2001, 2002; Stice, Marti, & Durant, 2011). As mentioned above, BD may result from appearance-related teasing, but also originates from the pressure to be thin. The *tripartite influence model* described by Thompson and colleagues (Thompson, Coovert, & Stormer, 1999; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999) posits that three main social influences exist: peers, parents and media. All of them have a direct impact on BD but also an indirect impact via the two variables *internalization of the appearance ideal* and *appearance comparison* (processes that involve the negative influence of media are described in more detail in chapter 4.2). BD is expected to foster restraint eating and negative affect which then contribute directly to bulimic symptoms. This association is conceptualized in the *dual pathway model of eating pathology*, which

summarizes that perceived pressure to be thin and internalization of the thin beauty ideal contributes to BD (Stice, 2001). According to this model, BD promotes unhealthy dieting behaviors that may progress to different forms of EDs. Moreover, BD is associated with negative affect, which may lead to unhealthy eating and weight management styles (e.g. binge-eating as described in the affect regulation model). In a prospective longitudinal study over eight years with almost 500 adolescent girls at the age of 12-15 years, Stice and colleagues (2011) found BD to be the strongest predictor of the risk for onset of any ED symptoms: girls in the upper quarter of BD had a fourfold risk to develop symptoms of disordered eating (24% of the girls with high BD showed symptoms of disordered eating eight years later, versus 6% of those with less BD). The risk of pathological eating behavior was at highest, when high BD went along with comparably high depressive symptoms. Under these circumstances 43% of the girls showed dysfunctional eating. Among those who did not show striking BD, dieting was the most important predictor of disordered eating (Stice et al., 2011).

Figure 1 summarizes the presented factors contributing to a basic etiological model of disordered eating. In the next chapter, the influence of repeated confrontation with body ideals propagated by media will be discussed in more detail. In a further step, the model will be complemented by factors, which are proposed in a comprehensive etiological and risk model of BD and disordered eating.

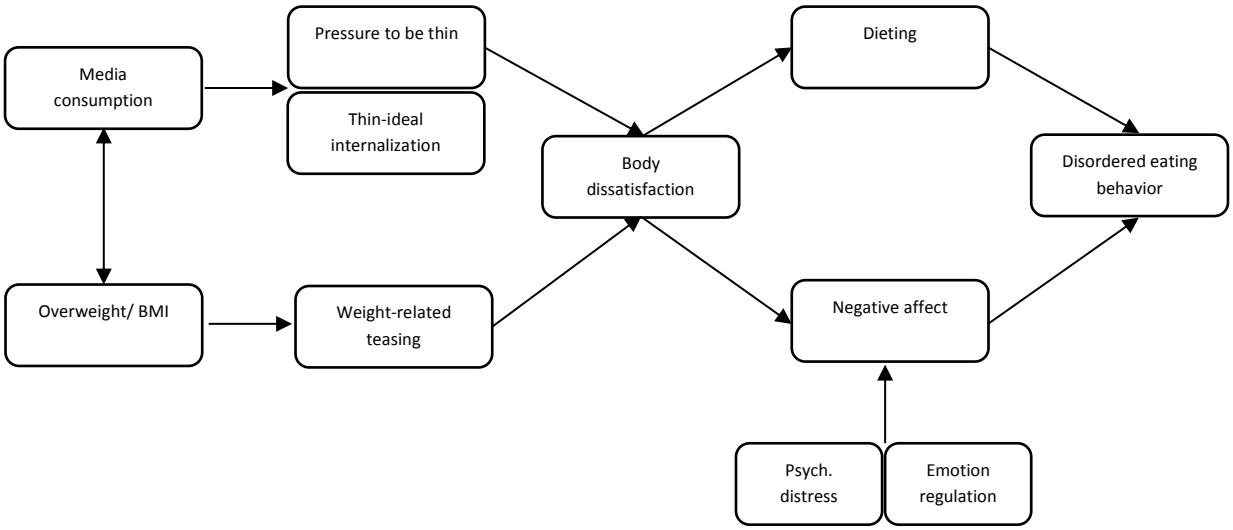

FIGURE 1: Basic sociocultural risk model of body dissatisfaction and disordered eating behavior (according to Haines & Neumark-Sztainer, 2006; Stice, 2001).

4.2 The Influence of Media on Body Dissatisfaction and Disordered Eating Behavior

The cultural development of the female and male body ideal has seen many changes over time. Whereas in the 19th century the "reproductive" and thus more corpulent female body shape was considered ideal, in the 1920ies a shift to a very slim ideal occurred. In the postwar period female curves were highly valued again. However, since 1960 the ideal of a female body has developed into a very skinny shape. The male ideal also underwent significant shifts since about 1960. A more and more muscular, defined and athletic ideal developed, also visible by means of the changed design of cartoon characters and toy heroes for kids (for an overview see Grogan, 2008). Altogether, the current female and male body ideal has become unrealistic and unattainable for most people. Yet the desire to look like the supermodels on TV and in magazines is more pronounced than ever. This is also due to body ideals in our western society standing not only for attractiveness, but also for self-esteem, happiness, success, health, self-control, social status, power, strength and many more aspired attributes (Tiggemann, 2002). The individual *body image* is an integral part of a person's identity. It reflects a person's attitude towards her/ his body in all its different attributes such as weight, height and shape. Body image, as a part of self-representation, is a multifactorial construct including body-related perceptional, cognitive, emotional, and behavioral components (for an overview see e.g., Cash & Smolak, 2011). The importance of the *perceptive component* becomes apparent by the finding that subjective body-perception correlates better to disordered eating behavior and negative emotions towards one's own body than objective measures such as BMI or the waist-hip ratio (Wilson, Tripp, & Boland, 2005). That *emotional and cognitive components* are closely linked has been shown by experimental studies using mirror exposure. Negative body-related cognitions and associated emotional responses following a mirror exposure were more frequent in patients with BN and BED than in healthy controls. Cognitive body image disturbance and associates emotions are established maintaining factors (e.g., Hilbert & Tuschen–Caffier, 2005). Preliminary findings indicate that a neurobiological correlate of body-related cognitions and emotions exists, since in ED patients, an increased cerebral activity in the right inferior frontal lobe and the right

temporal lobe was observable following body exposure (Beato-Fernandez et al., 2009). Within a cognitive-behavioral framework, cognitions and emotions form a triangle with behaviors. Characteristic correlates of the *behavioral component* of body image are shape- and weight-related avoidance and control behaviors, which are significantly more pronounced in ED patients than in healthy controls. These behaviors are seen as expressions of the overvaluation of weight and shape and are acknowledged as important maintaining factors in ED pathology (e.g., Shafran, Fairburn, Robinson, & Lask, 2004).

According to Cash & Smolak (2011), body-related attitudes can be described based on two main components: an *evaluative component*, such as the experience of body (dis)satisfaction and self-ideal discrepancy, and an *investment component*, encompassing the cognitive-behavioral salience of the physical appearance. The investment component consists of basic assumptions about the self which guide the processing of self-related information. Certain situations activate schema-based processing of appearance-related information and may lead to distorted and dysfunctional body-related thoughts, feelings and behaviors (Cash, Melnyk, & Hrabosky, 2004; Cash & Smolak, 2011). Apart from these overlapping, general features of body image, it is necessary to distinguish between female and male body image. Whereas in females the aspired ideal is mainly one-dimensional thinness-oriented, in males the ideal is lean and muscular, thus the male ideal needs to be described within a two-dimensional frame. More information about the specific characteristics of the female and male body image and related behaviors are contained in *publication 2* (males) and 3 (females).

In sum, a negative body image or more precisely BD in respect of shape and/ or weight is so prevalent that it has been described as a *normative discontent* (for overviews see Grogan, 2008; Rodin, Silberstein, & Striegel-Moore, 1984; Tiggemann, 2002). To reduce BD and approach the desired ideal, several behaviors were shown to influence eating, weight and shape (predominantly restraint eating and exercising in women (e.g., Forrest & Stuhldreher, 2007), in men also frequent exercising, steroid abuse and supplement intake) (e.g., Strother et al., 2012). Importantly, through mass media, the body ideal is not only repetitively presented, but also strategies to attain this ideal

are propagated. It is being suggested that the ideal can be achieved, if the right clothing, diet, cosmetic product, fitness program and so forth is chosen. The thin body ideal in women respectively the muscular body ideal in men is opposed by the permanent availability of high-caloric food. Thus, many individuals experience a dissonance between the wish to control body weight/ shape and the continuous attraction of high-caloric quickly available food, which is also excessively promoted in mass media (e.g., Harris, Bargh, & Brownell, 2009).

Against this background, the influence of thin or muscular ideals transmitted via media on BD as well as on dysfunctional eating behavior has been investigated in numerous studies and discussed critically in several reviews and meta-analyses (Grabe et al., 2008; Groesz, Levine, & Murnen, 2002; Hausenblas et al., 2013; Levine & Murnen, 2009; López-Guimerà, Levine, Sánchez-Carracedo, & Fauquet, 2010). There is broad agreement that a direct association is unlikely and that therefore different *intermediary variables* need to be considered (such as internalization of the body ideal, see next section in this chapter). In a current meta-analysis, including 204 experimental, correlational and longitudinal studies, the effect of thin ideals on women's respectively of muscularity ideals on men's BD and ED symptomatology has been examined. Concerning main outcome variables (BD and ED symptoms), little evidence for media effects on males has been found. For most women, the effects were marginal; however, women with preexisting BD seemed to experience a stronger negative effect, especially in experimental studies. The author concluded that general negative effects of media exposure can be considered minimal, but factors such as BD may contribute to a certain vulnerability (Ferguson, 2013). This finding suggests that intermediary variables may play an important role and need to be taken into account when describing a comprehensive sociocultural risk model that focuses on the influence of media exposure on BD and disordered eating. In the next section, some of the factors that account for varying responses to media exposure are presented.

First of all, it is important how much an individual has internalized the ideal of thinness or muscularity. The repeated confrontation with an unrealistic, unattainable body ideal may foster *internalization* of this ideal, but not in every person to the same extent. The term *internalization*

refers to the degree to which a person accepts the socio-culturally prescribed ideals of attractiveness and regards them as personally desirable. It also includes the personal engagement in behaviors to achieve this ideal (Thompson & Stice, 2001). It is supposed that internalization leads to a shifted inner representation of the picture of how a "normal" woman or man looks like. This mechanism is more generally described in the *cultivation hypothesis* (Gerbner, 2002), that summarized the observation that people, who consume mass media frequently, are cultivated/ socialized through them and tend to accept the conception transmitted of the world. Not infrequently, this creates a distorted perception of reality. From representative intercultural studies it is known that the exposition to western media poses an important predictor of striving towards a very thin body ideal and high BD in women (Swami et al., 2010). Considering the omnipresence of unrealistic portrayals of body ideals, it is not surprising that a large proportion of women and men experience *self-ideal discrepancy* (Higgins, 1987), which is defined as a gap between their desired body ideal and their self-perception. It is especially valid for women, that the thinner the striven ideal is, the more pronounced is the reported BD and unhealthy dieting behavior, independently from BMI (Markey & Markey, 2005). Again, in contrast to women, whose primary goal is to achieve thinness, men's concerns regarding their body image seem more complex, as an increase in muscularity and/or weight loss/body fat reduction is desired (Tylka, 2011).

In short, media pose a relevant source of orientation regarding the striven body ideal. This goes hand in hand with a more or less pronounced pressure to conform to this ideal. Following the *tripartite influence model* (Thompson, Coovert, et al., 1999; Thompson, Heinberg, et al., 1999), mass media represent one of the three main sources of perceived *social pressure* to be thin respectively muscular (together with the influence of parents and peers). Media have shown to have a significant effect on BD via the experienced pressure to conform to a body ideal. BD, in turn, fosters restraint eating and thus has an influence on bulimic behaviors (Thompson, Coovert, et al., 1999; Thompson, Heinberg, et al., 1999). In empirical studies this model received support in samples of female adolescents (Keery, van den Berg, & Thompson, 2004) and women (van den Berg, Thompson, Obremski-Brandon, &

Coovert, 2002) and also in male adolescents (Smolak, Murnen, & Thompson, 2005) and men (Tylka, 2011). Concerning men, the model has been further differentiated in respect of dissatisfaction with muscularity and/ or body fat followed by muscularity enhancement behavior and/ or disordered eating behavior (Tylka, 2011). Overall, perceived pressure from media has been shown to be significantly related to negative feelings about one's own body, as well as BD, low self-esteem, psychological disorders (such as depression) and behavioral correlates such as restraint eating and excessive exercising in men (Barlett, Vowels, & Saucier, 2008) and women (López-Guimerà et al., 2010).

Besides internalization of the body ideal and the perceived pressure to conform to this ideal, *social comparison* processes have turned out to moderate the relationship between media exposure and a negative development of BD and disordered eating (Want, 2009). The well-established social comparison theory (Festinger, 1954) states that thin ideals in media activate upward social comparison and result in negative evaluation of one's own body (Halliwell & Dittmar, 2005; Tiggemann & McGill, 2004; van den Berg et al., 2007; Want, 2009). Upward comparisons (i.e., comparisons with media personalities that are more attractive than the perceiver) are shown to be related to either positive or negative body image perceptions depending on whether the media personality is perceived as inspiring or threatening. Interestingly, the effect of media exposure is not unidirectional, as certain young healthy females also felt better after viewing thin body ideals via media (Myers & Biocca, 1992). For example in a study of Mills and colleagues (Mills, Polivy, Herman, & Tiggemann, 2002), having been exposed to pictures of thin beauty ideals resulted in a temporary feeling of thinness in young women identified as restraint eaters, even though they later engaged in disinhibited eating in the laboratory. Tiggemann, Polivy & Hargreaves (2009) were able to experimentally support a *self-enhancement process* or so called *fantasy effect* in undergraduate female students. These women have been exposed to magazine advertisements either containing thin-ideal images or product images. Instructing participants to compare themselves to the thin ideals increased negative mood and BD whereas the fantasy-instruction (what it would be like to be

the women in the image) increased positive mood. Despite this possible positive initial effect of thin ideals in media, the behavioral consequences may be dysfunctional. For example, a young woman may be motivated to stick to a certain dysfunctional body related behavior such as dieting and a man may decide to further engage in excessive body shaping, although in fact these behaviors have health-threatening consequences.

Cognitive processing models of BD and EDs (Tantleff-Dunn & Thompson, 1998; Thompson, Heinberg, et al., 1999) refer to *appearance schemas* which include cognitive structures that influence the individual processing of self-related information concerning appearance (e.g. individual beliefs about the importance of shape and weight to the self). The confrontation with a body ideal for example, may activate such schemas and sensitize the attention of an individual to further schema relevant information. It is likely that a negative body image and a high importance of the appearance to the self result in negative body-related cognitions, emotions and behaviors (Cash et al., 2004). An experimental study with healthy adolescents showed that appearance commercials activate personal appearance schemas and that this activation partially mediated the influence of the commercials on BD in females (Hargreaves & Tiggemann, 2002). Evidence for the assumption that appearance-related cognitions can be distorted have been found in an EMA study with undergraduate females: distorted appearance cognitions were related to negative outcomes (e.g. body checking) following appearance focused social comparison (Ridolfi, Myers, Crowther, & Ciesla, 2011).

Following a cognitive-behavioral model, appearance-related cognitions have a strong impact on the experienced body-related emotions and behaviors. The individual's *mental representation of their own appearance* develops and maintains itself depending on thoughts and feelings regarding one's own body but also on body-related behaviors: For example, avoidance behavior such as not looking in the mirror, may result in inadequate feedback about one's own body shape and thus fosters a distorted mental representation of it. In an experimental study with 78 ED patients (BN and EDNOS), using a digital photo distortion technique, the participant's overestimation of own body shape was significantly predicted by body-related avoidance behavior, but not by BMI or shape/ weight

concerns (Vossbeck-Elsebusch et al., 2015). In an fMRI study, neural correlates of viewing pictures of one's own and other women's bodies have been investigated in AN, BN and healthy controls. The results provide pointers as to which structural differences in ED patients compared to the healthy controls exist: Activity in the inferior parietal lobule was reduced in AN and BN patients compared to healthy controls when viewing pictures of their own body. Higher amygdala activity was observed only in women with AN if they were confronted with pictures of another woman. The authors concluded that reduced attentional processes in response to one's own body may reflect a neural correlate of avoidance behavior. Limbic activity when looking at another woman's body may be associated with social comparison processes (Vocks, Busch, et al., 2010).

These findings obviously indicate that the perception and processing of appearance-related contents in media depends on the individual body image or more precisely the degree of preexisting *body dissatisfaction* (BD). This has also been confirmed in experimental studies in which preexisting appearance concerns have been found to be an important predictor of the negative influence of media exposure (Groesz et al., 2002; Levine & Murnen, 2009; López-Guimerà et al., 2010). On the one hand, BD builds the basis for schema-congruent information processing and for stronger experience of self-ideal discrepancy; on the other hand, it may be the origin of a *selective body-focused perception*, which is frequently found in ED patients. Attention may be directed to disliked body parts and/ or media contents may be perceived selectively (e.g. focusing on the perfection of the models seen and neglecting the unreality of the pictures). Madsen and colleagues (2013) were able to show that patients with AN tend to focus very strongly on details and specific aspects of their body and neglect the overall picture when looking at themselves.

In sum, exposure to body ideals in media fosters internalization of body ideals and contributes to experienced social pressure. Simultaneously, appearance schemas were activated and appearance-related cognitions were triggered. Attention is further guided to appearance-related information concerning the self and others. As a consequence an unrealistic representation of body ideal as well as a distorted mental representation of one's own appearance arises. This is associated with social

comparison processes and body-related avoidance behavior which in turn contribute to the solidification of the representations. Moreover, appearance related media contents are processed biased by preexisting BD. Taken together; these factors make the experience of self-ideal discrepancy more likely. What results are negative body-related cognitions, emotions and behaviors as well as attempts to reduce BD; these are all signs of ED pathology (see *figure 2*).

Overall, it is important to note that media do not have a negative impact per se, but evoke detrimental consequences via the above mentioned and in figure 2 plotted mechanisms (for overviews see e.g., Ferguson, 2013; López-Guimerà et al., 2010). In the next chapters the proposed model is complemented with a new factor, termed *Thought-Shape Fusion* (TSF) that includes the susceptibility to cognitive distortions regarding the perception of one's own body shape and weight.

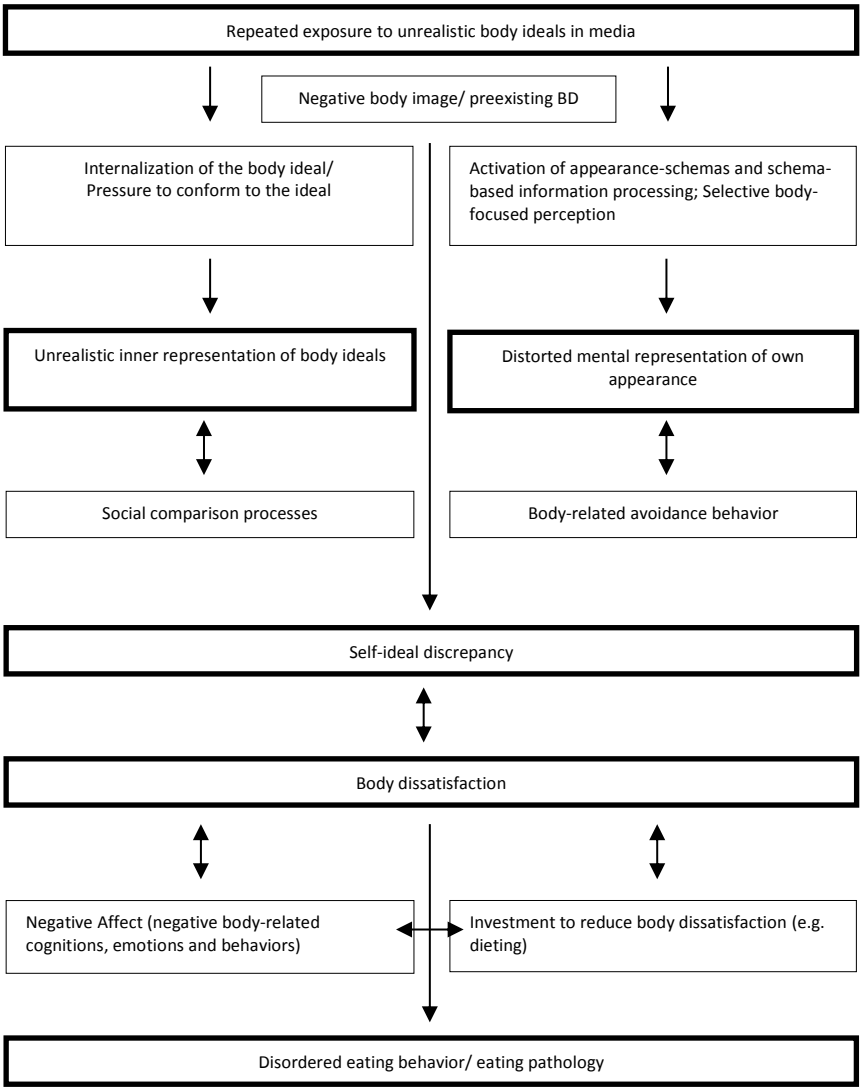

FIGURE 2: Processes explaining body dissatisfaction and disordered eating behavior as a consequence of media exposure.[6]

4.3 Expanding the Sociocultural Risk Model of Eating Disorders

4.3.1 Publication 2: The Susceptibility to Cognitive Distortions (Thought-Shape Fusion)

Most prominently, *cognitive distortions* have been described in the context of depressive disorders by Aron T. Beck (1963). He emphasizes thought processes in depression and conceptualized depression not as a mere *affective disturbance* but also as a *thought disorder*. One of the main characteristics of the cognitions in depressive patients is a distortion of reality to a more pronounced

[6] The graphic design of figure 2 indicates two paths; however it is assumed that the two paths are not mutually exclusive but may be activated simultaneously. It must be noted that the figure is a simplification and does not represent all relevant factors and relationships between them sufficiently.

degree than the inaccuracy and inconsistency that is found in healthy individuals. In depressed patients *systematic errors* which are biased against the self can be observed. In different ways cognitions deviate from logical and realistic thinking. The most common systematic errors arise from *arbitrary interpretation*, *selective abstraction*, *overgeneralization* as well as *magnification* and *minimization*. All of these processes have in common that patients neglect information and do not consider alternative information. Information processing is biased according to the *cognitive triad*, that is a negative perception of and attitude towards the self, the world and the future (Beck, 1963). Examples for cognitive distortions have also been found in other disorders such as panic disorders where the misinterpretation of bodily sensations is an important maintaining factor (Clark et al., 1997). Cognitive distortions have already been discussed in the context of EDs in the late 70ies and early 80ies of the last century. They were recognized as core symptoms and maintaining factors in ED patients. For example, Garner and Bemis (1982) described several distorted attitudes and beliefs among AN patients and pointed out that they are the basis for many ED characteristics such as bulimic behavior (Garner & Bemis, 1982). As a consequence of these empirical findings, cognitive-behavioral treatment approaches targeted these irrational beliefs and attitudes and attempted to change them (e.g., Cooper, 2005; Fairburn, 1981).

Schulman and colleagues (1986) developed and evaluated a scale to assess irrational beliefs and cognitive distortions in BN. The scale resulted in two factors measuring cognitive distortions on the one hand in terms of automatic eating behavior (e.g. “When I get angry I must binge.”) and in respect to physical appearance on the other hand (e.g. “My value as a person is related to my weight.”) (Schulman, Kinder, Powers, Prange, & Gleghorn, 1986). In doing this, they complied the need of identifying specific cognitive distortions and thus made them accessible for therapeutic interventions. Today, a distorted perception of one’s own body is a core symptom of patients with different forms of EDs; most notably in AN, where the perception of fatness and/ or the fear of weight gain persists although significant underweight is present (see also chapter 2.2) (APA, 2013).

Recently, studies investigating ED specific cognitive distortions have become more frequent. One etiologically relevant distortion has been described as *Thought-Shape Fusion (TSF)* by Shafran and colleagues (Shafran, Teachman, Kerry, & Rachman, 1999). The concept of TSF was developed according to the *Thought-Action Fusion* (TAF) concept in individuals with obsessional compulsive disorders (OCDs) (Rachman & Shafran, 1999; Shafran, Thordarson, & Rachman, 1996). In OCD, patients believe that the likelihood of an undesirable event occurring is increased by a negative thought (likelihood TAF) and that these negative thoughts are morally equal to the performance of the negative behavior in reality (moral TAF) (Rachman & Shafran, 1999; Shafran et al., 1996). The TAF concept has then been adapted, as the authors assumed that a comparable cognitive distortion may also be relevant in ED pathology. Transmitted to the ED domain, this means that the mere thinking about eating fattening/ forbidden food, gaining weight, not exercising or discontinuing a diet, makes patients feel fatter and concerned about weight gain (for the short version of the TSF trait questionnaire refer to Coelho et al., 2013). TSF has been described through three theoretical factors: *1) Likelihood* (the mere thought lead to the sensation that a subsequent weight gain is more likely), *2) Moral* (the thought is morally wrong) and *3) Feeling* (the thought evokes feelings of fatness) (Shafran et al., 1999).[7] These irrational beliefs persist, even if the individuals are aware of the fact that it is not possible that thinking really has an influence on their actual body shape (Shafran & Robinson, 2004; Shafran et al., 1999). Susceptibility to TSF has been shown to be closely associated with the core ED symptoms, such as overvaluation of shape and weight as well as pronounced concerns about eating (Coelho, C. Baeyens, C. Purdon, A. Pitet, & M. Bouvard, 2012; Coelho et al., 2014; Shafran & Robinson, 2004).

In sum, TSF can be described as a tendency to a distorted self-perception arising from thinking about fattening/ forbidden food or weight gain. TSF is thought to be associated with negative body-related emotions and dysfunctional behaviors such as intensive efforts to improve appearance or restraint eating. It is very well conceivable, that the experience of TSF constitutes an important factor

[7] However, the factor structure of the TSF questionnaire has not been statistically proven so far. Analyses resulted in a unifactorial structure (TSF concept scale).

contributing to the development and maintenance of disordered eating. This leads to the assumption in *publication 2* which encompasses that the tendency to experience cognitive distortions regarding the perception of body shape and weight (such as TSF) contribute to the explained variance in the association between BD and disordered eating and compensatory behavior (DECB). On the one hand, high BD is supposed to be correlated to a stronger degree to TSF, on the other hand, TSF is assumed to be related to behavioral consequences. Taken together TSF may be one of the relevant factors that transform BD into a dysfunctional behavior.

4.3.2 Publication 2: Methods and Main Results

The aim of *publication 2* was the integration of the ED specific cognitive distortion TSF into a comprehensive sociocultural risk model of disordered eating. The so-called "Model of Disturbed Eating Behavior in Men" links BMI and perceived social pressure to BD and BD to Disturbed Eating and Compensatory Behavior (DECB). Against the background of the high frequency of BD in men, *publication 2* aimed at shedding light on underlying mechanisms relating to BD and DECB. Within a multi-factorial model TSF, as a marker for the susceptibility to distorted cognitions related to eating, shape, and weight, is introduced as a possible mediator variable, explaining the connection between BD and DECB. Besides the cognitive factor TSF, non-acceptance of emotional response has been considered as another mediating variable (for more details on emotion regulation and non-acceptance of emotional responses in this context, see *publication 2*).

Data which has been analyzed in *publication 2* has been collected within an online questionnaire study using a cross-sectional design. A sample of 141 healthy men were registered for this study, from which 18 (12.8%) dropped out during the online assessment. The remaining 123 men were on average 23.8 years old (SD=3.2). All participants were healthy young men, not in treatment for a psychological disorder. Participants were recruited via emails to the students at the department of Psychology at the University of Fribourg and in the private environment of the investigators. Data of three recruitment periods was available for the statistical analysis: Group 1 encompasses 58

participants which have signed up for an online questionnaire survey for two bachelor theses from December 2012 to March 2013. Group 2 has been recruited within an experimental study between Mai 2013 and Mai 2014 (n=16), and group 3 participated in another online questionnaire survey between April 2014 and January 2015 (n=49). No group differences between the three subsamples were found regarding BMI F (2, 120) = 2.68, p = .073 and age F (2, 120) = 0.90, p = .410, but in terms of ED pathology: an ANOVA with orthogonal contrast revealed a significant difference in the EDE-Q global score between subsample 1 (M=0.78, SD=0.76) and 3 (M=0.26, SD=0.36), T (84.71) = 4.60, p < .001.[8]

All participants filled in the same series of online-questionnaires after giving informed consent. To fill in this set of questionnaires took approximately 40 to 50 minutes. The questionnaires were presented via an online survey platform (Umfrageonline; Enuvo). The original format and content of the questionnaires were not altered. According to the literature, the validity of internet-based assessments is comparable to paper pencil versions (Carlbring et al., 2007). All participants answered the following questionnaires: Sociodemographic questions (own items, i.e. age, nationality, educational level, weight and height to calculate BMI) and questions regarding media consumption (own items, i.e. frequency of TV and magazine consumption, internet use), Eating Disorder Examination Questionnaire to assess ED pathology[9] (EDE-Q; Fairburn & Beglin, 1994; German version by Hilbert & Tuschen-Caffier, 2006), Body Shape Questionnaire for the assessment of general BD (short version; Evans & Dolan, 1993; German version by Pook, Tuschen-Caffier, & Stich, 2002), Beck's Depression Inventory as an indicator of the general psychopathology (BDI-II; Beck, Steer, & Brown, 1996; German version by Hautzinger, Keller, & Kuehner, 2009), Social Attitudes Towards Appearance Questionnaire providing an estimation of internalization, awareness and pressure from body ideals

[8] Since analyses showed a violation of the assumption of homogeneity of variances, the results of the Brown-Forsythe test, which provides good robustness, are reported. There was a statistically significant difference at the p < .001 level found for the EDE-Q global score between the groups: F (2, 90.28) = 13.76.

[9] To avoid an overlap of the variables that assess BD and ED pathology, a new variable named *disturbed eating and compensatory behavior* (DECB) was created. This variable contains the following items of the EDE-Q: items 1–5 (restrained eating), 15 (binge-eating), 16 (self-induced vomiting), 17 (taking laxatives), and 18 (excessive exercising). While items 1–5 were scored on a scale from 0-6; items 15-18 were coded based on the given occurrences of binge-eating (number of days in the last month), as well as purging, exercising and use of laxatives (number of events in the last month). Cronbach's alpha of the new DECB scale was .80.

(SATAQ; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004) (German version by Knauss, Paxton, & Alsaker, 2009), Difficulties with Emotion Regulation Scale to assess emotion regulation capacities (DERS; Gratz & Roemer, 2004) (German version by Ehring, Fischer, Schnulle, Bosterling, & Tuschen-Caffier, 2008) and finally the Trait Thought-Shape Fusion Scale (TSF trait, short version; Coelho et al., 2013). This scale was translated from English into German and back-translated (German version by Wyssen & Munsch, unpublished, available in appendix E). The TSF trait scale provides an assessment of body image and eating related cognitions. The short version of the questionnaire contains 14 items assessing the TSF concept and four items to measure the clinical impact. The concept scale, used in this context, consists of items such as "I feel fatter after thinking about eating fattening/ forbidden foods (e.g. chocolate)." The questionnaire showed adequate psychometric properties with good reliability (Cronbach's alpha TSF concept scale .92) and predictive validity (Coelho et al., 2013).

Within the statistical analysis of *publication 2*, a path model comprising two parts was tested: First, the predictive value of BMI and social pressure to conform to a body ideal on BD was examined. In a second step, the association between BD and DECB was investigated in more detail. It was hypothesized that cognitive distortions (TSF) and non-acceptance of emotional responses take on the role of mediators in the relationship between BD and DECB.[10]

In addition to the main results of *publication 2*, the next section contains unpublished, preliminary results of the same path model in a sample of healthy young females (Humbel, Wyssen, Bryjova, Meyer, & Munsch, in preparation).

Combining the male (see *publication 2*) and female sample (see appendix D) overall 496 young adults were available for analysis (N=123 men, N=373 women). The participants derive from a community-based sample, consisting of approximately 75% students, since main recruitment took place at the Universities of Fribourg and Bern. On average, male participants were 23.75 years (*SD*=3.17), female participants 22.57 years old (SD=3.40). Mean BMI of the male sample was 23.27 (*SD*=3.05) of the

[10] More information about procedure, instruments, drop-out analysis and statistical analysis were given in publication 2 (see appendix B).

female sample 21.72 (*SD*=2.96). A significant level of BD was observable in 11.4% (N=14) of men and 38.3% of women (N=143) (BSQ ≥ 18, according to (Evans & Dolan, 1993). Clinically relevant ED symptomatology appeared in 2.4% of men (cut-off value ≥ 2.09 EDE-Q global score; Lavender, De Young, & Anderson, 2010) and 8.3% of women (cut-off value ≥ 2.66 EDE-Q global score; Hilbert, Tuschen-Caffier, Karwautz, Niederhofer, & Munsch, 2007).

In sum, the analysis of the path model, which has been proposed in *publication 2*, revealed that BMI and perceived pressure to conform to an unattainable body ideal both significantly predicted BD in men (together explaining 23% of the variance in BD). In addition, the expected significant association between BD and DECB has been confirmed (BD explained 33% of the variance in DECB, direct path c). In accordance with the main hypotheses, the susceptibility to cognitive distortions (TSF) was significantly related to BD and DECB. Moreover TSF partially explained the relationship between BD and DECB (partial mediation, 33% explained variance; the direct path c' remained significant). In contrast, the assumption that difficulties in emotion regulation or more precisely non-acceptance of emotions poses another mediator, has not been supported by the results of the analysis. In total the explained variance of DECB in this mediation model was 41%.

It was concluded that TSF, as a possible marker for cognitive vulnerability, needs to be taken into account when describing the role of BD in young men at risk for development of disordered eating behavior. Comparable results have been found for the sample of women: BMI and pressure both significantly predicted BD in women (31% explained variance). Moreover, BD explained 39% of the variance in DECB (direct path c). TSF was significantly related to BD and DECB and partially mediated the relationship between BD and DECB (24% explained variance). The same is true for non-acceptance of emotions (6% explained variance). The direct path c' remained significant when taking into account both mediators. In total the model explained 45% of the variance in women's DECB (see appendix D).

Publication 2 is available in appendix B.

Citation: Wyssen, A., Bryjova, J., Meyer, A. H. & Munsch, S. (submitted). A Model of Disturbed Eating Behavior in Men: The Role of Body Dissatisfaction, Emotion Dysregulation and Cognitive Distortions.

4.3.3 Publication 3: Thought-Shape Fusion in the Context of a Thin-Ideal Media Exposure

Whereas in *publication 2*, the main focus was on the cognitive distortion TSF as a psychological trait, attention is now shifted to the inducibilty of TSF as a variable trait. Interestingly, distorted cognitions in terms of TSF can be experimentally induced by the imagination of forbidden foods, resulting in negative feelings (e.g. guilt and anxiety), feelings of fatness and a perceived higher degree of moral wrong-doing (Coelho, Carter, McFarlane, & Polivy, 2008; Coelho, Roefs, & Jansen, 2010; Radomsky, de Silva, Todd, Treasure, & Murphy, 2002; Shafran et al., 1999). Moreover the induction of TSF through the imagination of food leads to an increased urge to engage into dysfunctional behavior such as body shape checking or restrictive eating (Coelho et al., 2012). As expected, TSF has shown to be more pronounced in females with an ED, but was also found in healthy young women of the general population (Coelho et al., 2008). Thus, TSF is inducible and is directly associated with emotional and behavioral correlates, which were assumed to be crucial in the maintenance of EDs. By definition, a cognitive distortion is relevant for a disorder when it is associated with the symptoms of a disorder, when the experimental manipulation of the distortion leads to the expected disorder-specific effects and when the reduction of the distortion goes along with or is followed by a reduction of the core psychopathology or symptomatology (Shafran et al., 1999). The first two aspects of this definition have been shown to be true for TSF in its original conception, the third part remains to be proven in treatment studies (see discussion chapter 5.4).

Although the assumption appeared intuitive, it had not yet been investigated whether, analogously to the thinking about food, merely thinking about bodies corresponding to the thin ideal may induce cognitive distortions such as TSF in women. In *publication 3*, the TSF concept has been adapted from the imagination of fattening/ forbidden food to the imagination of female thin ideals (TSF-B). It has

been expected that TSF is not limited to food-related thoughts, but may generalize to weight-related concerns as well. If TSF is associated with weight-related thoughts, this distortion is likely to be invoked by exposure to thin ideals in media. Even though meta-analyses refer to a minimal or moderate effect of experimental media exposure (Ferguson, 2013), studies have shown that even short confrontation with, e.g. thin women in music videos may immediately increase BD in young women (Bell, Lawton, & Dittmar, 2007). Importantly from a longitudinal perspective, the increase of BD within a short appearance-related media exposure (TV commercials) predicted a negative development of body image satisfaction and the desire to be thin two years later (even if initial body dissatisfaction was statistically controlled). Thus, the contribution of thin ideals in media to the negative development of a women's individual body image may be understood as a cumulative process; the immediate responsiveness to a brief media exposure in the laboratory might be a marker for the susceptibility to the negative influence of thin ideals in media over the long-term (Hargreaves & Tiggemann, 2003).

Publication 3 contributes to the understanding of processes that are triggered when women are exposed to thin ideals in media. The aim was to investigate the inducibility of body-related cognitive distortions, such as TSF-B. It was expected that these effects were stronger in healthy young women who show symptoms of disordered eating.

4.3.4 Publication 3: Methods and Main Results

The objective of *publication 3* was to answer the question if the vivid imagination of female thin ideals, after a short exposure to a fashion magazine seen in a waiting room, leads to a distorted shape and weight perception in young healthy women (measured as TSF-B). This hypothesis was examined within a complex experimental design which has been described in detail elsewhere (Munsch, 2014).

The experiment has been conducted with 91 healthy female students (mean age 21.9, SD=2.0) recruited at the University of Fribourg. The data collection in this study lasted three weeks for each

participant: baseline measures at week 1, completion of diagnostic interviews (Diagnostisches Interview für psychische Störungen (DIPS), Schneider & Margraf, 2011) at week 2, and finally the experiment in the laboratory at week 3. Baseline assessment included the following questionnaires[11]: Sociodemographic questions (own items, i.e. age, nationality, educational level), Eating Disorder Examination Questionnaire to assess ED pathology (EDE-Q; Fairburn & Beglin, 1994; German version by Hilbert & Tuschen-Caffier, 2006), Beck's Depression Inventory as an indicator of the general psychopathology (BDI-II; Beck et al., 1996; German version by Hautzinger et al., 2009), Trait Thought-Shape Fusion Scale (TSF trait, short version; Coelho et al., 2013; German version by Wyssen & Munsch, unpublished) and finally the Thought-Shape Fusion Body Trait Scale (TSF-B trait, Wyssen & Munsch, unpublished, available in appendix E). On the basis of the original TSF trait scale, the items have been adapted to the imagination of thin ideals instead of food (TSF-B trait; Wyssen & Munsch, unpublished, available in appendix E). The item of the original scale as mentioned above was transferred into: "I feel fatter after imagining the body of a thin woman." Cronbach's alpha in this sample was .87.

During the experiment, several measures have been used to assess changes following the experimental manipulation: The Visual Analog Scale Body Image (VAS-BI), a 7-item scale that was developed to assess the changes in body image satisfaction during the experimental procedure (Wyssen & Munsch, unpublished, available from the authors). Participants rated the items on a 100-mm VAS scale (0 not at all to 100 completely). Next, the Brief Mood Scale (BMS) which is a modified version of a brief three dimension mood scale that assesses valence, calmness, and energetic arousal with bipolar items (Wilhelm & Schoebi, 2007). The scale relies on the Multidimensional Mood Questionnaire (MDMQ; Steyer, Schwenkenmezger, Notz, & Eid, 1997). Finally, the Thought-Shape Fusion Body State Scale (TSF-B state), a 5-item questionnaire that has been designed to assess body-related cognitive distortions, was used. The scale was adapted and shortened from the original version from Radomsky et al. (2002) and Coelho et al. (2012). After items were checked for language

[11] Among others that have not been included in publication 3.

compatibility (translation from English to German and back-translation), they were slightly modified to refer to the fashion magazine seen during media exposure, rather than food exposure as in the original items. Cronbach's alpha of this scale in the present sample was .86 (Wyssen & Munsch, unpublished, available in appendix E).

The study design consists of a typical waiting room paradigm (see e.g., Turner, Hamilton, Jacobs, Angood, & Dwyer, 1997), in which participants were exposed to either a fashion magazine containing the common thin ideal or a nature magazine containing landscapes. Subsequently a vivid imagination, of the pictures seen in the magazine (either thin ideal or landscape), was guided using the procedure of Radomsky and colleagues (2002). The so-called *TSF induction*, which originally implied the imagination of eating fattening/ forbidden foods, was adapted to the imagination of thin ideals.[12]

First of all, correlation coefficients revealed that TSF-B trait scores correlated moderately with depressive symptoms (BDI-II; r = .29, p = .005) and moderately to highly with ED symptomatology (EDE-Q global score r = .61, p = .000, restraint r = .37, p = .000; shape-concern r = .55, p = .000; weight-concern r =. 60, p = .000; eating-concern r = .47, p = .000). This confirms the expected link between the adapted TSF concept on a trait level with ED and general psychopathology. Moreover TSF-B trait was highly correlated to TSF trait (r =. 66, p = .000).

Furthermore, evidence for the main hypothesis has been found, that is the inducibility of TSF-B state through the imagination of thin ideals. Women imagining thin ideals experienced significantly more pronounced cognitive distortions regarding the perception of their own body (such as feeling fatter) than women who imagined landscapes. Not only that women in the landscape condition did not experience cognitive distortions, but also they reported a steadily increase in mood and body image satisfaction whereas women in the thin-ideal condition reported a decrease in mood and body image satisfaction after the imagination (but not after mere media exposure). In accordance with our

[12] More information about procedure, instruments and statistical analysis were given in publication 3 (see appendix C).

hypothesis, these effects were more pronounced in healthy women with symptoms of disordered eating.

The results of *publication 3* indicate that cognitive distortions may be triggered by thin ideals which may have a negative impact on mood and body image satisfaction as well as on behavioral correlates of ED pathology. Moreover the results give reason to assume that healthy women showing symptoms of disordered eating are more prone to experience a negative impact of thin-ideal exposure via media.

Publication 3 is available in appendix C.

Citation: Wyssen, A., Coelho, J. S., Wilhelm, P., Zimmermann, G. & Munsch, S. (submitted). Thought-Shape Fusion in Young Healthy Females Appears after Vivid Imagination of Thin Ideals.

4.3.5 Summary: TSF and TSF-B Integrated into an Expanded Sociocultural Model

Whereas in figure 1 a basic sociocultural risk model is described, figure 2 zooms into specific processes and underlying mechanisms that make media exposure a risk factor. The intention was to find answers to the question why some individuals are negatively affected by body ideals in media in terms of BD and disordered eating while others are not. The main factors, which have been identified as relevant in previous studies, were preexisting BD, body ideal internalization, pressure to conform to the ideal, social comparison processes, appearance schema activation and schema-congruent information processing. These factors were proposed to be relevant for the manifestation and stabilization of a) an unrealistic inner representations of body ideals and b) a distorted mental representation of the own appearance (see figure 2). This in turn fosters the negative impact of body ideals in media on BD and disordered eating. In a next step, the model described will be complemented by the newly introduced factor TSF/ TSF-B which have been investigated in *publication 2 and 3*.

The results of *publication 2* support the assumption that TSF in its original conception is a factor that contributed to the understanding of the relationship between BD and eating pathology. Therefore,

TSF as a tendency to a distorted body perception can be included in the etiological model as a relevant aspect of the cognitive information processing which is supposed to have emotional and behavioral consequences. Interesting results have been found regarding the adapted version of TSF that refers to the confrontation with body ideals (TSF-B) as well. Even if it remains to be demonstrated that TSF-B mediates or moderates the influence of media exposure/ content it has been shown that TSF-B is inducible by a thin-ideal exposure and that this is associated with negative body-related emotions (e.g. feeling fat) and the urge to ED related behaviors such as restraint eating. Within *figure 3*, TSF/ TSF-B are classified into the existing model.

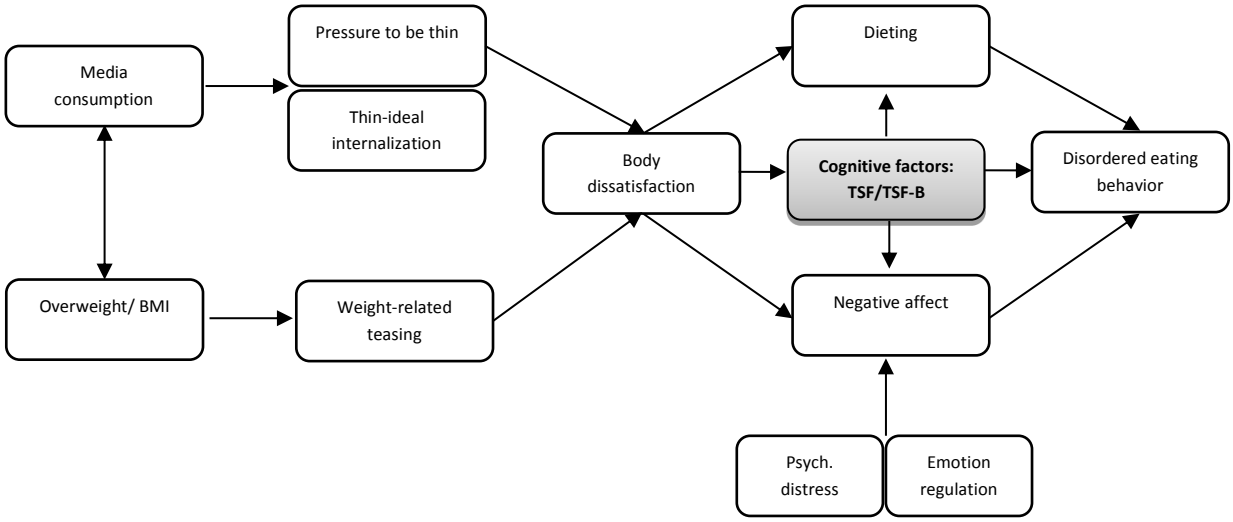

FIGURE 3: Expanded sociocultural risk model of body dissatisfaction and disordered eating behavior – the role of TSF/ TSF-B.[13]

Finally, it is worth broadening the perspective of the presented model: Cognitive distortions such as TSF/ TSF-B have shown to be associated with negative body-related emotions and dysfunctional behaviors. A distorted body and self-perception, however, is not only relevant in EDs, but also in other mental disorders such as depression (Beck, 1963). Rawana and colleagues (2010) presented a *cognitive vulnerability developmental framework* and assumed that depressive disorders and EDs develop based on similar negative attitudes towards oneself and one's own body (including similar

[13] It must be noted that figure 3 is a simplification and does not represent all relevant factors and relationships between them sufficiently. Highlighting sociocultural factors results in a reduction of an etiological model. Thus, it is important to note that genetic, biological and individual factors cannot be neglected when describing a comprehensive etiological model of EDs.

cognitive distortions regarding the perception of e.g. shape and weight). Especially during adolescence when incidence rate of EDs and depressive disorders increase, body image plays a crucial role, also regarding identity development (Rawana et al., 2010).

5 Discussion

5.1 Contributions to New Approaches in the Diagnosis, Prevention and Treatment of Eating Disorders

The intention of the present thesis was to provide an overview of the current practice of diagnosis, prevention and treatment of disordered eating behavior, both in respect of subthreshold as well as fully developed clinical pictures. Moreover, the aim was to describe an etiological model with a specific focus on sociocultural risk factors and to expand the model by introducing a new factor, termed *Thought-Shape Fusion* (TSF) (e.g., Shafran et al., 1999), that emphasize the importance of body-related cognitive distortions. In this chapter the main conclusions derived from the three publications will be summarized and discussed with respect to diagnosis, prevention and treatment of EDs.

In *publication 1* the German S3-guidelines for the diagnosis and treatment of EDs (DGPM & DKPM, 2011) were summarized and commented with consideration to the clinical practice in Switzerland. It has been concluded that the guidelines, which aim to establish quality standards and access to effective treatment, were applicable to the situation in Switzerland. Importantly, the guidelines support the transfer of evidence-based knowledge to the clinical practice; that requires a continuous update and the integration of new research results. The most important change in recent times was the revision of the DSM (DSM-5; APA, 2013).[14] In *publication 1* were summarized the main changes from DSM-IV-TR to DSM-5 regarding the diagnoses AN, BN and BED. The guidelines, which are currently under revision, will need to address these changes. It remains open, whether other disorders that were added to the chapter FED of the DSM-5 will be included in the guidelines (such as

[14] The release date of the forthcoming revision of the ICD-11 is in 2018 (Weltgesundheitsorganisation, 2011).

ARFID, pica and rumination disorder). Overall, the revision of the DSM can be seen as an important step towards an accurate description of the different disorders which is necessary to ensure appropriate, disorder-specific treatment. This consideration will also be important for the current revision of the German S3-guidelines. The adjustments of the criteria facilitate early detection, prevention and treatment of EDs and also recognizes that subthreshold EDs are associated with a significant degree of functional impairment and emotional distress (e.g. by specifying the disorders in the OSFED category and lowering the time and frequency criteria in BN and BED; see chapter 2.2; Keel et al., 2011; Stice et al., 2013).

One concern that has been raised in the context of the DSM-5 revision was "overpathologizing" normative eating patterns particularly in individuals with obesity (Frances & Widiger, 2012). The concern was expressed that adding the BED diagnosis would cause an avalanche of new BED cases among individuals with obesity, that do in fact not suffer from a mental disorder (Frances & Widiger, 2012). So far, this concern has not been substantiated. In a sample of obese patients seeking treatment, point prevalence of EDs was not substantially higher when applying DSM-5 criteria (Thomas et al., 2014). Moreover, empirical findings confirmed diagnostic validity of the BED criteria and showed a clear distinction from obesity (by e.g. psychosocial impairment, overvaluation of shape/ weight and psychiatric comorbidities; Grilo, Masheb, & White, 2010; Latner & Clyne, 2008). What is more, the concern of overpathologizing contrasts with encouraging recent findings that diagnoses which would have been classified as EDNOS in the DSM-IV-TR now receive a more specified and descriptive diagnosis (e.g., Keel et al., 2011).

Regarding the treatment of EDs, it can be concluded that the S3-guidelines provide a good basis for an evidence-based treatment approach. They pose an important and useful source of information and orientation in terms of basic therapeutic interventions and support practitioners in decisions about treatment strategies. As the term "guidelines" implies, a basic structure of the treatment is provided and reference is made to the central elements of the therapy. In this context two critical questions should be considered: The first question concerns the actual *implementation* of the

guidelines in clinical practice. It has been shown in several studies that evidence based practice in clinical settings is relatively low (e.g., Shafran et al., 2009). This may be partly due to the willingness of the psychotherapists, but also due to general difficulties of transferring scientific knowledge to the clinical practice (for a summary on this topic see Bohus, 2015). The second question concerns the *compatibility* or *applicability* of evidence-based interventions for specific groups of patients such as non-responder and men, which are characterized by distinct clinical pictures and specific needs. As the high non-responder rates show (e.g., Keel & Brown, 2010), tailored extensions of treatments are required for specific patient profiles. Complementing approaches should be based on differentiated and individualized etiological models (e.g., Fairburn, Cooper, & Shafran, 2003; Kass et al., 2013; see also chapter 5.3).

In *publications 2 and 3* a sociocultural framework for understanding BD and disordered eating is provided. Both publications aimed at emphasizing the importance of cognitive factors in the context of ED pathology, namely body-related cognitive distortions either triggered by thoughts about fattening food and weight gain or by the imagination of thin ideals. In the context of the two publications, the ED specific cognitive distortion TSF is introduced and classified into the etiological model (see figure 3). *Publication 2* confirmed that higher BMI as well as stronger experienced pressure to conform to the male body ideal was significant in predicting the degree of BD in men. This may reflect the latest trend of the ideal male body image characterized by a thin, slender and lean figure, which is difficult to achieve (Grogan, 2008). The two factors explain together about one quarter of the variance in BD which suggests that other factors need to be considered in this regard such as the degree of internalization of the body ideal and global self-esteem (López-Guimerà et al., 2010). In addition, *publication 2* contributes to the explanation of the previously confirmed close connection between BD and disordered eating by emphasizing the relevance of cognitive factors. The main result of *publication 2* supported the assumption that the susceptibility to body-related cognitive distortions (TSF) partially mediates the relationship between BD and disordered eating in males. Therefore, males that are more prone to experience cognitive distortions triggered by, for

example, the thought of eating fattening food or the imagination of weight gain (such as described in the TSF concept) may experience negative body-related emotions and the urge to engage in dysfunctional eating or compensatory behavior. Whereas BD alone is not necessarily initiating a behavior, TSF may be a relevant factor that triggers emotions and behaviors that are crucial in the context of EDs. However, as TSF was revealed as only a *partial* mediator of this association, there remains room for alternative explanations. Non-acceptance of emotions has been tested as another moderator in the path model but has not been confirmed for males. Additional preliminary analysis of the same mediation model in a larger sample of women revealed that the pattern of results found in males also can be applied to females. Moreover, non-acceptance of emotional responses emerged as a predictor in the female sample, explaining a small but significant proportion of the variance in disordered eating (Humbel et al., in preparation). Thus, correlates of emotion regulation difficulties may be a factor that merits further examination. This would also be in line with the dual pathway model of Eric Stice (2001) that describes negative affect arising from BD as a core element which promotes ED symptoms. Overall, *publication 2* allows the conclusion that the susceptibility to cognitive distortions is a worthwhile complement to an elaborated risk and maintenance model of disordered eating (see figure 3) and should therefore be taken into account, for example in screenings to detect individuals at risk but also in therapeutic approaches (see chapter 5.3).

In *publication 3* the TSF concept has been adapted to the imagination of thin ideals (TSF-B). It has been hypothesized that thoughts about thin ideals lead to the experience of feelings of fatness, concern of gaining weight and the impression of moral wrong-doing, analogously to the original conception of TSF (which is related to thoughts about eating fattening food). These expectations have been supported, both for TSF-B as a stable trait as well as a variable state. As a trait measure, TSF-B was significantly associated with measures of ED symptoms, which supports the assumption of TSF-B as a possible marker for ED pathology. However, the present results only apply to healthy females and it remains to be investigated how TSF-B is expressed in different groups of ED patients. The main focus of the experimental study described in *publication 3* lay on the demonstration of the

inducibility of TSF-B as a state variable through the imagination of thin ideals. In accordance with the expectations, TSF-B state in terms of cognitive (e.g. concern of weight gain), emotional (e.g. feeling fat) and behavioral (e.g. the desire to restraint eating) consequences appeared after the imagination of thin ideals but not after the imagination of landscapes in healthy young women. Moreover, participants, who were instructed to imagine thin ideals, experienced a significant decline in mood and body image satisfaction. The question of how the activation of cognitive distortions and changes in mood and body image satisfaction are related, could not be entirely answered within the design of this study. It is conceivable that the experience of TSF is the driving force behind these reactions, but it could also be vice versa. Interestingly, not mere media exposure, in this case the confrontation with a fashion magazine, initiated changes in mood and body image satisfaction but the subsequent guided imagination of the thin ideals. Moreover, the effects of the experimental manipulation on mood and TSF were moderated by the ED symptomatology of the participants: participants without any symptoms of ED were not affected by the thin-ideal imagination, whereas the negative effect increased with more pronounced ED symptoms. This result is in line with the awareness that mere media exposure does not necessarily have a negative impact on BD or disordered eating behavior but intermediary variables such as preexisting BD and internalization of the body ideal need to be taken into account (e.g., Ferguson, 2013). It remains to be investigated in a subsequent study, whether TSF-B is a factor that partially mediates the relationship between media exposure and negative outcomes such as increased BD or if the activation of TSF-B is a moderating variable leading to a stronger negative impact of media, since it fosters dysfunctional processing of appearance-related information.

To sum up, TSF-B is a new concept, which has been described and assessed for the first time in *publication 3*. Cognitive distortions are inducible through the confrontation with thin ideals in healthy young women, particularly when showing ED pathology. It is assumed that the confrontation with thin ideals activates dysfunctional, distorted processing mechanisms regarding self-relevant information (Cash et al., 2004; Ridolfi et al., 2011) and leads to the experience of a pronounced self-

ideal discrepancy which is associated with negative emotions and behavioral coping mechanisms. This is in line with a cognitive-behavioral conception of EDs (e.g., Tantleff-Dunn & Thompson, 1998) as well as with the model regarding the influence of media as plotted in figure 3.

5.2 Strengths and Limitations of the Present Thesis

This thesis started with a description of the current evidence-based practice regarding classification, diagnosis and treatment of EDs and puts emphasis on the utility of evidence-based approaches. Furthermore, prevention and treatment efforts were reviewed and the importance of early detection and intervention was highlighted (*publication 1*). In doing so, reference was made to the necessity of looking beyond the state of the art, considering expanded sociocultural etiological models including newly introduced concepts such as the susceptibility to body-related cognitive distortions that were considered as important in ED pathology (*publication 2 and 3*). Finally, conclusions for clinical implications were drawn and ideas for future research were outlined. Therefore, the contribution of the present thesis stems from a comprehensive overview of the classification, diagnosis, etiology and treatment of subthreshold and threshold EDs. This includes a description of the current state of the art as well as references to open questions and reflections about further developments such as the implementation of evidence-based treatment and the necessity of tailored interventions. Another strength of the present thesis is the application of different methodological approaches, such as the review and commentary of the evidence-based guidelines, the conduction of an online-survey and of a complex experimental study. In addition, validated assessment instruments have been used where available and new instruments have been developed to illustrate and assess new concepts. The sample sizes were large enough for the statistical analyses (sufficient statistical power) and drop-out rates were comparably low. In the next paragraph, the strengths and limitations of each of the three publications are described.

Publication 1 is a commentary on the German S3-guildelines for the diagnosis and treatment of EDs (DGPM & DKPM, 2011). The aim of this publication was to summarize the guidelines and to comment

on their applicability to the situation in Switzerland. The methodological approach included a review and commentary of the guidelines with the inclusion of additional literature to underline the main statements. This resulted in a compact overview of the main statements of the guidelines in respect of the three EDs AN, BN and BED. Moreover, an overview about the changes in the course of the DSM-5 revision and the associated diagnostic implications was provided. The major limitation of this publication is the lack of empirical data. An interesting extension to this publication would have been the analysis of the care situation and clinical practice in Switzerland to gain insight into the effective application of the guidelines and of evidence-based treatment.

Publication 2 constitutes of a cross-sectional design. 123 male participants from a community sample filled in online questionnaires with regard to their eating behavior, body image, perceived social pressure, emotion regulation, and cognitive distortions. Data was treated using path analysis. A major benefit of *publication 2* is the emphasis on men's body image and eating behavior. Up to the 1980s women's bodies were represented in the media far more frequently than men's bodies, the study of body image and BD therefore mainly focused on women. However, over the last 20 to 30 years the male body image has become more visible in commercials, and the aesthetic appeal of the male body has become more important (for an overview see Grogan, 2008). As a consequence, it is important that research engages in the investigation of the male body image and related behaviors. In *publication 2*, the factor TSF has been systematically investigated in a sample of young men for the first time. The results add knowledge to the moderately disordered eating behavior of otherwise healthy young men at risk for developing EDs. However, due to the cross-sectional design, no statements can be made regarding the causal relationship between either of the assessed variables. The generalizability of the results is limited due to only male participants being included and no comparison with females could be made. However, in a subsequent study, the same theoretical model has been tested and confirmed for women as well (Humbel et al., in preparation; preliminary results are available in appendix D). Another critical point that has to be considered is the exclusive use of self-report questionnaires. For example, BMI has been assessed via self-report, which bears

the risk of inaccuracy (i.e. underestimation of BMI; Drake et al., 2013). Moreover, no differentiation between slenderness and muscularity was made. It should be considered that low BMI may refer to low muscle or low body fat percentage, whereas high BMI may reflect high muscle or high body fat percentage respectively. Consequently, body fat and body muscle percentage should also be assessed in future male studies (Tylka, 2011). The selection of questionnaires entails the difficulty that some of the diagnostic instruments employed were originally designed for women. That applies especially to those which assess BD and eating behavior. Thus, gender specific instruments should be developed to improve matching of unique expressions of ED pathology in men (e.g., McCreary, Sasse, Saucier, & Dorsch, 2004; Tylka, Bergeron, & Schwartz, 2005). Instruments to study dysfunctional behavior should not only assess attempts to lose weight, but also attempts to gain muscles, for example with items about the use of steroids (which are not included in the EDE-Q). Additionally, sexual orientation of the participants should be taken into account, since evidence shows that homosexual male adolescents and young adults tend to be more dissatisfied with their appearance than heterosexuals (e.g., Jankowski, Diedrichs, & Halliwell, 2014).

In a subsequent study more attention should be given to the distinct characteristics of EDs in males. Men may express different clinical pictures in some aspects of ED pathology and may therefore be misunderstood and under-diagnosed (Strother et al., 2012). It would be worth replicating the present study with men suffering from clinical EDs but also with men engaging in excessive exercising, bodybuilding and competitive sports since it has been shown that prevalence rates of EDs are higher among these groups (Bratland-Sanda & Sundgot-Borgen, 2013).

Publication 3 includes an innovative experimental design (the study protocol is published in Munsch, 2014). It consists of a typical waiting room situation, in which the 91 participating healthy women were randomly assigned to an exposure to either a fashion magazine or a nature magazine. The experiment aimed at investigating the effects of a thin-ideal imagination after media exposure with a fashion magazine, compared to the imagination of landscapes after a media exposure with a nature magazine. Statistical analyses involved ANOVAs and multiple linear regression analysis. The main

strength of this study design may also be seen as a weakness: This study is characterized by high external validity, since the experimental manipulation is very close to naturally occurring every-day situations. However, this involves limitations in respect of the internal validity (e.g. it was not possible to standardize the intensity of the media exposure in the waiting room). Nevertheless, the experimental situation has been controlled as far as possible by standardizing testing procedure including standardized instructions, training sessions for examiners, fixed testing time in the afternoon and limitation of food and drink intake[15]. In addition, participants have been randomly assigned to the experimental conditions and the analyses revealed no group differences at the beginning of the experiment regarding the variables of interest such as mood and body image satisfaction. Another critical point is certainly the variability of the experimenter; eight female experimenters conducted the experiment, a fact that makes some intra-individual differences inevitable. Finally, findings of this study rely exclusively on self-report. It would be worth to go beyond self-report to further validate TSF-B, for example by adding behavioral observation measures in response to the thin-ideal imagination (such as body checking and eating behavior directly after imagination but also delayed reactions at home; see e.g., Kollei & Martin, 2014 regarding post event processing mechanisms). In a further step the results should be replicated with clinical samples of women with different EDs and other psychological disorders, such as depressive and anxiety disorders, to be able to make statements about the differentiated influence and inducibility of TSF-B. Moreover, there is a need for comparable experimental studies with men to assess the influence of muscle ideals and to possibly detect male specific cognitive distortions (see chapter 5.4 for an outlook to future research).

Although the lack of clinical samples is as a major limitation in *publication 2 and 3,* the results can be considered to be important, as signs of subthreshold EDs, such as high body image concerns and restrictive eating patterns, are common in healthy young females and males and pose important risk factors (e.g., Haines & Neumark-Sztainer, 2006; Stice, 2002; Stice et al., 2010). Groups which are at

[15] Due to physiological measures (saliva cortisol and salvia alpha-amylase; analyses of these variables were not covered in publication 3).

risk of developing an ED need to be better characterized and understood, to allow effective preventive interventions. Overall 2.4% of the male and 8.3% of the female participants in the present studies reported a level of ED symptomatology that refers to clinically relevant symptoms (according to the EDE-Q; Hilbert et al., 2007; Lavender et al., 2010). Moreover 11.4% of the males and 38.3% of the females reported pronounced levels of BD (according to the BSQ, short version; Evans & Dolan, 1993). These values were comparable to epidemiological data based on a representative sample in Switzerland, were 40% of female and 17.5% of male adolescents indicated being unsatisfied with their own body (Narring et al., 2004). This underlines the designation of high BD and disordered eating as a major public health issue.

5.3 Clinical Implications

5.3.1 Diagnosis and Prevention of Eating Disorders

A key message of the German S3-guidelines discussed in *publication 1*, refers to the importance of early diagnostic identification of individuals with EDs. That demands suitable *screening instruments* for the assessment of the core risk factors and symptoms of disordered eating. On the basis of the high rates of BD and dieting in children and adolescents (Evans et al., 2013; Stice et al., 2010), systematic school-based screenings should be implemented (Kurz et al., 2015). Broad screening should also be done for young adults in secondary and vocational schools. Valid screenings instruments need to consider comprehensive etiological models (such as presented in figure 3) and consequently assess the most important risk factors and prodromal symptoms of ED pathology. *Publication 2* refers to the necessity to include measures of BMI, experienced social pressure and BD into screening tools; moreover, the results strongly emphasize the importance of assessing the *cognitive vulnerability* of an individual, such as the susceptibility to experience body-related cognitive distortions. These findings were supported by *publication 3* which highlights that body-related

cognitive distortions may be activated in everyday situations in which young women were confronted with thin ideals.[16]

Valid screenings build the basis for appropriate *prevention strategies*. Empirical evidence shows that larger effects were found for preventive efforts that target distinct populations selectively (Stice et al., 2007), i.e. focusing on risk factors such as social pressure. As an example, empirical support has been found for a prevention program that aims at building up resistance against perceived sociocultural pressure by including cognitive dissonance based interventions (Stice, Shaw, Becker, & Rohde, 2008). It would be worth investigating whether modules targeting the susceptibility to body-related cognitive distortions such as TSF and TSF-B (e.g. increasing the understanding and awareness of TSF/ TSF-B and identifying situations in which such cognitive distortions occur) enhance preventive efforts.

Given that feeling negatively about one's appearance can be seen as a normative discontent (e.g., Grogan, 2008; Rodin et al., 1984; Tiggemann, 2002), *universal prevention programs*, in the sense of health promotion, to support the development of a positive body image are urgently needed for girls and boys. A good example is the program *PEP Body Talk*[17] developed by the "Fachstelle PEP" and supported by "Gesundheitsförderung Schweiz", "Swiss Balance" and the company "Dove" (among others) with the aim to support a healthy self-esteem and positive body image (the program consists of workshops concerning topics such as eating, physical activity, the influence of unrealistic body ideals and the importance of the appearance).[18] Such a program should be used not only selectively, but as an integral part of school education. Children and adolescents should have the opportunity to exchange their views and experiences about their own body, media influences, eating behavior and related topics in groups of peers with a teacher that guides the discussion and provides inputs such as on the topic of media literacy (McLean, Paxton, & Wertheim, 2013) and body appreciation (Halliwell, 2013). Interesting new approaches in prevention may include computer assisted

[16] However, to include the TSF/ TSF-B concept into school-based screening tools, the results of publication 2 and 3 need to be confirmed in samples of children and adolescents. An adaption of the TSF/ TSF-B questionnaires for children is in preparation by Munsch, Wyssen et al.

[17] PEP = Prävention Essstörungen Praxisnah

[18] For more information concerning PEP body talk see http://www.pepinfo.ch/

interventions such as those described in Yager and O'Dea (2008), who found promising results for programs using the internet as a medium to deliver contents to help foster a positive body image and healthy eating.

In conclusion, assessing TSF and TSF-B may be a good complement to a *comprehensive etiological model* of EDs. It may serve as a reliable source of information to identify individuals at risk to develop an ED. Besides well-known risk factors such as social pressure, body-ideal internalization, high BD, and negative affect, the susceptibility to cognitive distortions may represent another factor predicting the development or maintenance of a disturbed eating behavior (e.g., Stice et al., 2007). The relationship between BD and dieting as well as negative affect and in a further step ED pathology is well established (Stice, 2001). The susceptibility to TSF/ TSF-B could be a complementary factor and possibly a mediator of the relationship between BD and ED pathology and may also contribute to explanations regarding the negative impact of media on BD. The "fusion" of thoughts and shape perception (*Thought-Shape Fusion*) is assumed to activate emotional responses and behavioral tendencies as found in previous research in respect of TSF (e.g., Coelho et al., 2008) and in *publication 3* concerning TSF-B. However, these results need to be further confirmed in different settings and samples and the suggestibility of TSF-like distortions remains to be investigated in intervention studies.

5.3.2 Treatment of Eating Disorders

Publication 1 refers to the applicability of the German S3-guidelines in Switzerland and emphasizes the necessity to follow the guidelines in the clinical practice of the diagnosis and treatment of EDs. The guidelines do provide a description of key elements of evidence-based treatment; scientific knowledge is translated into concise statements and recommendations to facilitate the transfer between research and practice. In a psychotherapeutic care setting, practitioners can then rely on the best evidence-based state of the art research and combine it with their own clinical experience and the individual situation of the patient. However, evidence-based disorder-specific treatment is

not available for a considerable number of patients (Kass et al., 2013; Kazdin & Blase, 2011). This may be caused by a lack of specialized institutions (Wittchen et al., 2011) or by difficulties regarding the implementation of evidence-based guidelines (Beutler, Williams, Wakefield, & Entwistle, 1995; Shafran et al., 2009; Torrey et al., 2001). For example, Shafran and colleagues (2009) found that only about 40% of psychotherapists in England know that CBT has the best evidence for the treatment of EDs. Moreover, only 7% apply the state of the art treatment. In sum, there still exists a considerable gap between science and practice (Bohus, 2015).

Apart from the difficulty of implementing evidence-based guidelines, the care situation in EDs is complicated by the fact that even if evidence-based treatment is provided, up to 20% of the patients show a chronic course of the disorder and do not benefit as intended from the treatment (Steinhausen, 2002; Steinhausen & Weber, 2009; Wilson, Grilo, & Vitousek, 2007). This review of the treatment effectiveness makes evident that there is a considerable potential for improvement (e.g., Kass et al., 2013; Keel & Brown, 2010). New approaches have been deemed necessary that tailor evidence-based treatment to specific characteristics and needs of the patients (Kass et al., 2013; Wilson et al., 2007). For example, rapid response has shown to be the best established positive predictor of treatment outcome in BN and BED; as a consequence, tailored interventions should be applied if significant improvements do not appear within the first therapy sessions (Fairburn et al., 2004; Iacovino et al., 2012; Munsch, Meyer, & Biedert, 2012).

Some approaches to complement current evidence-based treatments to specific needs or characteristics of patients have been empirically supported. For example the addition of *Body Image Therapy (BIT)* has been shown to be beneficial for certain patients (e.g., Vocks & Bauer, 2015). However, the evidence base is not yet sufficient and, in particular for patients with AN, it is not proven that BIT enhances treatment outcome (DGPM & DKPM, 2011). Nevertheless, high BD as an important maintenance factor and residual symptom that increases risk for relapse after remission need to be taken into account (Keel, Dorer, Franko, Jackson, & Herzog, 2005).

To develop new perspectives in treatment of EDs an elaborated understanding of etiologically relevant factors is needed, but also the discovery of treatment outcome predictors is required. For these issues, *publication 2 and 3* provide some interesting insights from which therapeutic approaches might benefit. Future longitudinal studies should investigate, whether the susceptibility to TSF-B represents a risk factor for later ED development and maintenance and whether interventions in order to modify TSF-B result in decreased ED symptoms in general and in a lower risk of ED development. First results on the possibility of influencing TSF have been found by Coelho et al. (2014) who reported a decrease of TSF in the course of an ED treatment. However, TSF-specific interventions remain to be developed and evaluated in RCTs with different groups of ED patients.

A *cognitive-behavioral model* of EDs with a focus on TSF/ TSF-B includes *cognitions* such as the distorted perception and evaluation of shape and weight, *emotions* such as feeling fat and *behaviors* such as body checking or avoidance and restraint eating. From this insight, a rational for therapeutic interventions addressing TSF/ TSF-B may be derived. Assuming that food and or thin-ideal exposure leads to a distorted self-perception, methods of BIT could be applied. The aim of body exposure, which is a core element of BIT, is to reduce negative body-related emotions and cognitions through habituation. Furthermore, the attitude towards one's own body can be improved by a more differentiated body perception. BIT aims at identifying and reducing dysfunctional cognitions regarding one's own body in general and it aims at reducing body-related avoidance and body checking behavior as well as encouraging positive body-related activities (see Cash, 2008; Cash & Smolak, 2011; Vocks & Legenbauer, 2010; Vossbeck-Elsebusch et al., 2013). All of these strategies may be useful also regarding TSF/ TSF-B.

BIT has proven to have the potential to optimize the treatment success in patients with EDs (for an overview see Vossbeck-Elsebusch et al., 2013). However, consulting the S3-guidelines (DGPM & DKPM, 2011), one fails to find concrete recommendations or inputs specifically focusing on BIT. This is due to the fact that the evidence base in RCT is not yet sufficient. Nevertheless, results of empirical studies investigating the effect of body image focused treatment approaches are promising: In a

manualized BIT, negative body-related cognitions have significantly decreased in women with EDs. Moreover a significant reduction in general ED psychopathology was observable (Legenbauer, Schutt-Stromel, Hiller, & Vocks, 2011). BIT is highly recommended as a complementation to state of the art ED treatment programs. From a longer term perspective it is important to explicitly address BD in treatment and to work towards a more accepting attitude towards one's own body, since the improvement of body image is associated with a lower relapse rate in ED patients (Stice, 2002).

Apart from BIT, various other interesting new approaches in psychotherapy may be considered to treat EDs. That may also include new technologies such as virtual realities: In the treatment of EDs, virtual realities may be used for guided imagination and "in vivo" exposure (e.g. to food or body image) (see e.g., Ferrer-Garcia & Gutierrez-Maldonado, 2012). Such techniques may also be used for the "flooding" exposure with fattening/ forbidden food (TSF) and body ideals (TSF-B).

To support body acceptance but also to specifically address the emotional component of TSF/ TSF-B, therapeutic approaches from the third wave of CBT are worth considering. Therapeutic approaches such as *Acceptance and Commitment Therapy* (ACT; for an overview see Manlick, Cochran, & Koon, 2013) take into account that ED patients often show deficits in emotion regulation (e.g., Svaldi et al., 2012). ACT directly addresses emotional avoidance as an important factor in the onset and maintenance of EDs. Evidence suggest that ACT is a useful approach to treat BD and disordered eating. For example, in an ACT-workshop focusing on BD and dysfunctional eating attitudes, women who reported significant distress about their body, weight and shape experienced significant improvements in the corresponding variables (such as reduced preoccupation with shape and body anxiety) in short-term. These results are promising however larger studies with different samples and longer follow-ups are pending (Pearson, Follette, & Hayes, 2012). In ACT, negative body-related emotions, initiated by the experience of TSF-like cognitive distortions, could be addressed with the aim to enhance the use of functional (such as reappraisal, acceptance and expression of emotions) and decreasing the use of dysfunctional (such as avoidance, suppression and rumination) emotion regulation strategies.

Specific therapeutic intervention aiming to reduce body-related cognitive distortions, such as TSF and TSF-B (i.e. the mere thinking about eating fattening food (TSF) or thin ideals (TSF-B), makes individuals feeling fatter and concerned about weight gain), may be added to cognitive-behavioral ED treatment. In a first step, cognitive interventions could focus on the recognition of situations in which TSF/ TSF-B occurs (individual triggers, e.g. confrontation with body ideals in media). Then, the identification and understanding of the distorted cognitions could be supported (e.g. recognizing automatic thoughts by self-observation). As it has been shown that TSF can be experimentally induced by thinking of eating fattening food (e.g., Coelho et al., 2008) as well as by imagining thin ideals (see *publication 3*), it is probably possible to activate these specific body-related cognitive distortions, the associated feelings and behavioral tendencies in a therapy session (through in sensu or in vivo exposure, e.g. to thin ideals). Thus, the distorted cognitions could be made accessible for therapeutic interventions (cognitive restructuring using e.g. Socratic dialog, reality check[19] and changes of the perspective). Patients should be guided to the insight that thoughts and feelings do not necessarily reflect reality. Recognizing distorted cognitions in different situations and learning how to cope with them would hopefully be a useful additional module in ED treatment.

5.4 Directions for Further Research

Besides some promising clinical implementations this thesis enables the development of further research questions and designs. Starting again with *publication 1* and a look at the German S3-guidelines (DGPM & DKPM, 2011), in a future study the care situation in Switzerland could be described in more detail by evaluating the application of evidence-based diagnosis and treatment in psychiatric/ psychotherapeutic in- and outpatient settings. Another interesting development would include the establishment of more differentiated guidelines in respect of systematic population-based screenings and preventive interventions (including recommendations and efforts for implementation in different care settings). Early detection and prevention in this context would imply

[19] E.g. triggering the feeling of weight gain and then verify the weight in a scale.

that attention is also paid to subthreshold forms of EDs as well as on the new ED diagnosis in DSM-5 (such as ARFID; APA, 2013).

In terms of a sociocultural risk model of BD and disordered eating behavior such as described in *publication 2 and 3* (see figure 3), further research could address several topics, such as the influence of new media phenomenon such as *thin-ideal challenges* (e.g. "belly button challenge" or "collarbone challenge")[20] which spread very quickly via the internet. Another relatively new phenomenon which requires further research is the impact of the increased activity of individuals in *self-presentation* and *self-disclosure* on social media. First studies in this area revealed that adolescents and young adults experience a strong pressure to perfectly present themselves in social media. Acknowledgement, acceptance and respect via social media have become an important source of self-esteem (e.g., Lee, Ahn, & Kim, 2014; Lin, Tov, & Qiu, 2014). Also the impact of *appearance conversations* such as fat-talk requires further attention in respect of the risk to develop BD and disordered eating (e.g., Jones, Crowther, & Ciesla, 2014; Ousley, Cordero, & White, 2007).

Although, there is some evidence for a cumulative rather than a selective mechanism (Hargreaves & Tiggemann, 2003), the question how the increased presence of body ideals in media (such as in very popular model casting shows) and the increased use of social media influence children and adolescents of both genders in the short- and long-term has not yet been sufficiently answered. Within new study designs it should be investigated how recipients process appearance-related media contents and what kind of dysfunctional cognitive, emotional and behavioral consequences are triggered (e.g. body-related cognitive distortions such as TSF-B). In this context it would also be important to investigate the influence of peer and family interactions (in terms of the tripartite influence model by Thompson, Coovert, et al., 1999; Thompson, Heinberg, et al., 1999). It has already been shown that, for example, peers' dieting (Eisenberg & Neumark-Sztainer, 2010) as well as family weight talk and dieting (Neumark-Sztainer et al., 2010) are associated with extreme weight control behaviors in adolescents.

[20] See e.g.: http://www.stern.de/familie/leben/belly-button-challenge--verrueckt-gefaehrlicher-bauchnabel-trend-aus-china-6302394.html

New studies should also take advantage of innovative research designs including new assessment methods such as self-reports via EMA or assessment via electronically activated recorders (EAR) that does not rely on self-report and enables the assessment of for example, sound, speech, location and activity (e.g., Mehl, Robbins, & Deters, 2012). These methods allow capturing the relevant processes in (near) real-time in daily life (as examples see Heron & Smyth, 2013; Leahey, Crowther, & Ciesla, 2011) and may contribute to a deeper understanding of underlying mechanisms. Such assessment methods could provide insights into the activation of body-related cognitive distortions such as TSF/ TSF-B under *ecologically valid conditions*. It is intuitive to assume that the induction of TSF/ TSF-B is not artificial and that this phenomenon not only emerges in experimental situations. Comparable processes may also take place in daily routine, for example when young women exchange their views and experiences on what they have seen in model casting shows on TV or in fashion magazines. Consequently, future research should adopt the issue of cognitive distortions in daily life settings.

To be able to reliably integrate TSF and TSF-B as cognitive vulnerability factors into comprehensive etiological models, it is necessary to investigate these factors in prospective longitudinal studies: The relevance of the cognitive style in respect to the development, maintenance and the risk of relapse in EDs should be assessed. TSF/ TSF-B may be established as a factor that contributes to the connection between BD and disordered eating, just as e.g. negative affect does. Another aim of further studies should be to draw a conclusion about the possible moderating or mediating role of TSF-B regarding the processing of media contents. Moreover, intervention studies are necessary to examine the suggestibility and changeability of TSF/ TSF-B through therapeutic interventions. The application of specific interventions such as suggested in chapter 5.3.2 should be examined regarding the reduction of the cognitive distortions but also in respect of a possible positive impact on general ED pathology.

5.5 Final Conclusion

The diagnosis, prevention and treatment of EDs is faced with several challenges such as the difficulty of valid diagnostic criteria, the implementation of useful preventive programs and effective

therapeutic intervention for a broad range of clinical pictures and individual patient profiles. Interventions that aim at reducing the incidence and prevalence of EDs need to be evidence-based. At the same time, more effective treatments are needed and this requires that complementary treatment approaches are taken into account. That makes comprehensive etiological models necessary which inspire the development of promising preventive and therapeutic strategies. The principal points that can be drawn from this thesis in this regard are presented in the following section.

First of all, early detection, prevention and treatment of subthreshold and threshold EDs is highly desirable; that demands valid screening instruments and accurate diagnosis. Screening instruments need to be designed on the basis of a comprehensive understanding of the development and maintenance of EDs. Preventive efforts need to identify individuals at risk and target modifiable risk factors in those groups. Therefore, basic etiological research is still necessary; especially in our rapidly developing society with powerful social influences such as mass media. Future efforts should be made to implement and employ screenings and prevention programs on a broad basis (e.g., Wilfley et al., 2013).

Secondly, sociocultural risk and maintenance factors (such as social pressure from media and peers but also the high availability of food) are of major relevance in etiological models of EDs (e.g., Haines & Neumark-Sztainer, 2006; López-Guimerà et al., 2010). In this context the cognitive processing of food- and appearance-related information may play an important role. The susceptibility to body-related cognitive distortions is suggested as a factor that needs to be considered in prevention and treatment of EDs (e.g., Coelho et al., 2014; Thompson, Heinberg, et al., 1999).

Thirdly, systematic guidelines such as the German S3-guidelines (DGPM & DKPM, 2011) are important to implement accurate diagnosis and evidence-based disorder specific treatment. However, the difficulty of transferring scientific knowledge to the clinical practice appears to be an unsolved problem and the application of evidence-based research results in clinical practice needs to be improved (e.g., Bohus, 2015).

Fourthly, in controlled treatment studies in which evidence-based interventions are provided, a substantial number of patients do not recover from their ED. Thus, it is necessary to identify non-responders early in the treatment process and to provide tailored interventions to increase treatment outcome (e.g., Kass et al., 2013). Again, that makes a differentiated understanding of the etiology of EDs as well as knowledge about predictors of treatment outcome essential. Moreover, efforts should be made on maintaining and supportive treatments which demands continuous monitoring and knowledge about factors that increase risk for relapse after remission (e.g., Kazdin & Blase, 2011; Wilfley et al., 2013).

Fifthly, the future care situation in prevention and treatment of EDs may benefit from stepped care approaches, which distribute the available resources in the best possible way and provide appropriate treatment intensity to the patients (also taking into account e.g. guided self-help programs). The use of innovative technologies has shown to be promising and would support a stepped care approach (e.g., Bauer & Moessner, 2013; Kass et al., 2013). Preventive and therapeutic interventions that use new media, for example online therapy, should be designed, implemented and evaluated (e.g., Aardoom, Dingemans, Spinhoven, & Van Furth, 2013). In this context, not only the question of therapeutic effectiveness, but also of accessibility to treatment and economic efficiency has to be addressed (e.g., Kazdin & Blase, 2011; Wilfley et al., 2013).

Finally, the engagement of future research in investigating resilience models is highly desirable (e.g., Grogan, 2008; Halliwell, 2013). Protective factors against, for example, the negative influence of unrealistic body ideals in media need to be examined in more detail and included into health promotion programs with widespread dissemination. To promote more realistic and healthier body ideals would be just as important for public health as challenging associations between extreme thinness, femininity, popularity and success respectively high muscularity, masculinity, strength and power.

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Appendix

A) Publication 1

Leitlinien zur Diagnostik und Therapie der Essstörungen:

eine Kommentierung

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Quintessenz

- Essstörungen (ES) sind schwere psychische Störungen und treten mit Prävalenzen von 1-3.5% auf. Auch subklinische Formen beeinträchtigen die psychische Gesundheit.
- Der Prävention, Früherkennung und Frühbehandlung der Anorexia nervosa (AN), der Bulimia nervosa (BN) und der Binge Eating Störung (BES) kommen aufgrund der schwerwiegenden Folgen und der starken Chronifizierungstendenz eine hohe Bedeutung zu.
- Evidenzbasierte Leitlinien zur Diagnostik und Behandlung von Essstörungen fördern eine frühe Diagnosestellung und die Zuweisung zu wirksamer Behandlung.
- Die Übertragbarkeit der im Jahr 2011 in Deutschland erschienenen evidenzbasierten wissenschaftlichen Leitlinien auf die Situation in der Schweiz und die Förderung des Transfers des Behandlungswissens in die klinische Praxis ist größtenteils gegeben.

Einleitung

Gestörtes Essverhalten gehört zu den häufigsten Gesundheitsproblemen in westlichen Ländern. Subklinisch gestörtes Essverhalten tritt bei Kindern und Jugendlichen immer häufiger auf und kann die psychosoziale Entwicklung maßgeblich beeinflussen (1-3). Demgegenüber ist die Inzidenzrate der Essstörungen (ES) stabil (4). Die Lebenszeitprävalenz der AN, BN und BES liegt in der Schweiz laut einer aktuellen, repräsentativen Querschnittstudie bei 3.5% (5). Junge Frauen sind von AN und BN häufiger betroffen als Männer (5, 6). Nebst schwerwiegenden psychischen und körperlichen Folgeerscheinungen sowie hohen Rückfallraten sind die Folgekosten von ES hoch (7).

ES sind multifaktoriell bedingt und auf ein Zusammenspiel von biologischen, sozialen und psychologischen Vulnerabilitätsfaktoren zurückzuführen (8). Trotz der unterschiedlichen Phänotypen, ist die Entstehung und der Verlauf der ES durch überlappende psychopathogene Faktoren gekennzeichnet (transdiagnostisches Erklärungsmodell) (9). Ätiologische Kernmerkmale beinhalten dysfunktionale Kognitionen bezüglich des Körpers, der Figur und des Gewichts. Aktuelle Störungsmodelle verdeutlichen die Wechselwirkung des negativen Körperbilds mit negativem Affekt und pathologischem Essverhalten (10, 11) (Abb. 1). Die Aufrechterhaltung der ES wird über zwei ätiologische Pfade hergeleitet: Der eine Pfad bezieht sich auf dysfunktionale Verarbeitungsmechanismen essens- und körperbezogener Inhalte. Befunde zeigen, dass bei Personen mit ES bereits der Anblick von Nahrung und das Vorstellen der Nahrungsaufnahme zu dysfunktionalen Gedanken in Bezug auf den eigenen Körper führen kann (12) und negative Stimmung bzw. gestörtes Essverhalten auslöst (13). Der zweite Pfad hebt die beeinträchtigte Fähigkeit zur Wahrnehmung und Regulation von Emotionen hervor (14, 15).

---------- *Abbildung 1 bitte hier einfügen* ----------

Evidenzbasierte Leitlinien (Exkurs 1) zur Diagnostik und Behandlung von ES streben einen verbesserten Zugang zur wirksamsten Behandlung an. Entsprechende Leitlinien wurden vom britischen „National Institute of Clinical Health“ (NICE, 2004) und von der „American Psychiatric

Association“ (APA, 2006) erarbeitet (16, 17). Das Expertennetzwerk Essstörungen Schweiz (ENES) folgte 2006 mit Behandlungsempfehlungen (18). Im Jahr 2011 wurden erstmals deutschsprachige evidenzbasierte Leitlinien zur Diagnostik und Therapie der ES von der Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF) veröffentlicht (19).

---------- *Exkurs 1 bitte hier einfügen* ----------

Diagnostik bei Verdacht

Das Vorliegen einer ES sollte anhand der Kriterien eines operationalisierten Klassifikationssystems (ICD-10 oder DSM-IV-TR, resp. DSM-V) geprüft werden (20, 21). Hierzu liegen strukturierte essstörungsspezifische Interviews (z.B. Eating Disorder Examination, EDE, (22, 23); für anorektische und bulimische Essstörungen SIAB-EX (24)), sowie verschiedene Fragebögen (z.B. Eating Disorder Examination-Questionnaire, EDE-Q (25)) vor, die auch zur Verlaufsdiagnostik eingesetzt werden können. Um möglichst alle Formen der ES zu erfassen, wurden die Kriterien der ES in der fünften Ausgabe des DSM (www.dsm5.org) gelockert (Tab. 2, (26)).

---------- *Tabelle 1 bitte hier einfügen* ----------

Die medizinische Diagnostik bei Verdacht auf eine Essstörung beinhaltet im Minimum Körpergröße und -gewicht, Blutdruck und Puls. Ernsthafte medizinische Komplikationen werden durch folgende Merkmale angezeigt: Elektrolytentgleisung, Niereninsuffizienz, Schädigung der Leber oder der Bauchspeicheldrüse, Eiweiß-, Albumin-, Phosphatmangel (4). Neben den genannten körperlichen Auffälligkeiten, die auf eine Malnutrition hinweisen, sind weitere wichtige Hinweise zur Früherkennung einer Essstörung die ausgeprägte Beschäftigung mit Gedanken zu Figur, Gewicht und Nahrungsaufnahme, eine hohe Bedeutung des Körperbildes für das Selbstwertgefühl sowie stark restriktives oder unstrukturiertes Essverhalten und markante Maßnahmen zur Gewichtskontrolle. Auf diese Merkmale sollte im allgemeinärztlichen Setting besonderes Augenmerk gelegt werden. Zur Risikogruppe gehören primär junge Frauen, die entweder untergewichtig sind oder

normalgewichtige, jedoch mit starken Gewichtssorgen, des Weiteren Frauen mit Zyklusstörungen und gastrointestinalen Symptomen (4).

Anorexia nervosa (AN)

Das charakteristische Symptom der AN ist das Untergewicht, das bis zur vitalen Gefährdung führen kann. Dieses wird durch restriktives Essverhalten, selbstinduziertes Erbrechen und Abführen, Gebrauch von Appetitzüglern und/oder Diuretika sowie übertriebener körperlicher Aktivität herbeigeführt. Als Diagnosekriterium gilt ein Body-Maß-Index (BMI) von 17.5 kg/m^2 oder weniger, wobei ab einem BMI von <15 kg/m^2 eine deutliche Gefährdung und Indikation zur stationären Behandlung vorliegt und ab einem BMI von <12 kg/m^2 von einem sehr hohen somatischen Risiko gesprochen wird (27, 28). Trotz des teilweise massiven Untergewichts besteht eine ausgeprägte Angst vor Gewichtszunahme. Die Essstörungspathologie umfasst weiter das Ruminieren um Figur, Gewicht und Essverhalten. Infolge der Malnutrition kommt es zu einer Dysfunktion der Hypothalamus-Hypophysen-Nebennierenachse (u.a. Ausbleiben der Menstruation). Durch die Unterernährung und durch Erbrechen oder den Gebrauch von Abführmitteln können schwerwiegende körperliche Folgeschäden auftreten, welche unter anderem in Form von Herzrhythmusstörungen, Kaliummangel, beeinträchtigter Nierenfunktion, Osteoporose sowie erhöhter Infektionsanfälligkeit in Erscheinung treten(4, 27).

Betreffend Aufrechterhaltung der AN ist häufiges Diätieren zur Affektregulation charakteristisch. Ein geringer Selbstwert, der für die wahrgenommene Diskrepanz des eigenen Körperbilds mit dem Schönheitsideal prädisponiert, ist zudem ein wesentliches Merkmal (29). Im Sinne eines Teufelskreises wird zudem das bizarre Essverhalten durch die Folgeerscheinungen der Malnutrition aufrechterhalten.

Langzeitstudien zeigen, dass 5-6 Jahre nach Behandlungsende weniger als die Hälfte der behandelten und unbehandelten Betroffenen eine Remission erfahren und ungefähr 30% einen positiven Gesamtverlauf zeigen. Ca. 30% zeigen eine Besserung und 20% eine Chronifizierung (30). Die

Sterblichkeitsrate (erhöhte Suizidrate!) bei AN ist im Vergleich zur Allgemeinbevölkerung ca. 3- bis 10-fach erhöht (31, 32). Dies gilt insbesondere bei Patientinnen mit einem BMI <13. Die Mortalitätsrate wird unter anderem durch die Dauer und Intensität der Essstörungssymptomatik, sowie die psychische und physische Komorbidität beeinflusst (33, 34). Häufig liegen zudem komorbide Depressionen, Angststörungen und zwanghafte Persönlichkeitsstörungen vor (35, 36). Als positive Verlaufsprädiktoren gelten ein geringes Chronifizierungsausmaß und die Stabilität der Eltern-Kind Beziehung (37).

Bulimia nervosa (BN)

Kernsymptome der BN sind regelmäßige Essanfälle (EA), die mit subjektivem Kontrollverlust und gegenregulatorischem Verhalten einhergehen, wobei sich der BMI bei einer BN häufig im Normalbereich bewegt. Die Gegenregulation beinhaltet Erbrechen, Diätieren, Fasten, Vermeiden von hochkalorischer Nahrung, Missbrauch von Abführmitteln oder exzessive sportliche Aktivität. Ähnlich wie bei der AN beinhaltet die Essstörungspathologie ein ständiges Gedankenkreisen um Essen, Figur und Gewicht. Der BMI bei einer BN ist häufig normal.

Die Orientierung an unrealistischen Vorstellungen bezüglich Gewicht und Figur, ein geringes Selbstwertgefühl sowie erhöhte Impulsivität sind mit der Aufrechterhaltung bulimischen Essverhaltens assoziiert (29, 38). Dabei dient das dysfunktionale Essverhalten häufig der kurzfristigen Regulation aversiver affektiver Zustände (39). Zusätzlich kann die mögliche Mangelernährung die Entstehung von Heißhungergefühlen und Essanfällen begünstigen (38). Somatische Folgen der BN umfassen Läsionen der Zähne bzw. des Ösophagus durch die Einwirkung der Magensäure, Verdauungsbeschwerden, Müdigkeit, Hautveränderungen und Elektrolytstörungen (27).

Insgesamt sind nach einer kognitiv-behavioralen Behandlung ca. die Hälfte der Betroffenen kurz- und langfristig symptomfrei und bis zu 75% deutlich gebessert (38). Studien mit unbehandelten Betroffenen aus der Allgemeinbevölkerung ergeben (40), dass nach 5 Jahren noch 50 bis 66% unter

persistierenden bulimischen Symptomen leiden. Der Übergang von einer BN zu einer AN kommt selten, bzw. in 5.7% der Fälle vor (41).

Als prognostisch ungünstig haben sich komorbide psychische Störungen sowie erhöhte Impulsivität und anamnestischer Substanzmissbrauch erwiesen (42). Ein geringer Schweregrad der BN-Symptomatik sowie eine weniger ausgeprägte Depressivität zu Behandlungsbeginn und ein rasches Ansprechen auf die Behandlung sind Prädiktoren eines günstigen Verlaufs (40). Affektive Störungen zählen zu den häufigsten psychischen Komorbiditäten der BN und treten bei zwei Drittel der Patienten auf. Ebenfalls häufig kommen Angststörungen und Substanzmittelabhängigkeit vor (43).

Binge-Eating-Störung (BES)

Die BES ist gekennzeichnet durch subjektiv unkontrollierbare EA, ohne dass regelmäßige gegenregulatorische Verhaltensweisen durchgeführt werden. Die BES ist in den meisten Fällen mit Übergewicht oder Adipositas assoziiert. Die Essstörungspathologie umfasst eine Tendenz zum Verzehr hochkalorischer Nahrungsmittel (4). Alternativ zu EA kann aber auch eine kontinuierliche, über den Tag verteilte Nahrungsaufnahme (grazing, nibbling) beobachtet werden (29). Unter den ES weist die BES die höchste Prävalenz in der Allgemeinbevölkerung auf. Zudem leiden 20 bis 40% der Patienten, die wegen ihres Übergewichts oder ihrer Adipositas eine Behandlung aufsuchen unter BES. Die BES ist bei Frauen und Männern etwa gleich häufig (44, 45).

Die Entstehung der BES basiert auf dem Zusammenwirken einer beeinträchtigten Affekt- und Impulsregulationsfähigkeit, einer erhöhten Belohnungssensitivität für Nahrungsmittel, einem familiären ungünstigen Umgang mit Figur, Nahrung und Gewicht sowie dem Vorliegen von Übergewicht bzw. Adipositas in der Kindheit (40, 46).

Die BES verläuft chronisch fluktuierend und geht selten in eine AN oder BN über (47). Mit einer retrospektiv erfassten Zeitspanne von insgesamt 14.4 Jahren ist die Dauer der BES höher als jene der AN oder BN (47, 48). Ohne Behandlung führt die BES zur kontinuierlichen Gewichtszunahme. Zudem leidet ca. die Hälfte der Betroffenen mit BES unter affektiven und Angststörungen (46, 49). Weiter

kommen Substanzabhängigkeitsstörungen und Persönlichkeitsstörungen vom Borderline-Typus vor (50).

Behandlung der Essstörungen

Evidenzbasierte Behandlungsleitlinien existieren für die Störungsbilder der AN, BN und BES. Für die Behandlung subklinischer Formen dieser Störungsbilder oder nicht näher bezeichneter Essstörungen (EDNOS) gilt eine Anlehnung an die Behandlungskriterien des Vollbildes.

Als übergreifendes Ziel der Therapie gelten die deutliche Reduktion der Essstörungs- und allgemeinen Psychopathologie und der medizinischen Risiken bzw. die Behandlung der somatischen Folgeerscheinungen. Gemeinsame Voraussetzung aller therapeutischen Interventionen ist der Aufbau einer tragfähigen therapeutischen Beziehung. Grundsätzlich sind ambulante Maßnahmen einer stationären Behandlung vorzuziehen. Stationäre Behandlung ist dann indiziert, wenn eine massive Gefährdung vorliegt, eine ambulante Behandlung sich als unzureichend herausgestellt hat oder das soziale bzw. familiäre Umfeld einer erfolgreichen Behandlung zuwiderläuft. Weiter sollen Angehörige in Abhängigkeit vom Alter der Betroffenen und des Gefährdungsgrades in die Behandlung einbezogen werden. Bei Kindern ist ein Einbezug der Familie grundsätzlich empfohlen. Belege zur Wirksamkeit weisen auf geringe Effekte der Behandlung der AN sowie auf mittlere bis gute Effekte bei BN sowie BES hin, wobei nur wenige Ergebnisse zur langfristigen Wirksamkeit vorliegen (4, 37, 51, 52). Auch nach erfolgreicher Behandlung sind jedoch eine beeinträchtigte Stimmung, erhöhte Ängstlichkeit bei BN und BES bzw. Hinweise auf ungünstige Strategien zum Umgang mit negativen Affekten bei AN vorhanden (39, 53, 54). Es ist ebenso darauf hinzuweisen, dass zur Besserung der somatischen Folgeerscheinungen eine Gewichtsrestitution notwendig ist. Voraussetzung dazu ist eine normokalorische Ernährung (55).

Bei der AN steht die Wiederherstellung und Stabilisierung des Körpergewichts (Empfehlung BMI 18.5 kg/m^2) und die Normalisierung des Essverhaltens im Vordergrund. Die Behandlung in einem somatischen Spital ist nur als ultima ratio zu werten und sollte dann in Zusammenarbeit mit

Psychologen, Psychiatern oder Psychosomatikern durchgeführt werden, wobei auf eine Kontinuität der Psychotherapie zu achten ist. Anzustreben ist die multimodale, multidisziplinäre Behandlung in speziell für essgestörte Patienten ausgerichteten Behandlungszentren, die in der Lage sind, auch schwer kranke Patienten psychotherapeutisch sowie bei Bedarf auch somatisch zu behandeln.

Die Psychotherapie ist die Therapie der Wahl, wobei keine Unterschiede bezüglich der Wirksamkeit unterschiedlicher Therapieverfahren (56) bestehen. Für die Wirksamkeit der Psychopharmakotherapie bei AN liegt keine Evidenz vor. Antidepressiva können zur Behandlung komorbider depressiver Störungen eingesetzt werden, haben jedoch hinsichtlich der Essstörungspathologie keinen Effekt.

Bei der BN sind die Normalisierung des Essverhaltens sowie die Bewältigung interpersonaler Konflikte, die eine wichtige aufrechterhaltende Funktion einnehmen, die Behandlungsziele. Behandlung erster Wahl ist die ambulante Psychotherapie, wobei sich die deutlichsten Wirksamkeitsnachweise für die Kognitive Verhaltenstherapie (KVT) zeigen, gefolgt von der Interpersonellen Psychotherapie (IPT). Die Therapiedauer sollte mindestens ein halbes Jahr betragen. Angeleitete verhaltenstherapeutisch basierte Selbsthilfegruppen sind für Patientinnen mit isolierten Störungsbildern und geringerem Schweregrad wirksam. Bei schweren Fällen der BN, kombiniert mit anderen psychischen Störungen, die sich ambulant bei evidenzbasierter Behandlung als therapierefraktär erweisen, ist eine stationäre Behandlung indiziert.

Im Gegensatz zur AN hat sich bei der BN – ausschließlich in Ergänzung zur Psychotherapie – die psychopharmakologische Behandlung mit selektiven Serotonin-Wiederaufnahmehemmern (SSRI) (Fluoxetin, Dosis 60mg/d) als wirksam erwiesen, wobei die Drop-out Rate mit durchschnittlich 34% hoch ist (4, 57). Während bei einer medikamentösen Behandlung kurzfristige Effekte (z.B. Minderung der Frequenz der Essanfälle) nachweisbar sind, zeigt sich bei der KVT sowohl kurz- als auch langfristig eine Symptomreduktion (57).

Die Behandlung der BES setzt bei der Reduktion der EA, einer ausgewogenen und regelmäßigen Ernährung und der Bearbeitung dysfunktionaler Emotions- und Impulsregulation an. Eine erfolgreiche Behandlung der ES ist lediglich mit einer Gewichtsstabilisierung und nicht mit einer Gewichtsreduktion assoziiert, was bei den Betroffenen häufig zu Motivationsproblemen führt (58, 59). Eine Gewichtsreduktion sollte der Behandlung der BES nachgeschaltet werden.

Als Behandlung der Wahl für BES gilt die Psychotherapie, wobei die KVT bislang über die breitesten Wirksamkeitsbelege verfügt. Auch angeleitete, manualisierte Selbsthilfeprogramme mit KVT-Elementen sind wirksam. Für die medikamentöse Behandlung von BED z.B. mit SSRIs gibt es bisher moderate kurzfristige Wirksamkeitsbelege (ausschließlich off-label use) (60).

Anwendbarkeit der Leitlinien und Diskussion der praktischen Umsetzung in der Schweiz

Die in Deutschland entwickelten Leitlinien sollen den Zugang zu wirksamer Behandlung und die Etablierung von Qualitätsstandards innerhalb von Versorgungsstrukturen fördern. Auch wenn evidenzbasierte Leitlinien gebündeltes empirisches und anwendungsbezogenes Wissen repräsentieren, gelingt der Transfer in die klinische Praxis nur dann, wenn die individuelle Situation des Patienten berücksichtigt wird. Die Übertragbarkeit der evidenzbasierten wissenschaftlichen Leitlinien auf die Versorgungssituation in der Schweiz scheint theoretisch gegeben. Die gesundheitspolitische Situation der Schweiz unterscheidet sich jedoch von den Bedingungen in Deutschland. Ein wichtiger Unterschied besteht darin, dass in der Schweiz psychologische Psychotherapeuten bis anhin nur auf ärztliche Delegation hin für Betroffene via Grundversicherung finanzierbar sind. Dies benachteiligt ökonomisch schwächere Betroffene mit einer Essstörung und schränkt die Zahl der auf ES spezialisierten Fachpersonen ein, die auf der Basis der Kriterien von WZW (Wirksamkeit, Zweckmässigkeit, Wirtschaftlichkeit; KVG Art. 32) evidenzbasierte Behandlung anbieten können. Weiter sind in der Schweiz lediglich eine begrenzte Zahl ambulanter und stationärer Institutionen auf die Behandlung der ES spezialisiert (Tab. 3). Dies ist bedenkenswert, da

eine Behandlung der Betroffenen in hierfür nicht spezialisierten Institutionen wenig erfolgsversprechend ist.

Insbesondere bei der AN ist häufig von einer Spitalbedürftigkeit über mehrere Monate auszugehen, da das Erreichen des Zielgewichts (BMI 18.5) und die folgende Stabilisierungsphase für den Verlauf der AN prognostisch bedeutsam ist (61). In diesem Zusammenhang ist auch die eingeschränkte Möglichkeit zur Leistungsabrechnung konsiliarisch tätiger psychiatrisch und psychologischer Fachpersonen bei ES Patienten (in somatischen Spitäler) auf der Basis von Fallpauschalen (DRG) kritisch zu diskutieren, da dadurch bei begrenzter Verfügbarkeit spezialisierter Institutionen eine zusätzliche Limitierung in der interdisziplinären und fachgerechten Behandlung der ES eingeführt wird.

Insgesamt ist zu fordern, dass Ausbildung und Training in Diagnostik und wirksamer Behandlung gefördert werden. Im Bereich Früherkennung sind in der Schweiz verschiedene Organisationen aktiv, wie z.B. die Fachstelle „Prävention Essstörungen Praxisnah“ (PEP) und das „Experten Netzwerk Essstörungen“ (ENES). Eine stärkere Vernetzung wissenschaftlich und praktisch tätiger Fachpersonen könnte die Relevanz und das Ergebnis präventiver Bemühungen fördern.

Die in Deutschland im Jahr 2011 publizierten und in diesem Artikel kommentierten Leitlinien sind im Internet frei zugänglich *(www.awmf.org/leitlinien/detail/ll/051-026.html)* und auch in Papierform erhältlich [Herpertz et al., 2011].

Anhang

---------- *Tabelle 2 bitte hier einfügen* ----------

Weitere Textbestandteile

Exkurs 1: Leitlinien und evidenzbasierte Medizin

Wissenschaftliche Leitlinien sind systematisch entwickelte Aussagen, die den gegenwärtigen wissenschaftlichen und klinischen Erkenntnisstand wiedergeben und Behandlungspersonen und ihre Patienten bei der Entscheidungsfindung für eine angemessene Versorgung in spezifischen klinischen Situationen (Prävention, Diagnostik, Therapie und Nachsorge) unterstützen. Leitlinien tragen zur Verbesserung der Versorgungsergebnisse bei, minimieren Risiken, erhöhen die Therapiesicherheit und Wirtschaftlichkeit und reduzieren das Risiko einer inadäquaten Diagnose- und Behandlungsmethoden. Die Leitlinien werden in Deutschland nach den Vorgaben der Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF) als S1-, S2- oder S3-Leitlinie klassifiziert, wobei S3 dem höchsten Evidenzgrad und der höchsten Qualitätsstufe entspricht. Evidenzbasierte Leitlinien (S2 und S3 Leitlinien) sind mit dem Begriff der „Evidenzbasierten Medizin“ (EbM) verknüpft. EbM steht für gewissenhaften, ausdrücklichen und vernünftigen Gebrauch der gegenwärtig besten externen, wissenschaftlichen Erkenntnisse. Bei den Leitlinien zur Diagnostik und Behandlung der Essstörungen handelt es sich um S3-Leitlinen.

Tabellen und Abbildungen

Tabelle 1: Neuerungen DSM-V (De Zwaan & Herzog, 2011)

AN	Verzicht auf Formulierungen, die absichtliches Verhalten implizieren: Gewicht: neu „Einschränkung der Nahrungsaufnahme“ statt „Weigerung ein normales Körpergewicht zu halten“; Krankheitseinsicht: „Nichterkennen“ statt „Leugnen des Schweregrads“. Starke Angst vor Gewichtszunahme und/ oder mit Gewichtszunahme interferierendes Verhalten. Verzicht auf das Kriterium der Amenorrhö. Beurteilung des Subtypus (restriktiv oder bulimisch) für eine Zeitspanne von drei Mt.
BN	Frequenz von Essanfällen/Woche: neu 1 anstelle von bisher 2/ Woche (über einen Zeitraum von 6 Mt.). Keine Subtypisierung in Purging- und Nicht-Purging-Typus.
BES	Neu als klinische Störung aufgenommen. Frequenz von Tagen mit Essanfällen/Woche: neu 1 anstelle von bisher 2/ Woche (über einen Zeitraum von 3 statt 6 Mt.).
NNB	Störungsbilder werden benannt (z.B. Purging Disorder oder Night Eating Syndrom).

Tabelle 2: Auf Essstörungen spezialisierte Institutionen (ambulant und stationär)

Institutionen
Zentrum für Psychotherapie, Lehrstuhl für Klinische Psychologie und Psychotherapie, Universität Fribourg, http://www.unifr.ch/psychotherapie
Privatklinik Aadorf, http://www.klinik-aadorf.ch
Universitätsspital, Klinik für Psychiatrie und Psychotherapie, Zentrum für Essstörungen, Zürich http://www.psychiatrie.usz.chZentrumfuerEssstoerungen
Spital Zofingen, Kompetenzzentrum für Essverhalten, Adipositas und Psyche, http://www.spitalzofingen.ch/kea
Klinik Wysshölzli, Herzogenbuchsee, www.wysshoelzli.ch
Privatklinik Wyss, www.privatklinik-wyss.ch
Sanatorium Kilchberg, http://www.sanatorium-kilchberg.ch
Triemlispital, www.triemli.ch
Zentrum für Systemische Therapie und Beratung, www.zsb-bern.ch

CHUV, Lausanne, Service de Psychiatrie de Liaison, Centre vaudois anorexie boulimie, http://www.chuv.ch

Centro disturbi del comportamento alimentare, Ospedale Regionale di Mendrisio http://www.eoc.ch

Klinik Sonnenhalde in Riehen (www.sonnenhalde.ch)

Psychiatrie Baselland, Klinik für Psychiatrie und Psychotherapie, Liestal (www.pbl.ch)

UPK Basel, Psychotherapeutische Tagesklinik/Spezialambulanz für Essstörungen (SPESS), Basel (www.upkbs.ch)

Fachverbände Essstörungen und weitere Quellen

Arbeitsgemeinschaft Ess-Störungen AES, www.aes.ch

Prävention Essstörungen Praxisnah (PEP), www.pepinfo.ch

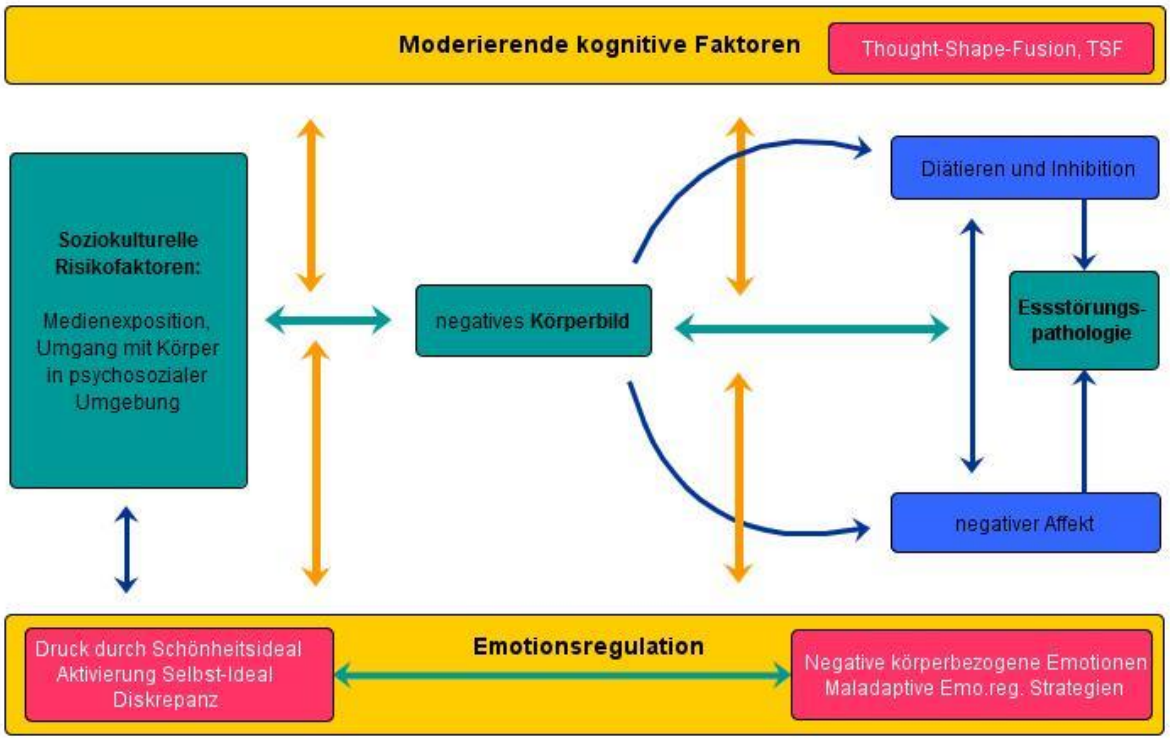
Experten Netzwerk Essstörungen (ENES), http://www.netzwerk-essstoerungen.ch

Schweizerischer Fachverband Adipositas im Kindes- und Jugendalter: http://www.akj-ch.ch/fachpersonen/grundlagen-wissen.html

Behandlungsrichtlinien Adipositas im Kindes- und Jugendalter: http://www.akj-ch.ch/fachpersonen/grundlagen-wissen.html

Behandlungsrichtlinien ENES: http://www.netzwerk-essstoerungen.ch/d/pdf/BEH_Fassung_2006.pdf

Abbildung 1: Adaptiertes Zweipfadmodell zur Entstehung und Aufrechterhaltung von Essstörungen (nach Stice, 2001, 2011; Dittmar, 2009)



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Appendix

B) Publication 2

A Model of Disturbed Eating Behavior in Men: The Role of Body Dissatisfaction, Emotion Dysregulation and Cognitive Distortions

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ABSTRACT (150 words)

Despite the high frequency of body dissatisfaction (BD) in men, only few studies focused on underlying mechanisms relating BD to eating disorder pathology. We present a multi-factorial model that links different components to BD and disturbed eating and compensatory behavior (DECB) in men. The model was tested in a community sample of healthy men in Switzerland (18–37y., N=123) using path analysis. In a cross-sectional online-survey, BMI, BD, social pressure to conform to body ideals, nonacceptance of emotions, cognitive distortions regarding the perception of one's own body, and DECB were assessed. BMI and pressure both predicted BD, which was positively associated with DECB. Cognitive distortions partially mediated the relationship between BD and DECB. Future studies should address the susceptibility to cognitive distortions as a risk factor related to ED in a longitudinal design. The role of cognitive distortions in the maintenance of DECB must be further clarified in men with ED.

Key words: disturbed eating in men, body dissatisfaction, cognitive distortions, thought-shape fusion, social pressure, nonacceptance of emotions

A Model of Disturbed Eating Behavior in Men: The Role of Body Dissatisfaction, Emotion Dysregulation and Cognitive Distortions

INTRODUCTION

Lifetime prevalence of eating disorders in the general male population is relatively low and ranges up to 0.3% for anorexia nervosa (AN), 0.9% for bulimia nervosa (BN), and 2.0% for binge eating disorder (BED) in studies in Europe (Preti et al., 2009) and the US (Hudson, Hiripi, Pope, & Kessler, 2007). In a recent, representative cross-sectional survey based on the DSM-IV-TR criteria in Switzerland that included a sample of 4423 men aged 15 to 60 years (Schnyder, Milos, Mohler-Kuo, & Dermota, 2012) lifetime prevalence of 0.2% for AN, 0.9% for BN, and 0.7% for BED were obtained. Despite the rare manifestation of full-blown eating disorders, a significant proportion of male adolescents and young adults showed symptoms of eating disorder pathology on a subclinical level: the lifetime prevalence of repeated episodes of binge-eating without fulfilling the criteria of an eating disorder in men in Switzerland was 2.9% (Schnyder et al., 2012). This is somewhat lower than the rates found in a US study (4%) (Hudson et al., 2007). In another US community sample, that included 1808 men at a mean age of 27.5 years, symptoms of disordered eating, such as overeating (26%), loss of control eating (20%), body checking (8.9%) and exercising (5.6%) were quite frequent (Striegel-Moore et al., 2009). A large questionnaire based study in Switzerland reported unhealthy eating behaviors in 50% of 3890 adolescent men (16–20 years) (Dominé, Berchtold, Akre, Michaud, & Suris, 2009).

Dysfunctional eating and weight regulation practices have been linked to body dissatisfaction (BD), both in men and women (Fiske, Fallon, Blissmer, & Redding, 2014; McCabe & Ricciardelli, 2004). BD is an individual's negative attitude towards his or her body including thoughts and feelings about the body size, shape, muscularity, and weight. It is conceptualized as the perceived discrepancy between a person's evaluation of his or her body and the ideal body (Cash & Szymanski, 1995). The prevalence of BD among US men varies widely (8–61%) (Fiske et al., 2014). Besides eating pathology, BD is known to be associated with impaired psychological well-being such as increased feelings of shame, low self-esteem, and depressive feelings in women and men (e.g., Paxton, Neumark-Sztainer,

Hannan, & Eisenberg, 2006; Stice & Shaw, 2002). In a longitudinal study, Neumark-Sztainer and colleagues (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006) found among more than 1000 US-male adolescents that BD predicted weight control strategies such as fasting or inappropriate use of food supplements, binge eating, and further correlates of an unhealthy lifestyle such as smoking and lack of physical activity; even when adjusted for BMI. Besides unhealthy dieting, BD promotes a number of other health risk behaviors to increase muscularity and reduce body fat, such as steroid abuse and supplement intake (Brower, Blow, & Hill, 1994; Cafri et al., 2005; Ricciardelli & McCabe, 2003). In contrast to women, whose primary goal is to achieve thinness, men's concerns regarding their body image seem more complex, as an increase in muscularity and/or weight loss/body fat reduction is desired (e.g., Tylka, 2011). Accordingly, BD in men may either result in muscularity increasing behavior or in efforts to lose weight (Tylka, 2011). Although it was found that BMI relates to and predicts BD in male adolescents from the general population (Paxton et al., 2006; Watkins, Christie, & Chally, 2008), the relationship between BMI and body dissatisfaction in men seems to be more complex than in women: Tylka (2011) found positive associations between BMI and body fat dissatisfaction as well as disordered eating but at the same time BMI was negatively associated with muscularity dissatisfaction in undergraduate men. In addition, BMI predicted unique variance in men's weight concern but not in appearance self-esteem and shape concern (Bardone-Cone, Cass, & Ford, 2008). In both studies sociocultural factors such as pressure to conform a body ideal and internalization of the ideal were more important and robust predictors of BD and concerns about weight and shape. Media exposure is an important factor with a pronounced impact on male BD, which has been well documented (e.g., Agliata & Tantleff-Dunn, 2004; Halliwell, Dittmar, & Orsborn, 2007). In a meta-analysis of 25 studies including correlational studies and experimental designs, perceived pressure from the mass media was significantly related to men's negative feelings about their own bodies, as well as BD, low self-esteem, psychological disorders (such as depression) and behavioral correlates (e.g., excessive exercising) (Barlett, Vowels, & Saucier, 2008).

While there is some evidence regarding the effects of BMI and sociocultural factors such as media exposure on BD among men, the relationship between BD and eating disorder pathology as well as on the psychological mechanisms involved in this process in men has only scarcely been investigated. One well-known and often mentioned factor influencing eating pathology is individual capacity to cope with emotions. Svaldi and colleagues (Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012) found significantly higher levels of experienced emotional intensity and at the same time lower levels of emotional acceptance, emotional awareness and difficulties in emotion regulation in a group of female adults with eating disorders compared to healthy controls. In addition, dissatisfaction with one's own body is related to negative affect, difficulties in identifying emotional states, and poor coping with negative emotions, which in turn has an impact on eating disorder symptoms, as shown in a cross-sectional study with teenage girls with bulimic symptoms (Sim & Zeman, 2006). In this line, Stice (2001) suggested a so-called "Negative Affect Regulation Pathway". Since appearance is an important evaluation component for individuals especially in western societies, this pathway suggests that BD contributes to development of negative affect. Elevated negative affect in turn increases the risk of developing eating disorder pathology in terms of restricting, dieting, binge eating and compensatory behaviors as an attempt to regulate the negative emotions (Stice, 2001). In particular, nonacceptance of emotional responses, described by the tendency to react with negative secondary emotions to one's original emotional state (Gratz & Roemer, 2004) has been shown to foster emotional overeating (Gianini, 2013), or dietary restraint (Merwin, Zucker, Lacy, & Elliott, 2010) in women. Moreover, nonacceptance of emotional responses was a significant predictor of both BD, and eating disorder pathology also in men (Lavender & Anderson, 2010). Similarly to the "Negative Affect Regulation Pathway" by Stice (2001) in women, Lavender and Anderson (2010) conclude that men who experience negative or unwanted emotional states arising from their dissatisfaction with own body are more likely to engage in maladaptive behaviors, such as binge eating, purging and excessive exercise.

In addition to the regulation of negative affect, cognitive distortions regarding the perception of one's own body contribute to the development and maintenance of eating disorders (e.g., Fairburn, Cooper, & Shafran, 2003). Cognitive distortions are characterized by skewed and non-veridical thoughts related to affective experiences and behavior that have been linked to the maintenance of psychological problems and mental disorders (Rachman & Shafran, 1999). Shafran and colleagues (1999) proposed a specific cognitive distortion mechanism regarding thoughts about food, weight and shape; the so-called "Thought-Shape Fusion" (TSF). TSF was developed according to the "Thought-Action Fusion" (TAF) concept in obsessive-compulsive disorder (OCD) (Shafran, Thordarson, & Rachman, 1996). Transmitted to the eating disorder domain, TSF includes imagining of eating forbidden foods, or of abstaining from compensatory behavior such as exercising or dieting. Not only can these thoughts trigger negative feelings about one's own body (Coelho et al., 2013), they are also directly related to dysfunctional behavior, such as the urge to engage in body checking or restrained eating. Shafran and colleagues found strong associations between TSF and the severity of eating disorder symptoms and general psychopathology in women (Shafran & Robinson, 2004; Shafran et al., 1999). When imagining specific food, TSF may be induced in healthy women (Coelho, Roefs, & Jansen, 2010), and more pronounced in women with eating disorders (Coelho, Carter, McFarlane, & Polivy, 2008; Radomsky, de Silva, Todd, Treasure, & Murphy, 2002). Dubois et al. (2013) investigated TSF in an Australian community sample and found that TSF significantly predicted eating disorder pathology as well as BD in both sexes, although the explained variance was somewhat higher for women than for men. Their findings remain, however, preliminary, as the male sample was relatively small.

In order to integrate previous empirical findings regarding predictors of BD and eating pathology in men, we present a comprehensive model of disturbed eating in men (see Figure 1). In this so-called "Model of Disturbed Eating Behavior in Men", BMI as well as the perceived social pressure to conform to a socially and medially transmitted body ideal predicts BD. Furthermore, BD positively predicts male eating pathology symptoms, here conceptualized as DECB. The relationship between

BD and DECB is thereby mediated by two characters: 1) nonacceptance of emotional responses (Nonacceptance), and 2) susceptibility to distorted cognitions related to eating, shape, and weight (TSF).

Insert Figure 1 here

METHOD

Participants

Altogether 123 men were registered for this online survey carried out at the Department of Clinical Psychology at the University of Fribourg, Switzerland. Participants' mean age was 23.7 (SD=3.17) years and the mean BMI was 23.3 (SD=3.1). 33.3% of the sample was of Swiss nationality, 63.4% was German and 3.3% were of other nationality. More than two thirds (68.3%) of the participants were students, 27.6% were employed, and 4.1% didn't indicate their occupation. Eighteen participants (12.8%) dropped out during the online assessment. According to the dropout-analysis, men that terminated the survey prematurely scored significantly higher on the shape-concern scale of the EDE-Q ($t(139)=-2.75$, $p=.013$), as well as in global symptoms of eating disorder pathology according to the EDE-Q ($t(139)=-2.30$, $p=.033$) compared to the completers. No significant differences were found regarding the BMI and age between completers and non-completers.

Measures

Standardized questionnaires in German language were presented via an online survey platform (Umfrageonline; Enuvo) during 2012–2014. The original format and content of the questionnaires were not altered.

Body dissatisfaction (BD): To assess body shape preoccupations the short-version of the "Body Shape Questionnaire" (BSQ-8C, Evans & Dolan, 1993; German version by Pook, Tuschen-Caffier, & Stich,

2002) was used. This self-report questionnaire relates to the last four weeks. The approved shortened form of the BSQ shows good convergent and discriminant validity as well as reliability (Evans & Dolan, 1993). Cronbach's alpha for this sample was .90. Values below 19 indicate no concerns with shape, scores from 19 to 25 refer to mild concerns with shape, and for values above 25 moderate to marked concerns with shape have to be considered (Evans & Dolan, 1993).

Disturbed Eating and Compensatory Behavior (DECB): To avoid an overlap of the variable BD and eating pathology, we created a new variable named disturbed eating and related compensatory behaviors (DECB) comprised of the following items of the EDE-Q (EDE-Q, Fairburn & Beglin, 1994; German version by Hilbert & Tuschen-Caffier, 2006): items 1–5 (restrained eating), 15 (binge-eating), 16 (self-induced vomiting), 17 (taking laxatives), and 18 (excessive exercising). While items 1–5 were scored on a scale from 0-6; items 15-18 were coded based on the given occurrences of binge-eating (number of days in the last month), as well as purging, exercising and use of laxatives (number of events in the last month). The EDE-Q has demonstrated good psychometric properties and has shown to be suitable to detect significant symptoms of eating disorders in individuals of the general population (Mond, Hay, Rodgers, Owen, & Beumont, 2004). The Cronbach's alpha for the global score is .97 and subscale values range from .85 to .93 (Hilbert, Tuschen-Caffier, Karwautz, Niederhofer, & Munsch, 2007). In our sample, the Cronbach's alpha was .82 for the global score, .82 for the scale restraint eating, .67 for the scale weight concern, .85 for the scale shape concern, and .71 for the scale eating concern. Cronbach's alpha of the new DECB scale was .80.

Body Mass Index (BMI): BMI (kg/m^2) was calculated relying on self-reported body weight and height as assessed in the EDE-Q. A BMI below 18.5 refers to underweight, above 25 indicates overweight, and above 30 obesity.

Social pressure (Pressure): The subscale "pressure" from the "Social Attitudes Towards Appearance Questionnaire" (SATAQ-G, Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004; German version by Knauss, Paxton, & Alsaker, 2009) was used to assess socio-cultural influences on body image. The subscale "pressure" contains items regarding the perceived pressure from media to

conform a certain body ideal. Mean scores of the German version applied in a sample of 819 male Swiss adolescents were 8.58, SD=4.21 (Knauss et al., 2009). Cronbach's alpha of the total score was .89.

Nonacceptance of emotional responses (Nonacceptance): A subscale of the "Difficulties with Emotion Regulation Scale" (DERS, Gratz & Roemer, 2004; German version by Ehring, Fischer, Schnulle, Bosterling, & Tuschen-Caffier, 2008), which refers to a tendency to have negative secondary emotions (such as guilt, shame, embarrassment, anger, irritation, feeling of weakness) when experiencing negative emotions such as anger or sadness, or nonaccepting reactions to one's distress (Gratz & Roemer, 2004). The nonacceptance scale displays good internal consistency (α=.85) and construct validity. The Cronbach's alpha scores in the present sample were good (overall score α=.93, nonacceptance α=.91).

Cognitive distortions (TSF): The "Short Trait Thought Shape Fusion Scale" (TSF trait scale, Coelho et al., 2013) provides an assessment of eating and body image related cognitions. Coelho and colleagues (2013) developed a short version of the original trait TSF scale (Shafran et al., 1999), consisting of 14 items assessing the TSF concept and 4 items to measure the clinical impact. The scale was translated into German and back translated (German version, available from the authors). The Cronbach's alpha for the 14-items scale "concept" in this sample was .87. This scale has not been validated for the use with men so far.

Procedure

Participants were recruited for the survey through mailing lists, flyers and an advertisement on the website of the University of Fribourg. The online survey took approx. 40 to 50 minutes to complete. Study design, procedure and materials were approved by the local ethical committee of the University of Fribourg, Switzerland. Student participants were compensated by receiving course credits for full participation. Other non-student participants have not been compensated for their participation, however they had been offered the possibility to receive a summary of the study results.

Data analysis

In order to test the proposed theoretical model, path analysis was conducted allowing us to assess the relationship between BMI and social pressure (Pressure), and body dissatisfaction (BD) as well as the relationship between body dissatisfaction (BD) and disturbed eating and compensatory behavior (DECB), potentially mediated by cognitive distortions (TSF) and nonacceptance of emotional responses (Nonacceptance). The second part of the model thus refers to a mediation model, comprising the total effect of BD on DECB, the indirect effects of BD on DECB via TSF and Nonacceptance, and the direct effect of BD on DECB controlled for TSF and Nonacceptance. Path analysis was performed using the software package R (Team, 2014), including the R package lavaan (Rosseel, 2012). Standard errors of indirect effects were obtained using 5000 bootstrapped samples.

RESULTS

Descriptives of the assessed variables are listed in Table 1. Mean global score of the EDE-Q was 0.53 (SD=0.63). Three participants (2.4%) scored higher than 2.09 on the EDE-Q global score, which refers to elevated eating disorder psychopathology (Lavender, De Young, & Anderson, 2010). According to the cut-off values for the BSQ, 14 participants (11.4%) reported elevated BD. Regarding the dependent variable DCEB the results show that 18 (14.6%) participants score above the mean value plus one standard deviation (M=0.35, SD=0.61), which refers to a comparatively distinct tendency to disturbed eating and compensatory behavior in this subgroup.

Insert Table 1 here

Insert Table 2 here

Table 2 presents Pearson correlations among all variables that were included in the path analysis. BMI and social pressure (Pressure) were both significantly positively correlated with BD, while BD was significantly positively correlated with DECB. In addition, BD was significantly positively correlated with Nonacceptance and TSF. The two mediator variables were significantly positively correlated with DECB.

The path analysis revealed the following pattern (Table 3 and Figure 2): As hypothesized, BMI (*coefficient* = 1.134, *SE* = 0.225, *z* = 5.03, *p* < .001) and Pressure (*coefficient* = 0.257, *SE* = 0.058, *z* = 4.47, *p* < .001) were both significantly positively related to BD, altogether explaining 23% of the variance of BD. Second, BD significantly predicted DECB (*coefficient* = 0.379, *SE* = 0.062, z=6.06, *p* < .001), thereby explaining 33% of its variance (= total effect, path *c*). In order to test whether TSF and Nonacceptance mediated this relationship, we set up the indirect effects of BD on DECB via these two mediators. TSF thereby partially mediated the relationship between BD and DECB (indirect effect *a1*b1* = 0.125, SE=0.041, z=3.03, p=.002), whereas Nonacceptance did not (*a2*b2* = –0.016, SE=0.031, z=–0.52, p=.603). The explained variance of DECB in this mediation model was 41%. Since the direct effect of BD on DECB was still significant (*c'*=0.270, SE=0.083, z=3.27, p= .001) when accounting for both mediators, TSF can be considered a partial mediator, explaining 33% (=0.125/0.379) of the total effect.

Insert Table 3 here

Insert Figure 2 here

DISCUSSION

Despite the relatively low prevalence of eating disorders in men (e.g., Hudson et al., 2007; Preti et al., 2009; Schnyder et al., 2012), symptoms of disordered eating on a subclinical level (e.g., Dominé et al., 2009) and most notably BD among men are quite frequent (e.g., Fiske et al., 2014). While 14.6% of the male participants in our study scored with .96 or higher on the DECB scale, comprising restrained eating, binge-eating, as well as excessive exercising, self-induced vomiting, and the use of laxatives according to the self-report questionnaire EDE-Q, only 2.4% of the participants exhibited clinical symptoms of eating disorders based on the EDE-Q cut-off values (Lavender, De Young, & Anderson, 2010). However, we assume that men with subclinical symptoms of disordered eating and related compensatory behavior, as assessed with the variable DECB, constitute a potential risk group for developing clinically relevant eating disorders.

In an attempt to investigate the underlying components in the relationship between BD and eating pathology, we proposed a model of disturbed eating behavior in men. According to this model, we expected both BMI and social pressure to conform to beauty ideals to predict BD. In line with our expectations and with previous findings (e.g., Paxton et al., 2006; Watkins et al., 2008), the path analysis revealed that BMI was positively related to BD. Thus, a higher BMI prompted a more intense dissatisfaction with body appearance in our sample. This may reflect the latest trend of ideal male body image characterized by a thin, slender and lean figure (Conway, 2013). As neither body fat nor muscularity were directly assessed in our study, the question whether BD is related to a greater or lower proportion of body fat, and/or muscles in men remains to be investigated. Previous studies have shown that BMI may be positively related to BD and disturbed eating, as our results confirm, but on the other hand, BMI may also be negatively related to muscle dissatisfaction and shape concerns (e.g., Tylka, 2011). Further studies should take into account this bidirectional association and differentiate between these two dimensions regarding BMI. We further cannot rule out that self-reported BMI in our sample is less accurate than measured BMI estimates (Drake, 2013). Nevertheless according to Markey & Markey (2005) it can be argued, that the subjective feeling of

enhanced BMI rather than actual BMI influences dysfunctional eating and related compensatory behaviors, particularly in men. Men's experience of their own body as fat or lacking muscle definition may be caused by the increasing pressure to conform to unrealistic muscular and slender body ideals as disseminated in media and social networks (Adams, Turner, & Bucks, 2005). The results of our path analysis support this notion, as the perceived pressure to conform to an unattainable body ideal significantly predicted BD in our sample and thus might have become far more than a "women's issue". Men seem to equally experience this pressure from media and social networks while they are at the same time expected to be unconcerned about their appearance (Frith, 2004). Future research should investigate possible mechanisms underlying perceived pressure and BD such as social reinforcement (acceptance by peers and family members) and internalization of the current ideal male body image (Thompson & Stice, 2001). Altogether, both BMI and Pressure explained a substantial amount (23%) of the variance of BD in our sample. Additional variables such as depressive symptoms, anxiety, experience of violence, age, perfectionism, and insecure attachment style are assumed to further influence BD in men (e.g., Dominé et al., 2009; Tiggemann, 1992), and should therefore be considered in consecutive studies.

According to our model of disturbed eating behavior in men, we further expected to find a positive relationship between BD and disturbed eating which was mediated by nonacceptance of emotional responses, and by cognitive distortions regarding one's own body perception. As for the variable (DECB), we deliberately excluded EDE-Q items regarding shape and weight concern with the aim to avoid a conceptual overlap between the two variables BD and DECB.

As expected, BD was a positive predictor of DECB in the path model. More importantly and in accordance with the model of disturbed eating behavior in men, we found a partial mediation effect of cognitive distortions (TSF) in the relationship between BD and DECB, which has been investigated in our study for the first time with men. TSF describes a cognitive process in which thoughts about eating fattening foods, not exercising or breaking up a diet lead to negative feelings regarding one's own body (e.g., weight gain). We demonstrated that the susceptibility to TSF was related to negative

body image and eating disorder pathology not only in women (Shafran et al., 1999), but also in men. It has been shown in women that e.g., the experience of feeling fatter, can be induced by the exposure to food items (e.g., Coelho et al., 2008) as well as by the exposure to thin-ideals in a laboratory setting (Wyssen, Coelho, Wilhelm, Zimmermann, & Munsch, submitted). The fact that cognitive distortions such as TSF may elicit similar phenomenon, is crucial, as they are likely to be induced daily by repeated exposure to fattening foods or body-ideals and as they relate to behavioral consequences, e.g., to the urge to diet or to repeated body checking. Nevertheless, these assumptions have to be tested in both sexes preferably using a longitudinal design to examine whether negative body image affects susceptibility to TSF and if TSF in turn affects disturbed eating behavior.

Although nonacceptance of emotional responses correlated with BD, it did not mediate the relationship between BD and DECB. This may partly be attributed to men's tendency to engage in automatic and non-conscious emotion regulation processes, which we were not able to assess by self-report measure such as the DERS (Nolen-Hoeksema, 2012). Future studies should therefore adopt a multi-method approach and include implicit measures or psychophysiological correlates of emotion regulation processes.

To conclude, our model of disturbed eating behavior in men was mostly confirmed in a community-based sample of healthy young men. Whereas BMI and social pressure were positively related to BD, BD was shown to be a positive predictor of DECB. Unlike Nonacceptance, TSF proved to partially mediate the relationship between BD and DECB. Since the present sample predominantly consists of young men with symptoms of disturbed eating on a subclinical level, we conclude that TSF represents a cognitive vulnerability that needs to be taken into account when describing the role of BD in young men at risk for development of disordered eating behavior.

The present study has several limitations that warrant attention. For instance, the sexual orientation of men in our sample was not assessed. Evidence shows that homosexual compared to heterosexual male adolescents and young adults tend to be more dissatisfied with their appearance (e.g.,

Jankowski, 2014). In a subsequent study, it should therefore be investigated, whether the coefficients in our path model differ depending on sexual orientation. Another drawback of this study is the use of questionnaires originally developed for women and then adapted for men (such as the BSQ), as they focus on the drive for thinness and possibly neglect specific male concerns about losing body fat and gaining muscles (e.g., McCreary, 2004; Tylka, Bergeron, & Schwartz, 2005). The present sample does not represent the general Swiss population, as it predominantly consists of young students of Swiss and German nationality, which may explain the somewhat lower prevalence of BD in our male sample (11.4%) compared to that reported by Narring and colleagues (2002) in a representative sample of young men (aged 16-20 years) in Switzerland (17.5%). The disparity, however, might also be accounted for by the distinctly younger sample, as well as the unstandardized assessment of BD in the study by Narring et al. (2002). Furthermore, the present sample exhibited lower scores on all scales of the EDE-Q, when compared to those reported by Lavender et al. (2010). This difference might be explained by the lower average BMI in our sample compared to that found in the study by Lavender and colleagues (2010), since overweight or obese male college students were shown to display significantly more body image concerns than normal- and underweight students (Watkins et al., 2008). Additionally, the difference in BMI might be accounted for by ethnic differences, since it is known that eating disorders are slightly less frequent in European countries (Preti et al., 2009) than in the US (Hudson et al., 2007). All men in our sample were of Caucasian ethnicity, compared to only 68% in the sample of Lavender et al. (2010). Moreover, men who prematurely terminated participation in our study reported significantly higher levels of shape concern and general symptoms of disordered eating, which may have caused an underestimation of BD and DECB in the present sample. Nevertheless, compared to other online-studies, the dropout rate of 12.8% in our study is relatively low (e.g., Jankowski, 2014). We therefore conclude that our results may well add knowledge to the moderately disturbed eating behavior of otherwise healthy young men at risk for developing eating disorders, though it remains to be investigated whether these findings are replicable for men in clinical populations.

Our results could complement evidence-based prevention programs in full or sub-threshold eating disorders in men. It would be worth investigating whether prevention modules incorporating training of resistance to the perceived socio-cultural pressure, or identifying and restructuring cognitive distortions such as TSF enhances prevention efforts.

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TABLES AND FIGURES

FIGURE 1: THE MODEL OF DISTURBED EATING IN MEN. BMI and social pressure both predict body dissatisfaction which in turn predicts disturbed eating and compensatory behavior, either directly or indirectly via nonacceptance of emotional responses and cognitive distortions.

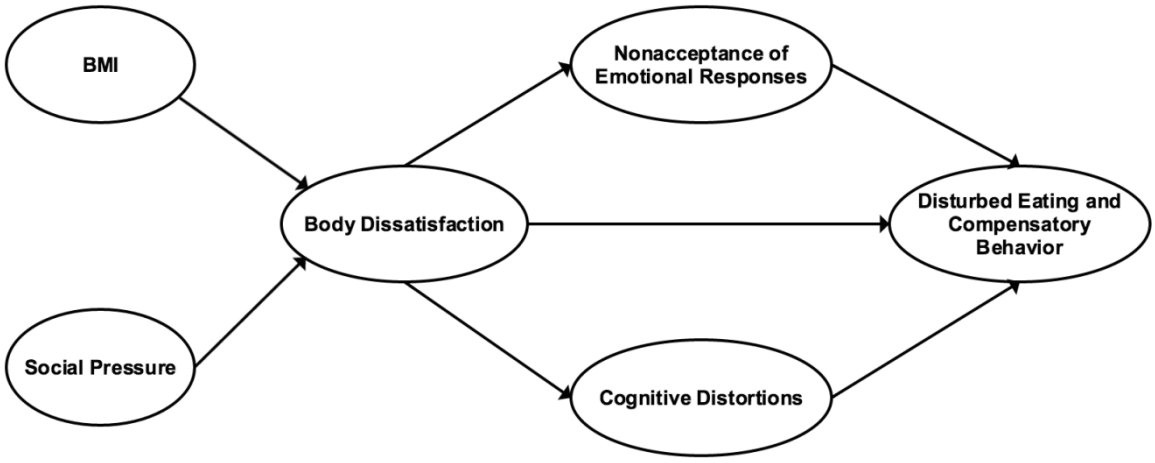


TABLE 1. DESCRIPTIVE STATISTICS. Range, means, standard deviations, and clinical cut-off for all variables involved in the study.

Variable	Range	Mean	SD	Cut-off
Age	18–37	23.75	3.17	-
BMI	18.22–41.58	23.27	3.05	18.5<x>25[1]
EDE-Q restraint eating	0–5.60	0.57	0.97	>2.23[2]
EDE-Q shape concern	0–5.38	0.85	0.88	>2.97[2]
EDE-Q weight concern	0–3.60	0.17	0.43	>2.56[2]
EDE-Q eating concern	0–2.80	0.26	0.50	>1.20[2]
EDE-Q global	0-3.91	0.53	0.63	>2.09[2]
EDE-Q DECB	0–4.22	0.35	0.61	-
BSQ short	8–39	12.85	6.02	>18.00[3]
DERS nonacceptance	6–30	13.24	5.50	>15.74[4]
DERS global	37–141	78.50	20.43	>99.45[4]
SATAQ-G pressure	5–23	10.76	4.86	>12.79[5]
SATAQ-G global	16–70	40.36	11.83	>47.95[5]
TSF trait concept	0–28	2.99	5.49	-

Note: 1) Normal weight according to the World Health Organization (WHO); 2) Mean plus one standard deviation (Lavender, De Young, & Anderson, 2010); 3) cut-off according to (Evans & Dolan, 1993); 4) Mean plus one standard deviation (Gratz & Roemer, 2004); 5) Mean plus one standard deviation (Knauss et al., 2009).

TABLE 2. PEARSON CORRELATION MATRIX. The matrix includes the following variables: body mass index (BMI), disturbed eating and compensatory behavior (DECB), body dissatisfaction (BD), nonacceptance of emotional responses (Nonacceptance), cognitive distortions (TSF) and pressure to conform body ideals (Pressure).

Variable	1	2	3	4	5	6
1. BMI	–	.204*	.288**	–.060	.122	–.116
2. DECB		–	.566***	.321***	.578***	.098
3. BD			–	.526***	.656***	.259**
4. Nonacceptance				–	.475***	.246**
5. TSF					–	.154
6. Pressure						–

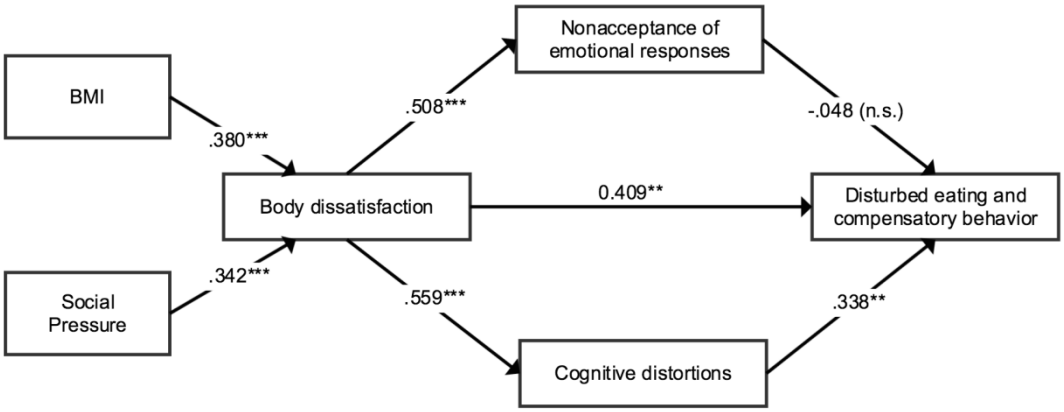
Note: * = $p < .05$; ** = $p < .01$; *** = $p < .001$, two-tailed.

TABLE 3. RESULTS OF THE PATH ANALYSIS testing the coefficients of the proposed Model of Disturbed Eating in Men. Regression coefficients (including standard errors) are all unstandardized. N=123

Outcome	Predictor[1]/Mediator[2]	Path	Parameter Estimate	SE
BD	BMI[1]		1.134***	0.225
	Pressure[1]		0.257***	0.058
TSF	BD[1]	*a1*	1.478***	0.230
Nonacceptance	BD[1]	*a2*	7.737***	1.415
DECB	TSF[2]	*b1*	0.084**	0.026
	Nonacceptance[2]	*b2*	-0.002n.s.	0.004
	BD (direct effect)[1]	*c'*	0.270**	0.060
	BD (indirect effect)[1]	*c*	0.379***	0.062

Note: $\chi^2(6) = 11.709$, $p < .069$; CFI = .968; TLI= .926; RMSEA = .088n.s.; *** = $p<.001$; n.s. = non-significant.

FIGURE 2: PATH ANALYSIS of the model of disturbed eating behavior in men. Coefficients are all standardized.



Note: The values above arrows indicate standardized parameter estimates. n.s.= non-significant; **p<.01, ***p<.001.

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Wyssen, A., Coelho, J. S., Wilhelm, P., Zimmermann, G., & Munsch, S. (submitted). Thought-shape fusion in young healthy females appears after vivid imagination of thin ideals.

Appendix

C) Publication 3

Thought-shape fusion in young healthy females appears after vivid imagination of thin ideals

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ABSTRACT (310 words)

Objective

It has been shown that exposure to female thin ideals in media has minimal to moderate effects on body image satisfaction (BIS), mood and dysfunctional eating in healthy young women. Preexisting body concerns, thin-ideal internalization and social comparison processes have been described as decisive regarding the possible negative impact. In line with these findings, the hypothesis of the present study include that not the media exposure alone but the subsequent cognitive processing (i.e., imagination of thin ideals) is crucial. The intention was to instruct vivid imagination of thin ideals after exposure to a fashion magazine and to assess the extent of changes in mood and BIS as well as resulting shape-related cognitive distortions (Thought-Shape Fusion Body, TSF-B). Additionally, it was examined whether participants with more pronounced eating disorder (ED) pathology experience a stronger effect.

Method

A total of 91 healthy women (mean age 21.9 years, *SD*=2.0) were exposed to either a fashion magazine (thin-ideal group) or a nature magazine (control group) in a waiting room design. Afterwards they were instructed to a vivid imagination of thin ideals respectively landscapes. Changes in mood and BIS as well as correlates of cognitive distortions (TSF-B) were assessed.

Results

In the thin-ideal group a significant decrease in mood and BIS was evident after vividly imagining thin ideals promoted via fashion magazines, but not after mere magazine exposure. Additionally, participants revealed indicators of cognitive distortions (TSF-B) such as feeling fatter after imagining thin ideals. A higher degree of ED pathology amplified this effect.

Discussion

This study showed that vivid imagination of thin ideals following a magazine exposure results in in decrease in mood and BIS and moreover in shape-related cognitive distortions (TSF-B), especially in healthy women with symptoms of disordered eating. The susceptibility to experience TSF-B,

triggered daily by repeated thin-ideal exposure, might relate to body dissatisfaction and dysfunctional eating and body related behavior, such as restraint eating.

Keywords (6): media exposure, thought-shape fusion, cognitive distortion, women, eating behavior, thin ideal

Thought-shape fusion in young healthy females appears after vivid imagination of thin ideals

INTRODUCTION

Mass media provide daily, multiple messages about attractiveness, ideal body weight and shape, self-control, and about food and weight management. Trying to achieve an ideal body represents a constant challenge especially for young women. As a consequence, feeling negatively about one's appearance, and having a dysfunctional attitude towards one's body, has become a *normative discontent* (for an overview see Grogan, 2008; Tiggemann, 2002). Up to 72% of women in representative population-based samples reported substantial body dissatisfaction respectively the experience of a self-ideal discrepancy in comparison with thin ideals (Fiske, Fallon, Blissmer, & Redding, 2014). Results from a large international study corroborated the high frequency of body dissatisfaction and a drive for thinness in young women and revealed that exposure to different sources of western media (television, movies, magazines, and music) predicted the extent of body dissatisfaction and the preference of a very thin beauty ideal (Swami et al., 2010). A meta-analytic overview of cross-sectional studies, assessing media exposure in terms of reading fashion magazines and watching television, implies that media consumption is positively correlated with body dissatisfaction and dysfunctional eating (Levine & Murnen, 2009). In their systematic review including cross-sectional, experimental and longitudinal studies, López-Guimerà and colleagues (2010) acknowledged mass media as a risk factor for body dissatisfaction and disordered eating behavior. Especially women with more pronounced body dissatisfaction are vulnerable, since these women tend to be more likely to consume media (such as fashion magazines) and to engage in upward social comparison and thus are more prone to experience self-ideal discrepancy. Despite the agreement that thin-ideal exposure is important in the development of body dissatisfaction, a direct association is unlikely and different intermediary variables such as preexisting body dissatisfaction and cognitive processes such as thin-ideal internalization are crucial (Hausenblas et al., 2013; López-Guimerà et al., 2010). In this line, in a current meta-analysis, including 204 experimental, correlational and

longitudinal studies, the effect of thin ideals on women's body dissatisfaction and eating disorder (ED) symptomatology have been found to be marginal. However especially when assessed in laboratory studies, women with preexisting body dissatisfaction seemed to experience a stronger negative effect (Ferguson, 2013).

Body dissatisfaction in young women is importantly related to ED pathology. High levels of body dissatisfaction has been described as the strongest predictor of the risk for onset of any ED symptoms: in a prospective study with adolescent girls, 24% of those with high body dissatisfaction showed symptoms of disordered eating eight years later versus 6% of those with low body dissatisfaction (Stice, Marti, & Durant, 2011). Related to possible longer-term consequences of repeated media exposure it has been found that in female adolescents, immediate negative consequences after a short exposure to thin ideal related television commercials predicted body dissatisfaction and drive for thinness two years later (even when initial body dissatisfaction was controlled). It may be assumed that the immediate responsiveness to a brief media exposure in the laboratory represents a marker for the susceptibility to the negative influence of thin ideals in media. Cumulative experiences may contribute to a negative body image and further ED pathology symptoms (Hargreaves & Tiggemann, 2003).

As a consequence, it is necessary to better understand the influence of thin ideals transported via media on body dissatisfaction, mood and the development of disordered eating in young women. According to a cognitive-behavioral model of disordered eating behavior (Fairburn, Cooper, & Shafran, 2003; Radomsky, De Silva, Todd, Treasure, & Murphy, 2002; Stice et al., 2011) in certain young women, media exposure leads to the experience of a discrepancy between self and ideal body image (Higgins, 1987) followed by negative emotions, dysfunctional behaviors and depreciative cognitions (Myers & Crowther, 2009; Tiggemann & McGill, 2004). This discrepancy is influenced by cognitive factors such as the tendency to internalize thin ideals (Dittmar, Halliwell, & Stirling, 2009; Dittmar & Howard, 2004), or the activation of appearance related cognitions (Ridolfi, Myers, Crowther, & Ciesla, 2011). Cognitive distortions, defined as inaccurate tendencies in information

processing play an important role in the maintenance of mental disorders, e.g. in panic or depressive disorders and also in EDs. As such weight and shape concerns represent core features of ED pathology and a target of evidence based treatment of EDs (Cooper & Fairburn, 1992; Fairburn, 1981). In the present study, we additionally assume that when exposed to thin ideals, specific shape-related cognitive distortions will be triggered.

The original food-related phenomenon of *Thought-Shape Fusion* (TSF) was developed according to the *Thought-Action Fusion* (TAF) paradigm in individuals with obsessional compulsive disorders (OCDs) (Shafran, Thordarson, & Rachman, 1996) and has been shown to be an important cognitive distortion in EDs (e.g., Coelho, Baeyens, Purdon, Pitet, & Bouvard, 2012; Coelho, Carter, McFarlane, & Polivy, 2008; Shafran & Robinson, 2004; Shafran, Teachman, Kerry, & Rachman, 1999). The food-related TSF concept includes the irrational believe that merely thinking about eating forbidden foods leads to a higher probability of weight gain or change in shape *(Likelihood TSF)*, the experience of pronounced feelings of fatness following thoughts about forbidden foods *(Feeling TSF)*, and the perception that thinking of forbidden foods is morally wrong *(Moral TSF)*. These irrational beliefs persist, even while individuals are aware of the unrealistic nature of the assumption that eating food actually might influence body shape and weight (Shafran & Robinson, 2004; Shafran et al., 1999). The susceptibility to TSF has been shown to be strongly related to the severity of ED symptoms and measures of general psychopathology in healthy women (Shafran et al., 1999) and patients with EDs (Shafran & Robinson, 2004). It has been demonstrated that TSF can be induced by the vivid imagination of fattening/ forbidden foods or weight gain in healthy undergraduate students (Coelho, Roefs, & Jansen, 2010) and even more in patients with EDs (Coelho, Baeyens, et al., 2012; Coelho et al., 2008) in the laboratory. The induction of TSF is further related with the urge to engage in restraint eating and body checking (Shafran et al., 1999).

Based on literature, we assume that not only food items but also the exposition to thin ideals and their vivid imagination can induce cognitive distortions in young women, leading to impaired mood, BIS and further disturbed eating behavior.

In other words, we investigated for the first time, whether correlates of TSF are activated after a short exposure with a fashion magazine in a waiting room design and the subsequent imagination of the seen thin ideals. Based on literature (Ferguson, 2013; López-Guimerà et al., 2010) we expect minimal effects of the mere exposure to thin ideals in magazines, but a more pronounced influence of the vivid imagination. Concretely, we expect that *Thought-Shape Fusion Body* (TSF-B) is triggered after vivid imagination of thin ideals and increases feelings of fatness, fear of gaining weight or of moral wrong-doing increases as well as the urge to engage in restraint eating. We further assume that after vivid imagination of thin ideals, mood and BIS decreases. We adapted the original TSF induction procedure (Radomsky et al., 2002) and replaced food stimuli by the imagination of female thin ideals. According to the literature (Ferguson, 2013; López-Guimerà et al., 2010), these effects were supposed to be more pronounced in individuals characterized by preexisting more pronounced ED symptoms. In addition we tested whether body mass index (BMI) moderated the effect, since it has been repeatedly confirmed that a higher BMI in women, negatively influences BIS (e.g., Stice & Whitenton, 2002).

METHOD

Participants

A total of 91 healthy German-speaking female students (mean age 21.9 years, *SD*=2.0) were recruited to participate in this study. Recruitment of the participants took place at the University of Fribourg, Switzerland. Inclusion criteria were: age between 18 to 35 years, availability for participation in the study; and sufficient German language skills. Exclusion criteria were past or present mental disorders according to the DIPS (telephone interview, Schneider & Margraf, 2011), pregnancy and serious medical conditions affecting eating and mood. No participants had to be excluded. All participants were bachelor or master students at the University of Fribourg and had at least secondary school level. 39.6% of the participants were Swiss, 52.7% were German, and 7.7% had another nationality.

Procedure

This study is part of a multi-center study on the impact of cognitive distortion and media exposure in young healthy women compared to groups of women suffering from EDs or other mental disorders. For a detailed description of the overall study protocol see (Munsch, 2014). Data collection was threefold and included informed consent and assessment of baseline measures (week 1), completion of diagnostic interviews (week 2), and the laboratory assessment (week 3).

Participants were randomly assigned to either the thin-ideal group (i.e., exposure to a fashion magazine representing the thin ideal and subsequent vivid imagination of the seen female bodies) or the control group (i.e., exposure to a nature magazine and subsequent vivid imagination of landscapes) during the experiment. The experiment was an adapted version of the original waiting room design of Turner and colleagues (1997). At the beginning of the experiment, participants were asked to fill in self-report measures of BIS and mood (*pre magazine exposure; T1)*. The participants were asked to leave all personal belongings (mobile phone, books, etc.) in the first room and were guided into a standardized waiting room. The waiting room consisted of chairs and a table. In accordance with Turner et al. (1997) the participants were asked to wait while physiological measures were taken (not considered in this publication). The experimenter left the waiting room and returned three minutes later with one magazine. Participants were explicitly told that they should have a close look at the pictures in the magazine while waiting. The experimenter put the magazine on the table in front of the participant and left the room for another ten minutes. The magazine was either a beauty magazine (spring edition of Vogue, 2/2012, for thin-ideal group) or a carefully chosen magazine with neutral stimuli (National Geographic, Collector's Edition 15/2012, for control group). We ensured that the control magazine contained as few images as possible picturing people (and if so, not representing the female thin ideal). No other reading materials or pictures were available in the waiting room. After ten minutes, participants were asked to return to the first room and to complete measures of BIS, and mood (*post magazine exposure; T2*).

Thereafter an 8-minute nature film[21] was shown followed by a third assessment of current BIS and mood (*pre imagination, T3*). Next, *vivid imagination* was guided following the procedure of Radomsky et al. (2002), Shafran et al. (1999) and Coelho et al. (2008). Participants in the thin-ideal exposure group were asked to remember actively the thin female bodies in the magazine, which they considered to be most attractive and to imagine them in vivid detail during five minutes (Coelho et al., 2008). In the control group they imagined landscape pictures that they liked most. In accordance with Coelho et al. (2008), participants were then instructed to write down the sentence: "I am imagining…" (describing the female body or the landscape respectively they are imaging). Afterwards, participants again completed questions about their current BIS and mood (*post imagination; T4*). In addition, participants completed a questionnaire to assess current shape-related cognitive distortions (TSF-B). Finally height and weight were measured. Participants were asked not to disclose the purpose of the study to other participants. Participants were debriefed and compensated after the ending of data assessment. The local human ethics committees of the department of psychology as well as of the canton Fribourg approved the study protocol.

Measures

Diagnostic interviews to exclude mental disorders: The DIPS (Diagnostisches Interview für psychische Störungen) is a structured diagnostic interview based on DSM-IV-TR (Schneider & Margraf, 2011) to assess mental disorders. The retest-reliability ranges from .35 to .94 (Cohen's kappa) and the interrater reliability from .57 to .92 (Schneider & Margraf, 2011). As the DIPS does not assess Body Dysmorphic Disorder (BDD), we used SCID-I modules for BDD, a well-established structured interview to assess mental disorders on Axis I according to DSM-IV-TR (SCID I; Wittchen, Zaudig, & Fydrich, 1997). The interview was conducted by telephone. The validity of telephone-based interviews is comparable to face-to-face interviews when screening for diagnoses (Rohde, Lewinsohn, & Seeley, 2014).

[21] In a pre-test (N = 45 healthy participants) no effect of the film on "serenity" and "seriousness" ($p > .33$), except a slight reduction of "bad mood" ($p < .01$).

Body mass index (BMI): Weight and height were measured on an electronic balance scale (Seca) and by a stadiometer (Seca) with participants wearing everyday clothing without shoes. Body Mass Index (BMI) was calculated as weight in kilograms divided by the square of height in meters (kg/m^2).

Eating disorder pathology: The Eating Disorder Examination Questionnaire (EDE-Q; German version by Hilbert & Tuschen-Caffier, 2006), is a self-report version of the Eating Disorder Examination (EDE; Fairburn et al., 2003) assessing ED behaviors and symptoms during the past 28 days. It consists of 28-items; 22 items address attitudinal aspects of ED pathology. These items are rated on a scale from 0 to 6 and can be summarized into a global score as well as four subscales: restraint eating, eating concern, shape concern and weight concern. Among six additional items, the frequency of key ED behaviors (e.g., episodes of binge-eating during the past 28 days) is assessed. The EDE-Q has good psychometric properties and is suitable to detect symptoms of EDs in individuals of the general population (Mond, Hay, Rodgers, Owen, & Beumont, 2004). Cronbach's alpha of the German version ranges from .85 to .97 (Hilbert, Tuschen-Caffier, Karwautz, Niederhofer, & Munsch, 2007). In the present sample the values were between .75 and .91.

Measures during the experiment: BIS, mood and cognitive distortions:

The *Visual Analog Scale Body Image Satisfaction* (VAS-BIS) is a 7-item scale developed to assess the changes in BIS during the experiment (Wyssen & Munsch, unpublished, available from the authors). Participants rated each item on a 100-mm visual analog scale (VAS) (0 not at all to 100 completely). The scale contains questions such as: "How much are you worrying about your appearance at the moment?" Other items focused on how comfortable the participants feel in their body at the present moment, if they are satisfied with their body shape and weight, and if they have the desire to control or change their body shape. A total score based on the average of the seven items was obtained. Cronbach's alpha computed separately for each of the four measures during the experiment was between .89 and .92.

The *Brief Mood Scale* (BMS) is a modified version of a brief three dimensional mood scale that assesses valence, calmness, and energetic arousal with bipolar items and is highly sensitive to

capture changes in mood states over time (Wilhelm & Schoebi, 2007). An extended version with four items to measure valence and four items to measure calmness was used in this experiment. Responses were given on a 100-mm VAS (0-100). As valence and calmness were highly correlated (r = .49 and r = .77), we collapsed them into a common scale that captures the pleasant- and relaxedness of the current mood state with eight items. Cronbach's alpha computed separately for each of the four measures during the experiment was between .88 and .95.

The *Thought-shape Fusion Body State Scale* (TSF-B state) is a 5-item questionnaire assessing body-related cognitive distortions. The scale was adapted and shortened from the original version from Radomsky et al. (2002) and Coelho et al. (2008). Items were translated from English to German and back and they were adapted to refer to thin-ideal exposure (Wyssen & Munsch, unpublished, available from the authors). The final scale resulted in five items, assessing participant's response to the vivid imagination of thin ideals. The items include ratings of the likelihood of weight gain, extent to which they felt fatter, urges to restrict food intake, the extent of moral wrongdoing and the desire to reduce the effects of imagining the pictures in the magazines. For detailed information on concrete items, please refer to the appendix 1. Participants rated each item on a 100-mm VAS scale (0 not at all to 100 completely). Cronbach's alpha for this measure was .86.

Statistical analysis

Data were analyzed with SPSS 22. To test whether changes in a) mood and b) BIS across the experiment were different for the two experimental groups we computed a two-factorial (2*4) repeated measures ANOVA with the within subject factor *time* of measurement (T1 to T4) and the between subject factor *experimental conditions* (control group: exposure to and imagination of landscapes vs. thin-ideal group: exposure to and imagination of thin ideals). To qualify the time point related to group differences, we computed two parallel series of multiple regression models.

We predicted mood and BIS after vivid imagination (T4) with mood respectively BIS before imagination (T3) and tested in a second step, whether experimental condition (dummy coded: 0 = control group, 1 = thin-ideal group) explained additional variance. To test whether TSF-B state at T4

(this variable was only assessed after imagination) differed between the two groups we applied a Mann-Withney-U-Test, because this variable was severely skewed. For the moderator analyzes described below we normalized the variable by adding + 0.1 and then computed the natural logarithm.

To test, whether participants' BMI moderates the effect of the experimental condition after imagination, we extended the last regression model. In a third step, we entered the linear and the squared component of BMI (mean centered) as further predictors. Including the squared component of BMI into the equation, takes into account that effects might be different for participants who are farer away from the normal weight range. In a final step we tested whether participants' BMI moderates the effect of the experimental condition, by entering the interaction between experimental condition and the linear and squared BMI. We proceeded in the same way to test whether ED pathology moderates the effect of experimental condition after imagination. We entered the normalized and centered EDE-Q-total score (natural logarithm of (total EDE-Q score + 0.5) - 0.23) in a third step and its interaction effect with experimental condition in a last step into the regression model above.

Due to an administrative error, responses of five participants were not recorded at T1. Assuming that non recorded data were missing at random, we used multiple imputation to estimate those missing data (Hayati Rezvan, Lee, & Simpson, 2015; Mackinnon, 2010). We used the fully conditional specification (FCS) procedure (SPSS 22), which is based on an iterative Markov chain Monte Carlo (MCMC) method. Inspecting the plots of the FCS iteration history 10 iterations were sufficient to achieve stable estimates for each of the 20 imputed data sets generated by the program. None of the estimated values was above the maximum or below the minimum of the original data. Statistical analyses described above were then conducted separately for each of the 20 imputed data sets and the original data with listwise missing.[22]

[22] SPSS provides results pooled across imputed samples for means and regression coefficients, corresponding standard errors and t-tests but not for F-tests and the corresponding effect sizes (ηp^2 or R^2-change). As the method of van Ginkel & Kroonenberg (2014) to pool F-tests across imputed datasets this method does not take adjustments due to the violation of the sphericity assumptions into account, we report the median of test results of the analyses of variance (*F*-values, Huynh-Feldt adjusted df, ηp^2) and the regression models (R^2-change,

We conducted an priori power analyses with G*Power 3.1.7 (Faul, Erdfelder, Buchner, & Lang, 2009), to consider power (.80) in order to detect reasonably large effects. For the repeated measures analysis of variance power was sufficient to detect medium between subject effects (f = 0.26), and already small within subject and interaction effects (f = 0.10), when a correlation between repeated measures of rho .7 was assumed and alpha was fixed to .05. Regarding multiple regression analyses, power was sufficient (.80, alpha .05), to detect moderate to large increases in the remaining variance, when a single predictor was added to the equation (f^2 = 0.09).

RESULTS

Participant characteristics

Participating women were between 18-30 years old (*M* = 21.9, *SD*=2.0). Mean BMI based on measured body weight and height was 21.7 (*SD*=2.4), ranging from 16.8 to 30.0. According to the World Health Organization (WHO, 2000) definition, 6.6% of the participants were underweight (BMI < 18.5) and 5.5% were overweight (BMI > 25). The mean EDE-Q global score was 0.92 (*SD*=0.74). 2.2% of the participants showed a value over 2.66 on this scale, which refers to elevated ED symptoms (Hilbert et al., 2007) (see table 1). The participants in the thin ideal and the control group did not significantly differ on any these variables nor on mood and BIS at T1 (see table 2).

Effects of experimental conditions on current mood and BIS

ANOVA analysis on mood and BIS trajectories revealed no significant main effect of experimental condition, but a large and significant main effect of time, and a moderate and significant interaction effect of time by condition. Mood and BIS equally improved in both groups until before imagination (T3). While from T3 to T4 mood and BIS further improved in the control group it decreased as expected in participants who imagined thin ideals (refer to figure 1 for detailed results of the repeated measure ANOVA). Means of mood over the course of the experiment are displayed in

corresponding *F*-values) for the 20 imputed samples and any of the 20 imputed data or original data in case tests suggest a different interpretation - which was only once the case

figure 1. More focused statistical tests with multiple linear regression analyses confirmed the results of the ANOVA analysis.

Effects of vivid imagination on current mood and BIS as well as on shape-related cognitive distortions (TSF-B)

In line with our expectations, significant changes in the dependent variables were observable after vivid imagination but not after mere magazine exposure[23] and only after imagining thin ideals but not landscapes.

The Mann-Whitney-U-test revealed that TSF-B assessed after imagination was significantly higher (U = 475.50, $p < .001$) in the thin-ideal group (M = 16.80, SD = 18.53, $Median$ = 10.10) than in the control group (M = 3.76, SD = 7.02, $Median$ = 1.40). The activation of cognitive distortions was accompanied by a decrease in mood and BIS: Mood before imagination (T3) explained 53% of the variation in mood after imagination (T4; $F_{(1,\ 89)}$ = 100.78, $p < .001$) and experimental condition explained further 10% ($F_{(1\ 88)}$ = 23.67, $p < .001$). The regression coefficient of experimental condition was B = -9.80 (SE = 2.02, β = -.32, $p < .001$). Mood of participants who imagined thin ideals seen after magazine exposure decreased significantly compared to mood of participants who imagined landscapes. Similarly, BIS before imagination (T3) explained a larger amount of variation in BIS after imagination (T4) (R^2_{Change} = .818, $F_{(1,\ 89)}$ = 398.78, $p < .001$), but the additional effect of experimental condition - although highly significant - was rather small (R^2_{Change} = .025, $F_{(1\ 88)}$ = 14.28, $p < .001$). The regression coefficient of experimental condition (B = -5.18, SE = 1.43, β = -.16, $p < .001$) indicates that, compared to participants who imagined landscapes, BIS of participants who imagined thin ideals decreased.

ED Pathology and BMI as moderating variables

We expected that negative effects of the imagination of thin ideals to be larger for those women with higher ED pathology. In the normalized TSF-B score, ED symptoms explained a moderate amount of additional variance after accounting for the experimental condition (R^2_{Change} = .129, $F_{(1,\ 88)}$ =

[23] Experimental condition had neither an effect on mood ($R^2_{\text{Change}} < .001$, $F_{(1,\ 88)} = 0.02$, $p = .897$) nor BIS ($R^2_{\text{Change}} < .001$, $F_{(1,\ 88)} = 0.49$, $p = .487$) after magazine exposure, when mood ($R^2_{\text{Change}} = .561$, $F_{(1,\ 89)} = 113.79$, $p < .001$) or BIS ($R^2_{\text{Change}} = .914$, $F_{(1,\ 89)} = 947.19$, $p < .001$), before magazine exposure (T1) had been controlled in the first step.

17.52, $p < .001$) as did the product of the normalized EDE-Q with experimental condition ($R^2_{Change} = .067$, $F_{(1, 87)} = 10.09$, $p = .002$). Coefficients of the final moderator model were as follows: Constant: $B = 0.58$; $SE = 0.18$; experimental condition: $B = 1.48$, $SE = 0.25$, $\beta = .48$, $p < .001$; normalized EDE-Q: $B = 0.31$, $SE = 0.36$, $\beta = .10$, $p = .393$; interaction of experimental condition and normalized EDE-Q: $B = 1.61$, $SE = 0.51$, $\beta = .37$, $p = .002$). Figure 2 shows how EDE-Q raw scores moderate the effect of experimental condition on TSF-B state raw scores.

Regarding BIS after imagination, neither the normalized EDE-Q score explained additional variance ($R^2_{Change} = .002$, $F_{(1, 87)} = 1.04$, $p = .310$), nor it's interaction with experimental condition ($R^2_{Change} = .001$, $F_{(1, 86)} = 0.40$, $p = .529$). However, ED symptoms explained a small to moderate additional part of the variance in mood after imagination ($R^2_{Change} = .047$, $F_{(1, 87)} = 12.63$, $p = .001$) as did the product of the normalized EDE-Q with experimental condition ($R^2_{Change} = .049$, $F_{(1, 86)} = 15.30$, $p < .001$). Coefficients of the final moderator model were as follows: Constant: $B = 82.32$; $SE = 1.25$; Mood T3: $B = 0.81$; $SE = .07$, $\beta = .67$, $p < .001$; experimental condition: $B = -10.12$, $SE = 1.76$, $\beta = -.33$, $p < .001$; normalized EDE-Q: $B = .17$, $SE = 2.51$, $\beta = .01$, $p = .947$; interaction of experimental condition and normalized EDE-Q: $B = -13.93$, $SE = 3.56$, $\beta = -.31$, $p < .001$).

BMI and BMI^2 did not explain additional variance in mood after imagination, when mood before imagination and experimental condition were already controlled ($R^2_{Change} = .003$, $F_{(2, 86)} = 0.34$, $p = .710$). Neither did they explain additional variance in BIS ($R^2_{Change} = .006$, $F_{(2, 86)} = 1.59$, $p = .210$), nor in the normalized TSF-B state[24] ($R^2_{Change} = .004$, $F_{(2, 87)} = 0.25$, $p = .781$). In contrast to our expectation, there was no interaction effect of experimental condition with BMI and BMI^2 on mood ($R^2_{Change} < .001$, $F_{(2, 84)} = 0.02$, $p = .985$), BIS ($R^2_{Change} = .006$, $F_{(2, 84)} = 1.60$, $p = .196$), nor on TSF-B state ($R^2_{Change} = .045$, $F_{(2, 85)} = 2.66$, $p = .076$).

[24] Experimental condition, entered as the first predictor, explained 22 percent of the variation ($F_{(1, 89)} = 25.38$, $p < .001$).

DISCUSSION

The present study aimed at investigating whether vivid imagination of thin ideals after media exposure leads to activation of shape-related cognitive distortion such as TSF-B as well as a decrease in mood and BIS in healthy young women. Additionally we supposed that imagination of thin ideals leads to more pronounced effects in women with symptoms of disordered eating and in women with higher BMI (Ferguson, 2013; López-Guimerà et al., 2010; Stice & Whitenton, 2002).

In line with recent literature (Ferguson, 2013) also in our study, a short media exposure with a fashion magazine in a waiting room did not influence mood or BIS in young healthy women. This finding is in contrast to Turner and colleagues (1997), who reported decreased BIS, more preoccupation with the desire to be thin, and more fear of weight gain in 49 healthy undergraduate women after the exposure to fashion magazines compared to nature magazines. Our results much more indicate a continuous recovery during the stay in the laboratory, i.e. an increase in positive mood and thus no effect of media exposure in the waiting room. The divergent results of Turner and colleagues (1997) compared to ours may be due to different age ranges in the two studies or by the fact that increased availability of media nowadays resulted in a habituation in young healthy women. Additionally, they did not take into account BIS before media exposure.

As hypothesized, our results reveal that shape-related cognitive distortions (TSF-B) in terms of anticipation of weight gain, feeling fatter and perceive of moral wrong-doing were activated through vivid imagination of thin ideals seen in a magazine (but not after imagining landscapes). Moreover, self-reported urges to restrict food intake were evoked, possibly leading to ED relevant behavior. Yet, it has to be further investigated, whether, when and which behavioral consequences resulting from thin-ideal imagination occur. Accordingly, mood and BIS changed after the vivid imagination of thin ideals but not after mere media exposure. Participants, who were instructed to imagine thin ideals, experienced a significant decline in mood and BIS. By contrast, in participants imagining landscapes, mood and BIS values continued to improve. It can be concluded, that in our study, not the mere magazine exposure but the subsequent intensified imagination of thin ideals had negative effects.

Moreover, changes in mood and BIS occurring simultaneously with the activation of cognitive distortions after vivid imagination and thus seem to be related. However it remains open, whether cognitive distortions (TSF-B) mediate changes in mood and BIS or whether the chronology is rather vice versa.

Women characterized by more pronounced symptoms of disordered eating behavior were subject to a stronger decline in mood following vivid imagination of thin ideals, while no such effect was found BIS. Generally, our study revealed less pronounced effects for body image related self-report than for mood. This might be explained by the fact that unlikely to mood, BIS represents a relatively stable construct, not susceptible to an immediate change after imagining thin ideals. As assumed, women with more pronounced ED pathology, identified themselves more strongly with statements such as "I feel fatter after imagining the pictures from the magazine", according to the TSF-B state questionnaire. Both, TSF-B (imagination of thin ideals) as well as the original TSF (imagination of forbidden food), seem to be related to ED pathology (e.g., Coelho, Baeyens, et al., 2012). The activation of such cognitive distortions in young healthy women seems to depend on the degree of ED pathology. Interestingly, moderator analyses suggest that preexisting factors such as symptoms of ED pathology are more important regarding the negative impact on mood and TSF-B (see figure 2) than the experimental manipulation (which is in line with previous studies; for an overview see Ferguson, 2013): In participants imagining thin ideals mood was comparable to participants in the control group, when they did not report symptoms of ED pathology (EDE-Q raw scores < .25), but the values were significantly below mood of the control group when participants reported symptoms of ED pathology (EDE-Q raw scores = 1). This difference was even more pronounced for participants in the thin-ideal group with clinically relevant ED symptomatology (EDE-Q raw scores > 2.66; Hilbert et al., 2007).

In sum, repeated thin-ideal exposure in daily life (Hargreaves & Tiggemann, 2003) and the susceptibility to shape-related cognitive distortions may be relevant factors in respect of a negative effect in the long-term. Future longitudinal studies should investigate, whether the susceptibility to

TSF-B represents a risk factor for later ED development and whether interventions in order to modify TSF-B result in decreased ED symptoms in general and in a lower "risk" of ED development (Coelho et al., 2014).

BMI, did not moderate the influence of vivid thin-ideal imagination after media exposure. This may be explained by the characteristics of our sample consisting of healthy young females, most of them being normal or slightly underweight. Reevaluating the role of BMI in a larger sample of overweight, obese or underweight women could reveal differential responses to the confrontation with thin ideals. First results in respect of the original, food exposure related TSF indicate a more pronounced susceptibility in normal weight compared to overweight females (Coelho, Jansen, & Bouvard, 2012).

Our findings have to be interpreted by taking the following limitations into account. First, as we investigated a group of young healthy females, our findings cannot be generalized to samples with obesity, EDs or males. Secondly, we assessed BIS by a self-developed visual analogue scale (VAS-BIS). We therefore cannot rule out if impaired reliability or validity of our instrument and not the stability of the body image construct, prevented us from finding more pronounced BIS changes during the experiment. Thirdly, the study design was in favor of ecological validity, accepting limitations to internal validity. In other words, we only asked our participants, whether they looked at the magazines, but did not manipulate the duration or intensity of the exposure nor did we eye-track participants while looking at the pictures in the magazines. Finally, findings of this study rely exclusively on self-report. Behavioral observation measures such as monitoring body checking or eating behavior at home should be added.

Despite these limitations, the results of the present study revealed that the vivid imagination of thin ideals triggered cognitive distortions such as TSF-B. Thus, not only the imagination of food, but also of thin ideals relates to cognitive distortions. Regarding the decrease in mood and BIS, the results showed that not the mere exposure to a fashion magazine, but the subsequent imagination of the thin ideals has a negative impact. This suggests that the cognitive processing of daily exposure to thin ideals (such as imagining) is a potential key to the risk of ED symptoms and should be further

investigated. This is even more important, as cognitive distortion are known to be related to emotional and behavioral consequences e.g. in anxiety or depressive disorders (Beck, 1963) and might provoke negative mood, body dissatisfaction and dysfunctional eating behavior, especially in women characterized by a higher level of ED pathology. It might further be assumed, that similar processes occur when young women exchange their views and experiences on what they have seen in model casting shows or in fashion magazines in everyday situations. Using real-time assessment methods is a promising approach in order to achieve a more differentiated understanding of shape-related cognitive distortions such as TSF-B (Leahey, Crowther, & Ciesla, 2011). In sum, TSF-B could be a factor that ranks among other explanations for the stronger or lower susceptibility to the negative influence of thin ideals transmitted via media. A deeper understanding of such mechanisms would enable tailored prevention and treatment strategies.

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Jennifer Coelho moved to a new position during the course of this research. She is currently at the Provincial Specialized Eating Disorders Program for Children & Adolescents, BC Children's Hospital, Canada.

Appendix 1

Items of the Thought-shape Fusion Body State Scale (TSF-B):

Item 1

GE: Haben Sie das Gefühl, dass Sie an Gewicht zugenommen haben, nachdem Sie sich die Bilder aus der Zeitschrift vorgestellt haben?

EN: Do you experience a feeling of weight gain after imagining the pictures from the magazine?

Item 2

GE: Wie viel dicker fühlen Sie sich nachdem Sie sich die Bilder aus der Zeitschrift vorgestellt haben?

EN: How much fatter do you feel right now because of imagining the pictures from the magazine?

Item 3

GE: In welchem Ausmass war es moralisch anstössig, dass Sie sich die Bilder aus der Zeitschrift vorgestellt haben?

EN: How morally wrong was it to imagine the pictures from the magazine?

Item 4

GE: In welchem Ausmass haben Sie den Drang, die Auswirkungen, die sich durch das Vorstellen der Bilder aus den Zeitschriften ergeben haben, zu reduzieren oder rückgängig zu machen?

EN: To what extent do you have an urge to try to reduce or cancel the effects of imagining the pictures from the magazine?

Item 5

GE: In welchem Ausmass haben Sie im Moment den Drang, Ihre Nahrungsaufnahme einzuschränken (z.B. während der nächsten paar Stunden gar nichts zu essen/ zu fasten) weil Sie sich die Bilder aus der Zeitschrift vorgestellt haben?

EN: To what extent do you have an urge to restrict your food intake right now (e.g., to avoid eating for several hours) because of imagining the pictures from the magazine?

Notes: GE = German version; EN = English translation; participants answered each item on a visual analog scale (0 not at all to 100 completely).

TABLE 2: Differences in TSF-B following vivid imagination of thin ideals versus landscapes (at T4).

Item		***N***	***M (SD)***	***t***
1	Control	45	3.22 (5.28)	
	thin ideal	46	11.83 (21.78)	-2.60**
2	Control	45	4.02 (9.08)	
	thin ideal	46	29.09 (28.58)	-5.66**
3	Control	45	2.96 (7.17)	
	thin ideal	46	12.59 (20.79)	-2.97**
4	Control	45	5.09 (9.47)	
	thin ideal	46	13.74 (22.93)	-2.36*
5	Control	45	3.51 (8.51)	
	thin ideal	46	16.76 (25.00)	-3.40**
total	Control	45	3.76 (7.02)	
	thin ideal	46	16.80 (18.53)	-4.456**

Notes: T4 = after vivid imagination;
control = control group; thin ideal = thin-ideal group;
*p<.05; **p<.01, differences between groups, one-tailed.

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Tables

TABLE 1: Sample characteristics (*N*=91, healthy women)

	M (SD)	**Range**	**Cut-off**
Age	21.87 (1.97)	18-30	-
BMI	21.66 (2.40)	16.79-29.97	25.0>x<18.5[1]
EDE-Q			
Global	0.92 (0.74)	0.00-3.60	>2.66[2]
Restraint	0.93 (1.11)	0.00-5.80	>2.60[2]
Weight concern	1.04 (0.95)	0.00-4.40	>3.08[2]
Shape concern	1.39 (1.04)	0.00-4.75	>3.69[2]
Eating concern	0.31 (0.55)	0.00-4.20	>1.84[2]

Notes: BMI = Body Mass Index; EDE-Q = Eating Disorder Examination Questionnaire
1) Normal weight (according to WHO, 2000); 2) Mean plus one standard deviation (Hilbert et al., 2007)

TABLE 2: Comparison of the two experimental groups at T1 (*N*=91, healthy women)

		N	***M (SD)***	***t***
Age	control	45	21.53 (1.90)	-1.62[n.s.]
	thin ideal	46	22.20 (2.01)	
BMI	control	45	21.48 (2.72)	-0.69 [n.s.]
	thin ideal	46	21.83 (2.06)	
EDE-Q global	control	45	0.94 (0.77)	0.26 [n.s.]
	thin ideal	46	0.90 (0.73)	
Mood T1	control	44	73.07 (12.43)	1.02 [n.s.]
	thin ideal	42	69.93 (15.95)	
BIS T1	control	44	72.45 (13.52)	-0.22 [n.s.]
	thin ideal	42	73.19 (17.50)	

Notes: T1 = at the beginning of the experiment; control = control group; thin ideal = thin-ideal group; n.s. = non-significant; differences between groups, two-tailed.

Figures

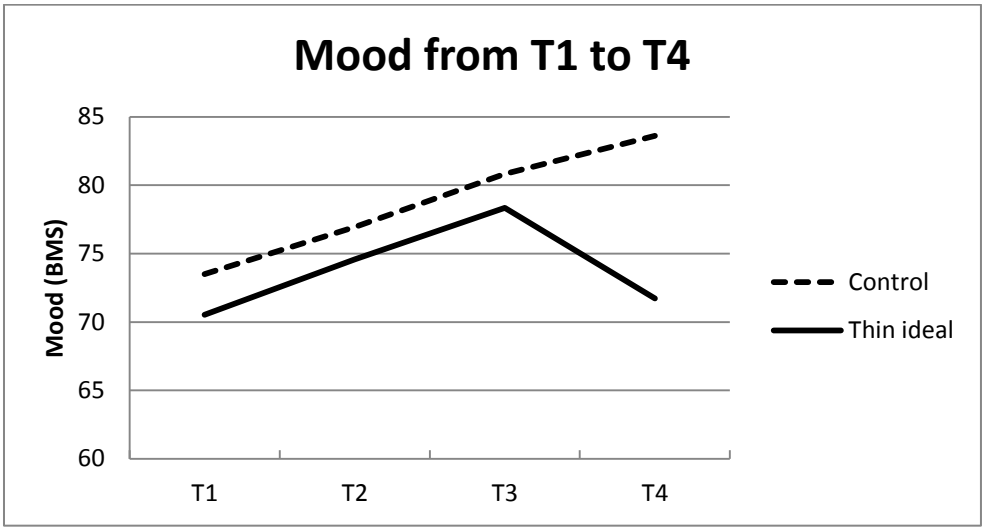

FIGURE 1: Changes in mood from T1 to T4 (means and standard errors).

Notes: control = control group (n=45); thin ideal = thin-ideal group (n=46); T2 = after media exposure, T4 = after vivid imagination.
No significant main effect of experimental condition in ANOVA analysis on mood trajectory ($F_{(1, 89)} = 3.71$; $p = .057$, $\eta_p^2 = .040$)[i], but large, significant main time effect ($F_{(2.67, 238.93)} = 18.54$, $p < .001$, $\eta_p^2 = .175$), and moderate and significant interaction effect for time by condition ($F_{(2.67, 238.93)} = 9.19$, $p < .001$, $\eta_p^2 = .092$.). Similar effects for BIS: no significant main effect for condition ($F_{(1, 89)} = 0.23$ $p = .635$, $\eta_p^2 = .003$) but, large, significant main effect of time ($F_{(2.86, 254.49)} = 31.91$, $p < .001$, $\eta_p^2 = .264$), and moderate, significant interaction effect for time by condition ($F_{(2.86, 254.49)} = 10.09$, $p < .001$, $\eta_p^2 = .102$).

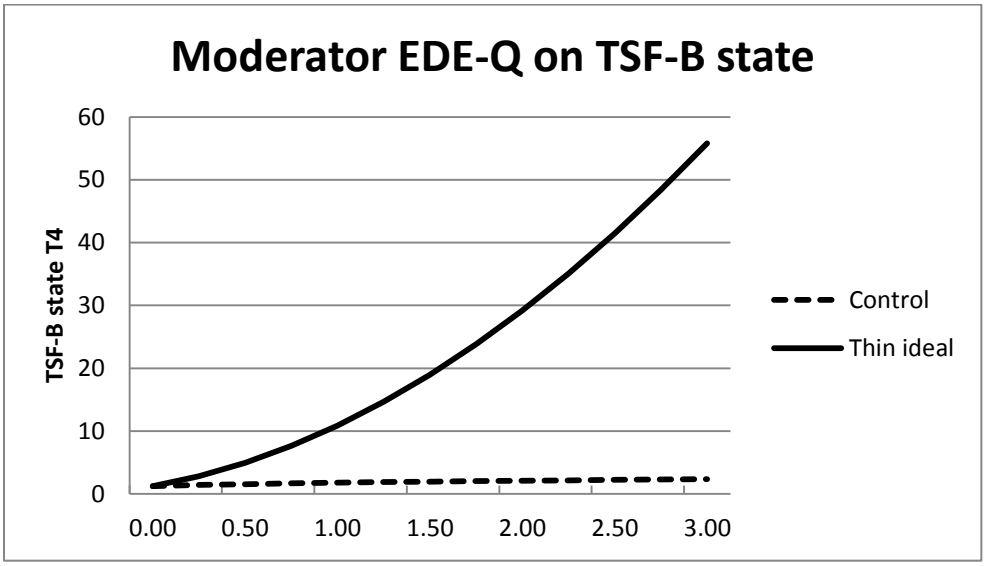

FIGURE 2: Moderating effect of eating disorder pathology (EDE-Q) on changes in TSF-B state after vivid imagination.

Notes: control = control group (n=45); thin ideal = thin-ideal group (n=46). On the x-axis EDE-Q raw scores are displayed.

Appendix

D) Preliminary Results: Model of Disturbed Eating Behavior in Women

TABLE 1. DESCRIPTIVE STATISTICS. Range, means, standard deviations (N=373).

Variable	Range	Mean	SD
Age	16-37	22.57	3.40
BMI	16.65-35.65	21.72	2.96
EDE-Q restraint eating	0-5.80	0.92	1.15
EDE-Q shape concern	0-5.75	1.55	1.36
EDE-Q weight concern	0-5.80	1.15	1.26
EDE-Q eating concern	0-5.20	0.40	0.76
EDE-Q global	0-5.15	1.01	1.02
EDE-Q DECB	0-4.56	0.57	0.71
BSQ short	8-44	18.38	7.95
DERS nonacceptance	6-30	11.87	4.87
DERS global	39-168	71.36	20.35
SATAQ-G pressure	5-25	14.01	5.62
SATAQ-G global	16-78	45.80	13.39
TSF trait concept	0-53	4.78	7.55

TABLE 2. PEARSON CORRELATION MATRIX. The matrix includes the following variables: body mass index (BMI), disturbed eating and compensatory behavior (DECB), body dissatisfaction (BD), nonacceptance of emotional responses (Nonacceptance), cognitive distortions (TSF) and pressure to conform body ideals (Pressure).

Variable	1	2	3	4	5	6
1. BMI	–	.168**	.292***	–.059	.197***	.119*
2. DECB		–	.559***	.215***	.497***	.297***
3. BD			–	.337***	.578***	.468***
4. Nonacceptance				–	.359***	.327***
5. TSF					–	.356***
6. Pressure						–

Notes: * = $p < .05$; ** = $p < .01$; *** = $p < .001$, two-tailed. N=373.

TABLE 3. RESULTS OF THE PATH ANALYSIS testing the coefficients of the proposed Model of Disturbed Eating in Women. Regression coefficients (including standard errors) are all unstandardized.

Outcome	Predictor[1]/Mediator[2]	Path	Parameter Estimate	SE
BD	BMI[1]		0.906***	0.144
	Pressure[1]		0.414***	0.041
TSF	BD[1]	*a1*	1.512***	0.102
Nonacceptance	BD[1]	*a2*	3.851***	0.564
DECB	TSF[2]	*b1*	0.058***	0.012
	Nonacceptance[2]	*b2*	-0.005*	0.002
	BD (direct effect)[1]	*c'*	0.302***	0.030
	BD (indirect effect)[1]	*c*	0.368***	0.024

Notes: $\chi^2(6) = 28.351$, p < .000; CFI = .960; TLI= .908; RMSEA = .101*; *=p<.05; *** = *p*<.001. N=373.

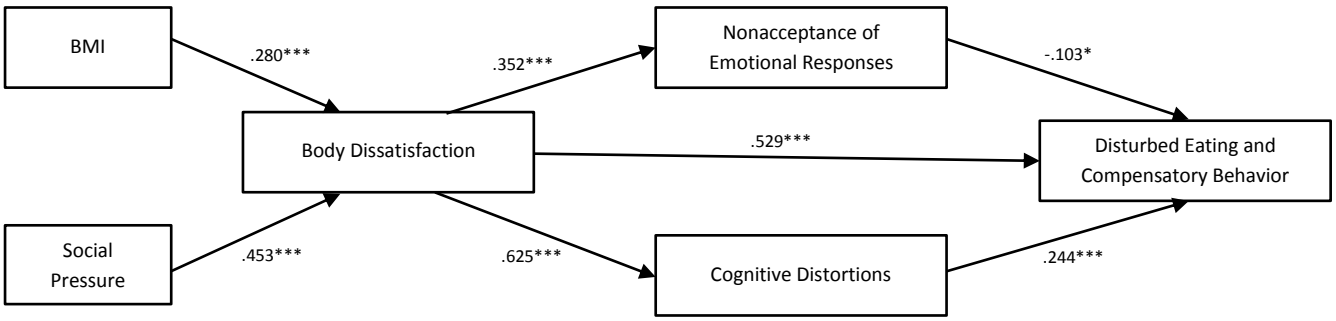

FIGURE 1: PATH ANALYSIS of the model of disturbed eating and compensatory behavior in women. Coefficients are all standardized.

Notes: The values indicate standardized parameter estimates. **p*<.05, ***p*<.001.

Table 1 presents descriptive statistics of the female sample (N=373). Table 2 presents Pearson correlations among all variables that were included in the path analysis. The path analysis revealed the following pattern (Table 3 and Figure 1): As hypothesized, BMI (*coefficient* = 0.906, *SE* = 0.144, *z* = 6.29, *p* < .001) and Pressure (*coefficient* = 0.414, *SE* = 0.041, *z* = 10.19, *p* < .001) were both

significantly positively related to BD, altogether explaining 31% of the variance of BD. Second, BD significantly predicted DECB (*coefficient* = 0.368, *SE* = 0.024, z=15.62, $p < .001$), thereby explaining 39% of its variance (= total effect, path *c*). In order to test whether TSF and Nonacceptance mediated this relationship, we set up the indirect effects of BD on DECB via these two mediators. TSF thereby partially mediated the relationship between BD and DECB (indirect effect *a1*b1* = 0.087, SE=0.019, z=4.55, $p < .001$), so did Nonacceptance (*a2*b2* = –0.021, SE=0.009, z=–2.20, $p = .028$). The explained variance of DECB in this mediation model was 45%. Since the direct effect of BD on DECB was still significant (*c'*=0.302, SE=0.030, z=10.11, $p < .001$) when accounting for both mediators, TSF can be considered a partial mediator, explaining 24% (=0.087/0.368) of the total effect. The same is true for Nonaccepance that explains 6% (=-0.021/0.368) of the total effect.

Appendix

E) TSF and TSF-B questionnaires

Thought-Shape Fusion Trait Scale (TSF trait; Wyssen & Munsch, in preparation) – short version for women and men

Bitte bewerten Sie jede der folgenden Aussagen, indem Sie das Feld ankreuzen, welches für Sie persönlich am besten beschreibt, wie sehr Sie der Aussage zustimmen oder wie wahr die Aussage für Sie ist (von *überhaupt nicht* bis *völlig/ immer*), auch wenn einige der Aussagen auf Sie irrational wirken. Bitte beantworten Sie jede Aussage ohne zu lange darüber nachzudenken.

	Wie sehr stimmen Sie den folgenden Aussagen zu?	Überhaupt nicht	Ein wenig	Mässig	Sehr	Völlig/ Immer
1.	Ich fühle mich dicker, nachdem ich daran gedacht habe dick machende/ „verbotene“ Speisen (z.B. Schokolade) zu essen.	0	1	2	3	4
2.	Wenn ich daran denke an Gewicht zuzunehmen, will ich überprüfen, ob meine Kleidung nicht enger sitzt.	0	1	2	3	4
3.	Darüber nachzudenken an Gewicht zuzunehmen, ist für mich moralisch fast genauso verwerflich, wie tatsächlich zuzunehmen.	0	1	2	3	4
4.	Wenn ich mir nur vorstelle, dass ich an Gewicht zunehme, kann das dazu führen, dass ich wirklich zunehme.	0	1	2	3	4
5.	Ich fühle mich enorm dick, wenn ich mir nur vorstelle, dass ich einen Monat lang nicht körperlich aktiv bin.	0	1	2	3	4
6.	Wenn ich nur daran denke mich mit Essen vollzustopfen, führt das dazu, dass ich mich wiegen will.	0	1	2	3	4
7.	Wenn ich darüber nachdenke meine Diät abzubrechen, will ich im Spiegel überprüfen, ob ich nicht dicker aussehe.	0	1	2	3	4
8.	Wenn ich nur daran denke nicht körperlich aktiv zu sein, kann sich mein Aussehen wirklich verändern.	0	1	2	3	4
9.	Ich fühle mich dicker, wenn ich nur daran denke mich mit Essen vollzustopfen.	0	1	2	3	4
10.	Wenn ich nur daran denke einen Monat lang nicht körperlich aktiv zu sein, will ich einschränken, was ich esse.	0	1	2	3	4
11.	Wenn ich nur daran denke meine Diät abzubrechen, ist das fast genauso inakzeptabel, wie es wirklich zu tun.	0	1	2	3	4
12.	Meine Figur kann sich schon dadurch verändern, dass ich plane, dick machende Speisen zu essen.	0	1	2	3	4
13.	Ich fühle mich dicker, wenn ich nur daran denke an Gewicht zuzunehmen.	0	1	2	3	4

14.	Wenn ich mir vorstelle, wie ich dick machende/ „verbotene“ Speisen esse (z.B. Schokolade), will ich meinen Körper überprüfen, um sicher zu gehen, dass ich nicht an Gewicht zugenommen habe.		0	1	2	3	4
15.	Wie oft haben Sie Gedanken an die Auswirkungen des Essens von dick machenden/ „verbotenen“ Speisen? 15a) Wie viele Stunden pro Tag?_____ 15b) Wie viele Tage pro Woche?_____		0	1	2	3	4
16.	a) In welchem Ausmass werden Sie im Allgemeinen von Gedanken an „verbotene“ Speisen beeinflusst?		0	1	2	3	4
	b) Wie sehr werden Sie durch Gedanken an „verbotene“ Speisen in Ihrem Alltag gestört?	0		1	2	3	4
17.	Wenn Sie Gedanken an „verbotene“ Speisen haben, wie *wichtig* ist es dann für Sie, diese Gedanken wieder aus Ihrem Bewusstsein zu bekommen?		0	1	2	3	4
18.	Wenn Sie Gedanken an „verbotene“ Speisen haben, wie *schwierig* ist es dann für Sie, diese Gedanken wieder aus Ihrem Bewusstsein zu bekommen?		0	1	2	3	4

Notes: Items 1-14 can be averaged to the scale “TSF concept”, items 15-18 to the scale “TSF clinical impact”. In publication 2, only the concept scale has been used. In the meantime the scale has been revised and complemented. The latest version is available from the author. A study to validate the scale is ongoing.

Thought-Shape Fusion Body Trait Scale (TSF-B trait; Wyssen & Munsch, in preparation) – short version for women

Bitte bewerten Sie jede der folgenden Aussagen, indem Sie das Feld ankreuzen, welches für Sie persönlich am besten beschreibt, wie sehr Sie der Aussage zustimmen oder wie wahr die Aussage für Sie ist (von *überhaupt nicht* bis *völlig/ immer*), auch wenn einige der Aussagen auf Sie irrational wirken. Bitte beantworten Sie jede Aussage ohne zu lange darüber nachzudenken.

	Wie sehr stimmen Sie den folgenden Aussagen zu?	Überhaupt nicht	Ein wenig	Mässig	Sehr	Völlig/ Immer
1.	Allein der Gedanke an schlanke Frauen ist für mich inakzeptabel.	0	1	2	3	4
2.	Ich fühle mich dicker, nachdem ich mir schlanke Frauen vorgestellt habe.	0	1	2	3	4
3.	Allein der Gedanke an schlanke Frauen führt dazu, dass ich mich wiegen will.	0	1	2	3	4
4.	Allein der Gedanke an Frauen, die schlanker sind als ich, kann dazu führen, dass ich tatsächlich dicker aussehe.	0	1	2	3	4
5.	Darüber nachzudenken, mein persönliches Schlankheitsideal aufzugeben, führt dazu, dass ich im Spiegel überprüfen will, ob ich nicht dicker aussehe.	0	1	2	3	4
6.	Ich fühle mich dicker, wenn ich bloss daran denke, nicht mehr danach zu streben dünn zu sein.	0	1	2	3	4
7.	Allein der Gedanke daran, einen Monat lang keinen Sport zu treiben, führt dazu, dass ich mein Aussehen sofort überprüfen will.	0	1	2	3	4
8.	Daran zu denken, mich nicht mehr weiter an einem Schlankheitsideal zu orientieren, ist für mich beinahe so unzulässig, wie es tatsächlich zu tun.	0	1	2	3	4
9.	Der blosse Gedanke an eine schlanke Frau kann meine Figur verändern.	0	1	2	3	4
10.	Mein Körper fühlt sich enorm dick an, wenn ich mir eine schlanke Frau vorstelle.	0	1	2	3	4
11.	Wenn ich mir den schlanken Körper einer Frau vorstelle, dann muss ich anschliessend meinen Körper überprüfen, um sicher zu gehen, dass ich nicht an Gewicht zugenommen habe.	0	1	2	3	4

Notes: The items can be averaged to the scale "TSF concept". In the meantime the scale has been revised and complemented as well as adapted for men. The latest versions of the scales are available from the author. A study to validate the scales is ongoing.

Thought-shape Fusion Body State Scale (TSF-B state, Wyssen & Munsch, in preparation)

Bitte beantworten Sie die folgenden Fragen:

Item 1: Haben Sie das Gefühl, dass Sie an Gewicht zugenommen haben, nachdem Sie sich die Bilder aus der Zeitschrift vorgestellt haben?
Item 2: Wie viel dicker fühlen Sie sich nachdem Sie sich die Bilder aus der Zeitschrift vorgestellt haben?
Item 3: In welchem Ausmass war es moralisch anstössig, dass Sie sich die Bilder aus der Zeitschrift vorgestellt haben?
Item 4: In welchem Ausmass haben Sie den Drang, die Auswirkungen, die sich durch das Vorstellen der Bilder aus den Zeitschriften ergeben haben, zu reduzieren oder rückgängig zu machen?
Item 5: In welchem Ausmass haben Sie im Moment den Drang, Ihre Nahrungsaufnahme einzuschränken (z.B. während der nächsten paar Stunden gar nichts zu essen/ zu fasten) weil Sie sich die Bilder aus der Zeitschrift vorgestellt haben?

Notes: Participants rated each item on a 100-mm visual analog scale (0 not at all to 100 completely) after vivid imagination of either thin-ideals or landscapes. The items can be averaged to one scale.