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Body Inversion Effect in Patients with Bulimia Nervosa: Analytical Body Processing and Self-Objectification

Shape and weight concerns leading to bodily dissatisfaction are a widely spread phenomenon in women in Western culture (Swami et al., 2010). Since the beginning of the *body positivity movement*, which aims to promote a nurturing bodily acceptance by providing "a space to showcase bodies of all shapes and sizes" (Sastre, 2014, p. 929), the issue received more media attention. However, bodily dissatisfaction and its associated factors like negative body representations have still not been researched sufficiently. This is problematic since negative body representations or *body image disturbances* have been identified as a factor, which contributes to the etiology, the maintenance and the relapse of eating and weight disorders (Stice, 2016; Stice & Shaw, 2002; Striegel-Moore et al., 2004).

"Eating disorders are one of the most common psychiatric problems faced by females and characterized by chronicity and high rates of relapse" (Stice & Shaw, 2002, p. 985). Patients with eating disorders (EDs) do not only have a high psychological but also physical strain: Since ED patients are mostly using their body as a medium to cope with stress and their inner conflicts, they are at high risk for suffering physical damage and medical problems like gastrointestinal diseases, diabetes mellitus and osteoporosis (Legenbauer & Vocks, 2014). Therefore it is of importance in research to draw more attention toward body image disturbances in patients with ED in order to improve existing prevention programs and psychological treatments (Le, Barendregt, Hay, & Mihalopoulos, 2017).

Body image disturbances are associated with a perceptual deficit which leads to the overestimation of the own body size (Serino et al., 2016). However it remains unclear if those perceptual deficits are limited to the overestimation of one's own body size or if they even affect more basic aspects of body perception and body processing (Urgesi et al., 2014). Evidence from previous studies indicates that body image disturbances might be associated with impairments in body processing, which involves *self-objectification*. Self-objectification means that the body is perceived like an object by reducing it to specific aspects or functions.

In this study, we investigated body image disturbances and self-objectification in patients with bulimia nervosa. Therefore, we used the *body inversion paradigm* to test if this group shows an impairment in the configural processing of bodies, which might indicate that patients with bulimia nervosa focus on single body parts and are unable to perceive the body in its entirety.

Bulimia Nervosa

Individuals suffering from bulimia nervosa (BN) follow rigid rules concerning eating behavior and strive towards an extreme pursuit of thinness (Legenbauer & Vocks, 2014). BN is diagnosed based on the DMS-5 (American Psychiatric Association, 2013) when the following symptoms occur at least once a week for three months: Firstly, the concerned person shows recurrent episodes of binge-eating while feeling a lack of control and eating an unusual amount of food during a discrete period of time. Secondly, the person exhibits recurring inappropriate strategies in order to prevent weight gain and compensate those binge-eating episodes, for example by vomiting, misuse of laxatives or excessive exercise. Furthermore, the person's self-evaluation is unduly influenced by body shape and weight.

Based on the applied compensating behaviors for weight control, the American Psychiatric Association (2013) distinguishes two types of BN: Whereas BN patients of the *purging-type* induce regular vomiting or misuse laxatives and/or diuretics, BN patients of the *non-purging type* are fasting or exercising excessively without vomiting or misusing drugs. Additionally, the American Psychiatric Association (2013) clusters the severity of the described symptoms into four categories: mild, moderate, severe and extreme.

The criteria of the ICD-10 (World Health Organization, 1992) mostly match the ones of the DSM-5, although the ICD-10 does not define operational criteria in regard to the duration and frequency of binge eating episodes.

Recent studies about incidence and prevalence statistics concerning BN are rare or not existing. Studies found a lifetime prevalence between 1-2% for American and Swedish adults with BN (Hudson, Hiripi, Pope, & Kessler, 2007; Trace et al., 2012). In Austria the point prevalence for EDs in general was estimated 4.6% for women, ages ranging from 40 to 60 years and 3.8% for women, ages ranging from 18 to 85 years (Mangweth-Matzek et al., 2006; Mangweth-Matzek et al., 2014).

Based on a cognitive-behavioral model, Svaldi and Tuschen-Caffier (2018) suggested that BN is characterized by a multifactorial etiology. The involved factors are distinguished in predisposing, triggering and maintaining factors, which represent either individual factors (e.g. genes, perfectionism, negative affect) or environmental factors (e.g. sociocultural pressure, critical life events, evaluative stressors). Due to a lack of functional coping mechanisms, persons with BN use binge-eating behavior to cope with the emotional stress caused by those factors. Heatherton and Baumeister (1991) tried to explain the protective function of the binge-eating behavior for BN patients in their *escape theory*: Accordingly, episodes of binge-eating represent attempts to escape from self-awareness by redirecting the

focus to other sensory stimuli (food) in order to avoid burdensome thoughts from entering the consciousness.

This study focused on body image disturbances, which represent an important individual factor predominantly contributing to the maintenance of the disorder (Svaldi & Tuschen-Caffier, 2018).

Body Image Disturbances

Although latest diagnostic systems do not define body image disturbances (BIDs) as a required factor for the diagnosis of BN, many studies showed that BID is a defining feature of BN, contributing mainly to the maintenance but also to the etiology and relapse (Stice, 2016; Stice & Shaw, 2002; Striegel-Moore et al., 2004).

Striving towards a very thin body and feeling dissatisfied with the own body shape and weight are considered as important risk factors (Striegel-Moore et al., 2004). When combined with a certain vulnerability for example low self-esteem or a dysfunctional body image conveyed in the family, it is more likely for the concerned individual to develop a BID and/or ED (Legenbauer & Vocks, 2014). Furthermore, BIDs are often accompanied by many other factors, which increase the probability of the onset and reinforce the maintenance of an acute BID. For instance studies found that BIDs are correlated with alterations in cognitive processing of body shape and weight-related information (Striegel-Moore et al., 2004) and dysfunctional behaviors like avoiding looking in the mirror (Legenbauer & Vocks, 2014).

Cordes, Bauer, Waldorf, and Vocks (2015) integrated the elements of nine different cognitive behavioral models, which aim to explain the development and maintenance of BID, into one heuristic meta-model. The meta-model is built as S-O-R structure, which describes the synergy of stimuli (e.g. picture of the own body), organism variables (relevant individual factors including deficits in emotion regulation, low self-esteem, perfectionism and body image attitudes) and reactions (including negative emotions, cognitive distortions, compensatory behavior body checking or avoidance behavior). These three main aspects are further influenced by environmental variables like genetics, media, family or peers, which can cause social comparisons or the internalisation of body ideals.

A similar model defined by Legenbauer and Vocks (2014), suggests that the body image is composed of four different components: Body perception, attitudes and beliefs about the own body, subjective feelings about the own body and body-related behaviors such as avoidance or body checking. Therefore BIDs can manifest on a perceptual, cognitive, affective and behavioral level (Legenbauer & Vocks, 2014). Likewise, Stice and Shaw (2002) differentiated between aspects of BIDs like body image distortions (perceptual component),

body dissatisfaction (affective component) and the over-emphasis placed on weight and shape (cognitive component). Nevertheless the different components are highly interrelated: Stice and Shaw (2002) stated for example that

> episodes of binge eating might lead an individual to feel more negatively about his or her body. Similarly, negative affect may be associated with a negative information processing bias that results in the perception that one's current body shape is further from one's ideal body shape. (p. 989)

The current study mainly focused on the perceptual component to investigate the nature of body image distortions and how they contribute to BIDs in BN patients.

Body Processing

The perceptual component regarding the manifestation of BID includes on the one hand misperceptions and on the other hand the over and underestimation of bodily dimensions. For instance studies showed that women with BN tend to overestimate body weight and shape (Legenbauer & Vocks, 2014). This may be caused by alterations in the human visual system, which correspond to the processing of bodies. In the following, two of those alterations are outlined in detail: Attentional biases and impairments in cognitive processing.

Attentional bias. A deficit-oriented attentional bias towards body-related stimuli has been identified as potential factor for pathological shape and weight concerns (Bauer et al., 2017; Blechert, Ansorge, Beckmann, & Tuschen-Caffier, 2011; Blechert, Ansorge, & Tuschen-Caffier, 2010; Cordes et al., 2015; Horndasch et al., 2012; Jansen, Nederkoorn, & Mulkens, 2005; Thomsen, Breckenridge, Infanger, & Harding, 2012; Tuschen-Caffier et al., 2015). Nevertheless, this factor has often been neglected in explanatory models about the development and maintenance of BID. In a systematic review Cordes et al. (2015) found that only two of nine cognitive behavioral models concerning BID, explicitly postulated a dysfunctional attentional bias as component.

Two paradigms have mainly been used to investigate attentional biases: One is the *emotional-Stroop* paradigm, which is based on the assumption that emotional relevant stimuli capture the attention of a person. Regarding shape and weight concerns, studies comparing healthy controls and persons with ED, found that only persons with ED had longer latencies in the performance of the actual task (naming the color of a word), when the presented word referred to bodily weight/shape or food (Dobson & Dozois, 2004).

The second paradigm used in several studies is the *dot-probe* paradigm: In the task, two competing stimuli are presented, whereas one of them implicates a salience, which is

related to the ED (e.g. body-related word). Shortly afterwards participants have to react and indicate the position of a neutral target. If the stimulus, which is considered more salient for persons with ED, captures the attention, it is expected that the person with ED react faster when the neutral target is presented at the same position as that stimuli. Aspen, Darcy, and Lock (2013) found in a meta-analysis that persons with ED show an attentional bias towards negative body- and food-related stimuli and away from positive stimuli. Furthermore, a study found that words indicating slim bodies captured more attention than words indicating corpulent bodies in a subclinical BID group (Cordes et al., 2015).

Although the two paradigms can provide important information for the understanding of attentional biases, they give no information about the spatial resolution of those biases. For this reason the tasks have often been combined with eye-tracking, based on the assumption that eye movements and fixation pattern represent attentional and cognitive processing (Henderson, 2003). Two eye-tracking studies found that persons with ED in general and BN patients showed an attentional bias towards the own self-rated "ugly" body parts and a decreased focus on the own "beautiful" body parts compared to controls. When viewing the bodies of others, the participants showed a reverse pattern, meaning that ED patients mostly fixated the "beautiful" parts of the other body (Bauer et al., 2017; Jansen et al., 2005; Tuschen-Caffier et al., 2015). Accordingly, Blechert, Nickert, Caffier, and Tuschen-Caffier (2009) found that BN patients fixated longer on bodies with lower body mass index (upward comparison: comparing oneself to someone superior), whereas healthy controls showed a reverse pattern and a longer fixation on bodies with high body mass index (downward comparison: comparing oneself to someone inferior). These results suggest that there is a deficit-oriented attentional bias and a tendency towards a social upward comparison in BN patients, which is associated with a lower self-esteem and higher bodily dissatisfaction (Blechert et al., 2011).

Despite all the evidence, the question of causality remains unanswered: To what extent contribute attentional biases to the development and maintenance of BIDs? In two studies, the authors induced an attentional bias towards negative shape/weight word in one group of healthy women. The authors found that this group reported higher bodily dissatisfaction afterwards (Smeets, Jansen, & Roefs, 2011; Smith & Rieger, 2010). Conversely, an induced bodily dissatisfaction did not cause an attentional bias (Smith & Rieger, 2010). Therefore, we can assume that attentional biases influence the body image and that they are of importance in the pathology of ED. Still, the underlying processes of those biases need to be further investigated.

Cognitive processing strategies. It figures that an attentional bias is not limited to a specific visual fixation pattern, but is also accompanied by a different strategy in cognitive processing of the visual information. In regard to patients with ED the fixation on specific body parts seems to involve the loss of an integrated perspective, so that the person is unable to see the body in its entirety (Groves, 2017; Mundy & Sadusky, 2014; Urgesi et al., 2014).

In this section, we outline different processing styles, point out which style is applied to which kind of stimuli and examine how the styles used by BN patients might differ from the ones used by healthy individuals. Regarding the perception of objects, faces and bodies, two main processing strategies are discussed: *Analytical processing* and *configural processing*.

Analytical processing. Analytical processing, which is also referred to as part-based or detail-based processing, allows the recognition of stimuli (e.g. objects) based on their single isolated features. This is especially useful if the point of view only allows a limited perspective on the perceived object (Piepers & Robbins, 2012).

Configural processing. In the literature, the term "configural processing" is often used synonymously with "holistic processing". So far, there is no clear consensus on the definition of those two terms. In general, both terms relate to the central premise of Gestalt psychology, which suggests that "sensory wholes …are qualitatively different to the sum of their individual parts or components" (Piepers & Robbins, 2012, p. 1) in that they "possess properties that cannot be derived from the properties of their constituent parts." (Wagemans et al., 2012, p. 3). These properties are further understood as *emergent features*, and correspond to configural and holistic processing strategies (Piepers & Robbins, 2012; Wagemans et al., 2012).

For example the configuration of faces includes *first-order properties* (e.g. eyes above nose, nose above mouth), which are important to detect a face, and *second-order properties* (e.g. spacing between the eyebrows and hairline), which are necessary to discriminate between faces. Information that is used to recognize faces can be placed on a continuum with isolated features on one end and configural features on the other. Whereas isolated features like hair color can be recognized without attending information about other facial parts, configural features require the processing of two or more facial parts simultaneously. (Piepers & Robbins, 2012)

Based on this model of face perception, researchers attempted to define and differentiate the terms "configural" and "holistic" processing: According to Piepers and Robbins (2012), configural processing means the integration of all or some second-order

information. It is inseparable from the analytical processing as it arises from an interrelation between the isolated features. In contrast, holistic processing is understood as the integration of *all* facial information and features. Therefore, Maurer, Le Grand, and Mondloch (2002) defined holistic processing as one extreme form of configural processing.

Whereas Piepers and Robbins (2012) associated configural processing mainly in regard to second-order information, Maurer et al. (2002) distinguished between configural processing of first-order and second-order relations. All in all, Maurer et al. (2002) defined three types of configural processing: holistic processing, the detection of first-order relations and the processing of second-order relations.

Reed, Stone, Grubb, and McGoldrick (2006) understood configural processing as an even more general expression, which describes a continuum including all kind of processing styles with analytical processing at one end and holistic processing on the other end.

This study is based on the definition suggested by Maurer et al. (2002), since empirical findings from behavioral tasks support their differentiation between the three types (Reed et al., 2006). Moreover, this definition has been used most commonly in the research of body processing and is therefore most suitable to compare results of different studies.

Research paradigms. To assess analytical versus configural processing, researchers mainly used three paradigms: The *composite effect*, the *part-whole* and the *inversion effect*. Whereas the two former paradigms are considered as direct measures of configural and analytical processing, the inversion effect is an indirect measure (Piepers & Robbins, 2012).

In composite tasks, one stimulus e.g. a face is presented to the participant: The face is composited of two face halves showing two different identities or emotions. The participant is then asked to make a perceptual judgement about one half and ignore the other. It is assumed that the processing of the composited stimulus will take more time and effort when it is processed configurally, since it is harder to ignore the other half. In contrast, it is expected that participants have lower reaction times and answer more accurate when they process a stimulus analytically. (Aviezer, Trope, & Todorov, 2012; Young, Hellawell, & Hay, 1987)

The part-whole paradigm (Tanaka & Farah, 1993) describes a task, in which participants observe a stimuli (e.g. face) and afterwards they have to recognize this original stimulus, which is presented together with one modified alternative (e.g. face with darker eyebrows). The two stimuli are either presented as isolated features (e.g. two pairs of eyes) or as a whole. If stimuli are processed configurally, the recognition of isolated features should be less accurate than the recognition of whole objects (Seitz, 2002).

The third research paradigm is the inversion task, which is based on the assumption that configural processing is inhibited when the stimulus is presented upside down (Young et al., 1987). This paradigm is used in this study and will be described in detail later in the text.

Processing of bodies, faces and objects. Based on described paradigms, behavioral studies found that the processes allowing face recognition and identification are similar to the processes involved in the perception of human bodies (Bosbach, Knoblich, Reed, Cole, & Prinz, 2006; Reed et al., 2006; Reed, Stone, Bozova, & Tanaka, 2003; Urgesi et al., 2014). That seems to make sense, since there are many physical properties that faces and bodies have in common: Similar to faces, bodies consist of first-order configurations (e.g. head attached to neck, arm attached to shoulder) and second-order configurations (e.g. interrelations between the single body parts) (Brandman & Yovel, 2016). Furthermore, the part organizations of bodies and faces are similarly symmetric (Reed et al., 2003).

Whereas objects were mostly shown to be solely processed analytically, the processing of faces and bodies seems to be facilitated by an additional configural processing. Thereby spatial relations between the individual parts (facial or bodily features) are integrated and analyzed in the context of the whole face or body (Urgesi et al., 2014). Consequently, faces and bodies seem to be processed as hierarchical configurations rather than as the sum of its parts. But what makes faces and bodies different from objects, especially from those, which have similar physical properties (e.g. symmetry)? Researchers suggested, that this might be due to social properties: Opposed to objects, faces and bodies give important social information about identity, age, gender, intentions and emotional state (Brandman & Yovel, 2016; Reed et al., 2003). Following, faces and bodies may represent more relevant stimuli (Ansorge & Leder, 2011) and therefore be processed faster than objects. That relevant stimuli are processed differently is also supported by the fact that there are some occasions in which objects are also processed configurally: Tanaka and Gauthier (1997) found that sufficient experience in the observation of a particular object category can lead to a shift from analytical to configural recognition (e.g. when a frequent bird watcher recognizes birds).

Cognitive processing strategies and eating disorders. As mentioned earlier an attentional bias in persons with ED and with that BID led to a stronger focus on single (unliked) body parts, whereas healthy controls showed a more balanced fixation pattern when viewing body stimuli (Tuschen-Caffier et al., 2015). Accordingly, it figures that the perception in ED patients might be modified such that bodies are processed solely analytically rather than configurally. This hypothesis has partially been investigated with the body inversion paradigm, which will be described in the following.

Inversion paradigm

The inversion paradigm has initially been used in the context of face recognition (Yin, 1969). It is mainly based on two assumptions: Firstly, faces are processed configurally, whereas non-face objects are merely processed analytically. Therefore, faces presented in their canonical upright position are recognized more accurate and quicker compared to non-face objects. Secondly, inversion disrupts configural processing, so that inverted faces are processed analytically rather than configurally. Following, a reduced visual discrimination performance (higher reaction time and lower accuracy) for inverted compared to upright faces is expected. Although most non-face objects are also more difficult to recognize in an inverted position, the drop in performance is not as significant, since they are processed analytically independent from their orientation. Following, the inversion effect is only expected for configurally processed stimuli (faces) and not for analytically processed objects (Diamond & Carey, 1986).

The inversion paradigm has been found to be a robust indicator for configural processing, since the inversion is able to inhibit configural processing, while not affecting analytical processing (Bernard, Gervais, Allen, Delmée, & Klein, 2015; Urgesi et al., 2014). Empirical evidence for the face inversion effect has been found in many behavioral tasks and neuroimaging studies (Yovel & Kanwisher, 2005).

Body inversion. Whereas the face inversion effect (Yin, 1969) has been investigated and found robust in many studies over the last decades (Valentine, 1988; Yovel & Kanwisher, 2005), the body inversion effect has been researched and discussed more recently (Reed et al., 2003). Since empirical evidence indicated that human bodies (like faces) are recognized via the configuration of their parts, the existence of a body inversion effect has been hypothesized.

Reed et al. (2003) first tested if an inversion effect can be found for human body postures. In a recognition task the participants had to indicate if the target stimulus was same or different to the stimulus shown before. Stimuli were presented in an upright or inverted orientation and the distractor stimulus varied in one feature from the target stimulus. They compared the inversion effect of body postures with faces, houses and furthermore with biomechanically impossible body postures. The results showed that the recognition of possible human body postures and faces were equally affected by inversion, whereas the inversion effect was diminished for impossible body postures and houses. These findings suggest that body postures are processed configurally like faces.

In another study Reed et al. (2006) manipulated different properties in body stimuli in order to further investigate the kind of processing, which is used for the recognition of body postures. Following, they compared the inversion effect of whole bodies with the inversion effects of three differently manipulated body stimulus categories: single body parts, scrambled bodies and body halves. Whereas the inversion effect was found for whole and halved body postures, there was no effect for single body parts and scrambled body postures. These findings provide further evidence that the recognition of body postures relies on first-order configurations of body parts rather than on single isolated features or the undifferentiated whole. Reed et al. (2006) did not specifically investigate second-order relations in their study. Nevertheless, since second-order relations are embedded in a specific first-order configuration, they are indirectly but inevitably affected as well, when first-order relations are disrupted. Following, when inversion disrupts first-order and consequently second-order relations, configural processing is inhibited and recognition becomes more difficult (Bosbach et al., 2006; Groves, 2017; Reed et al., 2006).

Most studies investigated the configural processing of bodies based on body postures (Bosbach et al., 2006; Brandman & Yovel, 2010; Reed et al., 2003; Reed et al., 2006; Seitz, 2002; Willems, Vrancken, Germeys, & Verfaillie, 2014; Yovel, Pelc, & Lubetzky, 2010). In face recognition tasks however, target and distractor stimuli mostly differ in a specific feature in appearance or even in identity (Seitz, 2002; Young et al., 1987). It is questionable if the modification in posture is comparable with modifications in appearance or identity. Still, most studies investigating body processing used faces as control condition. Consequently, it is necessary to compare body and face processing in more equivalent conditions. This has partially been done in studies applying the composite paradigm, which used identity-based conditions for both stimulus categories, but very little in the inversion paradigm (Minnebusch, Suchan, & Daum, 2008; Mundy & Sadusky, 2014; Robbins & Coltheart, 2012b; Soria-Bauser, Suchan, & Daum, 2011).

In addition, the fact that faces and bodies both produce inversion effects does not necessarily mean that they share the same underlying processes. Although they have very similar properties, bodies are still processed differently than faces (Groves, 2017).

Face-specific vs. domain-general hypothesis. Although the body inversion effect has been found in several studies, the nature of this effect remains unclear: Are face and body inversion caused by distinct face- and body-selective processes or are these two effects the result of the same underlying mechanisms? Researcher are mainly discussing two different hypotheses: The face-(/body-)specific hypothesis and the domain general hypothesis.

For instance Susilo, Yovel, Barton, and Duchaine (2013) found evidence for the face-specific hypothesis, which claims that face and body recognition reflect two individual processes. They tested patients with prosopagnosics, who were able to discriminate bodies just as well as healthy controls but failed in the recognition of faces. In conclusion, the face inversion effect and the body inversion effect seem to be qualitatively different.

Further evidence for face- and body-specific mechanisms have been found in neuroimaging studies, which identified different face-selective and body-selective brain areas (Astafiev, Stanley, Shulman, & Corbetta, 2004; Brandman & Yovel, 2010; Downing, Jiang, Shuman, & Kanwisher, 2001; Minnebusch et al., 2008). On one hand, the fusiform face area (FFA) in the ventro-medial infero-temporal cortex and the fusiform body area (FBA) in the medial occipito-temporal cortex, are believed to be associated to configural-based processing. On the other hand the occipital face area (OFA) and the extrastriate body area (EBA), both in the lateral occipito-temporal cortex, are assumed to be responsible for analytical processing. In line with this, Brandman and Yovel (2010) found that the EBA is sensitive for bodies and body parts, whereas the FBA is only sensitive for whole bodies.

According to the face-specific hypothesis, the FFA is believed to mediate the face inversion effect, whereas the body inversion effect is mediated by the FBA. Urgesi et al. (2007) tried to investigate this by using transcranial magnetic stimulation (TMS). Since the FBA is located too deep in the neural system, it cannot be manipulated by TMS. Instead, they created a lesion in the EBA and found an increased body inversion effect. This finding was interpreted in such a way as the body inversion effect is not mediated by the EBA and is therefore most likely associated with the FBA.

In contrast to the face-specific hypothesis, the domain-general hypothesis claims that the body inversion effect is mediated by face- but not body-selective mechanisms, meaning that both are based on the same underlying process. Even though studies identified body selective areas, it is unclear whether these are correlated with the body inversion effect. Since the identified body- and face-selective areas in the fusiform area (FBA and FFA) strongly overlap, the activation during body inversion may just as well reflect face-selective processing (Brandman & Yovel, 2016; Yovel & Kanwisher, 2005). In line with this theory, several studies found that the inversion effect disappeared for headless bodies (Brandman & Yovel, 2010, 2016; Minnebusch et al., 2008; Yovel et al., 2010). In an eye-tracking study, Arizpe, McKean, Tsao, and Chan (2017) found that the discrimination performance was better when the upper body (head or torso) was fixated compared to the lower body.

Therefore, the head seems to be the part of the body, which is crucial for recognition/discrimination.

Nevertheless, the findings concerning the inversion effect in headless bodies had been inconsistent: Some studies found significant inversion effects for headless bodies, although they were reduced compared to the inversion effect in whole bodies (Arizpe et al., 2017; Robbins & Coltheart, 2012a; Susilo et al., 2013). Robbins and Coltheart (2012a) argue that unsignificant inversion effect for headless bodies in previous studies were due to the use of different approaches (posture-based instead of identity-based) or due to deficient stimuli, which might have led the participants focus on irrelevant non-body aspects like clothes.

In this study we based our hypothesis on the face-specific hypothesis. We assumed that the recognition of faces and bodies both require configural processing but that they are still based on face- and body-specific processes. Since the head is a crucial part of the body configuration, it seems to be logical that the inversion effect disappears when the body is presented without the head.

Body inversion and body image disturbances. In case that BIDs are indeed linked to an attentional bias accompanied by analytical body processing, one would expect that the recognition performance in persons with BID is less affected by inversion. So far, there have not been many studies investigating this issue.

However, Urgesi et al. (2014) used the inversion paradigm to test the hypothesis of an impaired configural processing in patients with anorexia nervosa (AN). Comparing the inversion effect in bodies with the inversion effect in faces and objects between patients with AN and healthy controls, they found the typical inversion effect for faces but not for objects. Furthermore, AN patients showed a selective deficit for upright body stimuli compared to the controls. Consequently, their results indicate an impaired configural body processing in patients with AN.

A similar study has been conducted by Mundy and Sadusky (2014) in a non-clinical population, which they divided into two groups consisting of persons with high and low body image concerns. They examined differences in the inversion effect between faces, bodies and scenes. In contrast to Urgesi et al. (2014), they found a reduced inversion effect in all three conditions for persons with high body image concerns, to that effect that this group discriminated faster between inverted faces and bodies and more accurate in inverted scenes. These findings suggest that body image concerns might cause an analytical processing bias, at the expense of configural processing for bodies as well as for faces.

The findings of the two studies provide some evidence that the configural processing in persons with AN and high body image concern is somehow altered. However, to understand the quality of this alteration in more detail, it is necessary to consider an additional concept strongly linked to this issue: *self-objectification*.

Self-Objectification

In case that configural processing is impaired, the human body is processed in the same way as objects. This assumption is in line with the objectification theory (Fredrickson & Roberts, 1997), which links the objectification of one's own body, or more generally the self, (self-objectification) to ED and negative emotional experiences like shame and anxiety.

Objectification theory. The objectification theory was initially postulated by Fredrickson and Roberts (1997) in regard to the sexual objectification of women. Sexual objectification is thereby defined when others reduce a woman to her body, body parts or sexual function and believe that the appearance is sufficient to represent this woman. The visual inspection of a female body is considered as the most subtle way in which this sexualized evaluation can be displayed.

Fredrickson and Roberts (1997) argued that the constant or recurring objectification by others causes women to internalize this particular view, leading to self-objectification: The "cultural milieu of objectification functions to socialize girls and women to, at some level, treat themselves as objects to be looked at and evaluated." (p. 176). This overemphasis of the body has also been shown in studies, that found that women's bodies can influence and partially shape the women's lives due to weight-based stigma (Fikkan & Rothblum, 2012).

On a perceptual level, objectification is hypothesized to correspond to the attentional bias and analytical processing, which we previously hypothesized for individuals with BID. Therefore, cognitive impairments in persons with BID and/or ED might be interrelated with the objectification of bodies. Correspondingly, the inversion paradigm has also been considered as a suitable measure to assess objectification and has often been used to assess sexual objectification (Bernard et al., 2015; Bernard, Gervais, Allen, Campomizzi, & Klein, 2012; Schmidt & Kistemaker, 2015).

Over the past decades, self-objectification has been theoretically and empirically linked to a variety of negative consequences in nonclinical samples of women. Accordingly, the psychological distancing from one's physical body by seeing it as an object may evoke body shame, anxiety, depression and disordered eating (Calogero, Davis, & Thompson, 2005; Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998; Tiggemann & Slater, 2001).

Self-Objectification and eating disorders. Media, considered as the mirror of the cultural reality, has theoretical and empirically been identified as contributing factor leading to self-objectification and bodily dissatisfaction (Calogero, Davis, & Thompson, 2004; Fredrickson & Roberts, 1997; Legenbauer & Vocks, 2014; Stice, 2016).

Consequently, it figures that troubled attitudes toward eating became a widespread phenomenon in girls and women. According to the objectification theory, women are encouraged to constantly compare the own body with the cultural ideals knowingly that one's body will also be judged by others based on those ideals. Therefore, chronic dieting, restrained eating became a behavior, which is mostly accepted or even encouraged by peers and family. Hence, ED might represent a passive pathological strategy and an attempt to take control of the own body in order to deal with the lack of power they experience through objectification. (Fredrickson & Roberts, 1997)

Based on their theory, Fredrickson et al. (1998) investigated if self-objectification produces body shame, which in turn might lead to restrained eating and if self-objectification consumes attentional resources and therefore might result into a diminished mental performance. The researchers found that self-objectification indeed increased body shame, which predicted restrained eating and that self-objectification diminished one's math performance.

Fitzsimmons-Craft, Bardone-Cone, and Kelly (2011) conducted a study to further examine the relation between self-objectification and ED recovery. They found that healthy controls and persons, who fully recovered from ED, differ in objectified body consciousness, body surveillance and body shame from persons with active or partially recovered ED symptoms. These results provide evidence that the different aspects of self-objectification play an important role in ED recovery.

Self-objectification is not only relevant in ED recovery but also prevention. Kroon van Diest and Perez (2013) conducted a longitudinal study and investigated self-objectification, thin-ideal internalization, bodily dissatisfaction and ED symptoms within the context of a cognitive dissonance based ED prevention program for undergraduates. Cross-sectional path analysis thereby revealed that self-objectification and thin-ideal internalization predicted each other and both predict body dissatisfaction, which in turn predicted ED symptoms. The results of the longitudinal analysis indicated that one year after participating in the prevention program, the persons showed significantly reduced values in nearly all assessed variables except for self-objectification. The significant reduction of self-objectification compared to the baseline only lasted until five months after the prevention program. Prevention programs

might benefit from targeting self-objectification even more in order to increase and sustain significant reductions.

Further evidence supporting the role of self-objectification in the onset and maintenance of ED may lie in the findings of Dakanalis, Clerici et al. (2017), whose four-year-longitudinal study showed that self-objectification explained most of the variance in female college students compared to other predicting factors like dieting, negative affectivity, body dissatisfaction, appearance-ideal internalization.

Collectively, the empirical findings suggest that it is important to further investigate and target the role of self-objectification in women with ED in order to adapt and improve existing treatments and prevention strategies.

Aim of Study

Although BIDs are one of the main core symptoms in eating and weight disorders, they have often been neglected in existing ED treatments (Legenbauer & Vocks, 2014). This is mostly because it remains challenging to treat these dysfunctional representations (Mountford, Tchanturia, & Valmaggia, 2016), since not much is known about the development of BID.

The current state of research provides support for the assumption that impairments in configural processing of bodies and therewith-associated self-objectification are essential factors contributing to the onset, maintenance and relapse of BID and with that ED. However, previous findings were partially inconsistent and still little is known about the underlying processes causing and resulting from the distortion in body perception and representation.

Whereas many previous studies addressed this topic by investigating attentional biases in clinical ED populations, only very few studies examined impairments in configural processing in ED patients. Solely Urgesi et al. (2014) investigated this matter and found evidence for an impaired configural body processing in AN patients. This finding provided important insight in the understanding of body processing in ED. Nevertheless, it remains unclear if the impairments in configural body processing is limited to AN patients or whether they apply to persons with BID and ED more generally. Furthermore, there is not enough evidence to conclude if the impairment only relates to bodies or if it extends to other stimulus categories like faces or even scenes.

The current study was based on the design used by Urgesi et al. (2014) with the purpose to further investigate the quality of impaired body processing in persons with BID. One main innovation of this study was that we investigated BN instead of AN patients. Although AN, BN and also binge eating disorder sometimes overlap and share common

aspects as they are all part of the superordinate category ED, the groups differ considerably in symptoms as well as etiology and maintaining factors. Therefore, empirical evidence found based on one group of patients with ED cannot be generalized to all ED patients. Blechert et al. (2010) for example found opposite fixation pattern for patients with AN and BN, as they observed photos of their own body and bodies of others. Following, it is necessary to investigate those effects in each group individually.

Other innovations of this study were that we used an identity-based instead of posture-based approach in the inversion paradigm. Furthermore, we took additional potential influencing factors into account:

Firstly, since body weight might influence the perception of body size (Striegel-Moore et al., 2004), our sample consisted of participants with a similar and normal body mass index (BMI) in order to eliminate this potential confounding factor. Secondly, we assessed body checking behavior of participants due to empirical findings indicating that objects can be processed configurally when perceived by expert viewers (Diamond & Carey, 1986; Tanaka & Gauthier, 1997). Consequently, body processing might be influenced by the fact that BN patients either avoid body checking or observe their own and other's bodies more frequently, which could make them either "less" or "more" experts in body perception compared to controls. Thirdly, the emotional state was considered since positive emotions can lead to configural rather than analytical processing (Johnson & Fredrickson, 2005). Fourthly, in order to incorporate the discussion outlined above (face-specific vs. domain-general hypothesis), we included two different categories of body stimuli: Bodies with faces and bodies without faces.

Additionally, we aimed to link the expected impairments in body processing to self-objectification. As mentioned before the inversion effect is considered as a suitable indicator for both, configural/analytical processing and objectification. However, since the perception of other bodies does not reveal much about the perception of the own body, the inversion task in our study was not suitable to measure self-objectification. Furthermore, it makes more sense to assess these two aspects (processing style and objectification) independently because they are not the same: Whereas analytic and configural processing is executed on a more basal level, self-objectification is more complex construct since it implicates at least some (conscious or unconscious) appraisal. Consequently, we included an additional self-report questionnaire in order to assess self-objectification.

Although studies showed that gender differences in the prevalence of eating and weight disorders are only small to moderate (Striegel-Moore et al., 2009), most of the studies concerning ED included no or only a small number of male participants. Since gender

differences were irrelevant to our current research question, we included female participants only, to ensure that our results can be compared to those of previous studies and furthermore that they can be interpreted by taking previous findings into account.

Research Question and Hypotheses

In our study we addressed two main research questions. First of all: Do patients with bulimia nervosa show an impairment in the configural processing of human bodies? Or more generally: Do patients with bulimia nervosa process information about the human bodies differently than healthy controls (configural vs. analytical processing)? And secondly: Do patients with bulimia nervosa show a higher tendency towards self-objectification compared to healthy controls?

Based on previous findings the hypotheses were the following:

H1: Patients with bulimia nervosa (BN) show a reduced body inversion effect compared to healthy controls in both body conditions (bodies with and without faces).

H2: In both of the body inversion tasks BN patients show a lower accuracy rate and a longer reaction time in the upright condition compared to healthy controls.

H3: The difference between the two groups will be selective for the two body stimuli. There will be no difference between the groups in the face inversion task.

H4: BN patients report higher bodily self-objectification than healthy controls.

Method

The study has been approved by the ethics committee of the University of Vienna.

Participants

In this study we analyzed the data of 38 women, ages ranging from 18 to 37 years. The final sample consisted of two groups with an equal number of subjects: one experimental (19 patients with BN) and one control group (19 healthy controls). The ideal sample size (n = 38) was calculated in advance with the software G*Power Version 3.1.9.2 (Faul, Erdfelder, Lang, & Buchner, 2018) based on the expected effect size for the difference in the body inversion task (d = 1.18, η^2 = .26, α = .05). This effect size has previously been found for the upright body discrimination in a similar study with a sample size of 24 women (Urgesi et al., 2014).

A main inclusion criterion for all participants was a BMI of at least 18.5 and not exceeding 24.5. The BMI's were calculated based on the weight and height of the participants from two different perspectives: Firstly, it was calculated based on the self-reported measurments in the screening questionnaire. Secondly, the experimenter assessed the measurements (weight, height and girth) on-site to validate the data from the screening

questionnaire and to calculate the actual BMI, which was used later on in the analysis. Moreover, exclusion criteria concerning health condition and so forth have been defined for all of the participants (Table 1).

Whereas the participants in the experimental group needed to be diagnosed with BN, the healthy controls should not have had a diagnosis of ED within the last 10 years and should not show undiagnosed ED behavior in the present. This was ascertained by applying the German version of the *Eating Disorder Examination Questionnaire* (EDE-Q) from Hilbert, Tuschen-Caffier, Karwautz, Niederhofer, and Munsch (2007): Healthy controls were not supposed to exceed the cut-off scores in any of the four scales (restraint, eating concern, weight concern, shape concern) of the EDE-Q. Patients with BN were asked to fill out the EDE-Q as well but it was not necessary for them to exceed all of the cut-off scores to be included in the study. Instead, it was sufficient for them to affirm that they are currently diagnosed with BN based on DSM 5 or ICD 10. In the final sample most of the BN patients corresponded to the purging type (89%), while 11% corresponded to the non-purging type. All inclusion criteria are summed up in Table 1.

Table 1

Inclusion criteria for the control group and the experimental group.

Control group	Experimental group
− Women	− Women
− Age: 18-40	− Age: 18-40
− Body Mass Index: 18.5 – 24.5	− Body Mass Index: 18.5 – 24.5
− Eating Disorder Examination Questionnaire (EDE-Q): No exceedance of cut-off scores*	− Current diagnosis of bulimia nervosa (DSM 5 or ICD 10)
− No diagnosis of eating disorders within the last 10 years	− No alcohol and drug abuse
− No alcohol and drug abuse	− No diabetes mellitus
− No diabetes mellitus	− No neurological disorders (e.g. epilepsy)
− No neurological disorders (e.g. epilepsy)	− No current medication with drugs eliciting weight fluctuations (e.g. cortisone)
− No current medication with drugs eliciting weight fluctuations (e.g. cortisone)	− No current pregnancy
− No current pregnancy	

* Cut-offs calculated based on the mean scores plus one standard deviation of the non-clinical

group assessed by Hilbert and colleagues in 2007.

In the beginning, a total number of 52 women were recruited over a three month period by spreading the study invitation via the social media platform Facebook. Furthermore, seven different institutions and 23 clinical psychologists and psychotherapists in Vienna, which/who work in the field of ED, were contacted and asked to forward the invitation to their patients. After the screening process, 44 of the 52 women were invited to participate in the study: Two women were excluded due to incomplete screening questionnaires and two persons with BN were excluded because they were underweight. Moreover, four women who wanted to participate as healthy controls, but who exceeded the cut-off values for the EDE-Q, were also not included in the final sample. Forty of the 44 invited persons actually arranged an appointment for the participation in the study (21 persons with BN and 19 healthy controls). After conducting the experiment we excluded the data of two more persons with BN since their BMI measured by the experimenter was actually below 18.5. In the end, the final sample for the analysis consisted of 38 women (19 BN patients and 19 healthy controls).

The experimental group had a mean age of 23.84 years (*SD* = 5.06) and mean BMI of 21.15 (*SD* = 2.22). The control group had a mean age of 23.05 (*SD* = 2.95) and mean BMI of 20.54 (*SD* = 1.78). There were no significant differences between the two groups concerning age, BMI, weight, height and girth (Table 2). It has to be noted though, that five of the patients with BN refused getting their measures taken on-site. Therefore, the BMI of these persons was calculated based on the self-reported measurements from the screening and were not further validated.

Table 2

Demographic and clinical information of BN patients and healthy controls.

	patients with BN	control group	patients versus controls
	Mean (*SD*)	Mean (*SD*)	
Sample size	19 women	19 women	
Age (years)	23.84 (5.06)	23.05 (2.95)	t_{36} = -.59, p = .56
BMI (kg/m²)	21.15 (2.22)	20.54 (1.78)	t_{36} = -.93, p = .36
Weight (kg)	59.39 (8.78)	57.53 (7.18)	t_{36} = -.72, p = .48
Height (cm)	167.00 (5.71)	167.00 (7.81)	t_{36} = .00, p = 1.00
Girth (cm)	71.90 (5.07)	70.68 (4.46)	t_{36} = -.74, p = .46

EDE-Q			
Restraint (Cut off = 2.6)*	5.17 (1.16)	1.39 (0.45)	t_{36} = -13.29, $p \leq .00$**
Eating concern (Cut off = 1.84)*	4.35 (1.59)	1.13 (0.15)	t_{36} = -8.77, $p \leq .00$**
Weight concern (Cut off = 3.08)*	4.86 (1.44)	1.60 (0.66)	t_{36} = -8.99, $p \leq .00$**
Shape concern (Cut off = 3.69)*	5.29 (1.27)	1.95 (0.76)	t_{36} = -9.81, $p \leq .00$**

* Cut-offs calculated based on the mean scores plus one standard deviation of the non-clinical group assessed by Hilbert and colleagues in 2007.

** $\alpha = .01$

Material

To screen for symptoms of ED or ED behavior in participants of the control group, the German adaptation of the Eating Disorder Examination-Questionnaire (EDE-Q; Hilbert et al., 2007) was used. The EDE-Q focusses on the past 28 days and surveys different aspects of eating-disorder psychopathology on a 7-point rating scheme. It consists of 22 items from which one global score and four subscale scores can be derived: dietary restraint, eating concerns, weight concerns and shape concerns. Six additional items assess the frequency of binge-eating and compensatory behaviors.

Furthermore the *Self-Objectification Questionnaire* (SOQ; Fredrickson et al., 1998) was used to gather information about the participant's perception of their own body relating to test our hypothesis H4. In this ten-item rank order survey, the participant has to rank different body attributes according to their importance for the participant's self-concept from 1 (*least important*) to 10 (*most important*). Half of the items in the questionnaire are competence-based (strength, physical coordination, energy level, health and physical fitness) and half of them are appearance-based (weight, sex appeal, physical attractiveness, firm muscles and body measurements). The SOQ score may range from -25 to 25, with higher scores indicating higher levels of self-objectification. It is an ipsative measure, therefore it is not possible to calculate an internal consistency. However, construct validity has been demonstrated (Noll & Fredrickson, 1998). Since the SOQ is only available in English, it was translated into German and validated by the retranslation method in the course of this study.

The inversion task was presented on a computer screen (19-inch CRT-monitor, 100 Hz, 1280×1024 pixel) in a quiet laboratory with dimmed light. A chin-rest was used to

stabilize and control the viewing distance at 64 cm. The task was based on three sets of stimuli, which are further described in the following sections.

Additionally two more questionnaires were applied to gather information that is not directly linked to the hypotheses but which was considered to be helpful in regard to the interpretation of the outcomes of the inversion task: The German adaptation of the *Body Checking Questionnaire* (BCQ; Vocks, Moswald, & Legenbauer, 2008) and the *Positive Affect Negative Affect Schedule* (PANAS; Grühn, Kotter-Grühn, & Röcke, 2010).

The BCQ consists of 23 items assessing different body checking behaviors. Participants indicate how often they show a specific behavior on a 5-point Likert scale from 0 (*never*) to 4 (*very often*). All items contribute to one global score, which may range from 0 to 21, with higher values indicating a more frequent body checking behavior. Reliability estimates based on the data of women are indicative of adequate internal consistency (α = .90-.95) and test-retest reliability (r_{tt} = .88) (Vocks et al., 2008). Furthermore convergent validity has been demonstrated (Vocks et al., 2008).

The participants filled out the PANAS before (t0) and after the experiment (t1) to check for changes in their emotional state, which might influence the results. On a 5-point Likert-scale from 1 (*very slightly or not at all*) to 5 (*extremely*) participants had to indicate for 20 different emotions, how strong they feel these emotions in that present moment. Ten of the items were used to calculate the positive affect score and the other ten items were used to calculate the negative affect score. To find out if there were any changes in the emotional state during the experiment, the scores from t0 from the scores from t1 were substracted. High internal consistencies have been shown for both subscales (α = .86) (Grühn et al., 2010).

Stimuli

The experiment involved three different categories of stimuli: faces, bodies with faces and bodies without faces (see Figure 1). Each category consisted of photographs from a frontal perspective of six different female identities, which were presented in an upright or inverted position. Following each category contained 12 stimuli (6 upright, 6 inverted) summing up to an overall number of 36 stimuli. All of them were grey-scaled cropped photographs on a white background with a size of 450 x 610 pixels.

Faces. The face-stimuli were retrieved from the online database *Karolinska Directed Emotional Faces* (Lundqvist, Flykt, & Öhman, 1998) and adapted for the purpose of the study. The photos from the database show female Caucasian amateur actors, ages ranging from 20 to 30 years, expressing different emotions. In this study we only used the faces with neutral expression of six similar looking women from the database. To achieve an appropriate

level of difficulty for the subsequent recognition task, the photos have been further adjusted in Adobe Photoshop: The hair and background was removed and the shape of the face was standardized by fitting the face into a standard ellipse form. Additionally the position of the eyes was standardized. The women showed no specific accessories like earrings or glasses.

Bodies with faces. For the body stimuli we took photographs of six Caucasian female students with a BMI within a normal-weight range (18.5-24.5) and ranging in age from 21 to 27 years. The photographs were taken with a digital camera in a standardized camera and light setting, in which the women wore the same form-fitting clothes and posed in front of the same background. The women were asked to tie their hair back and to remove noticeable make-up, glasses or other accessories. Furthermore, they were instructed to adopt the same neutral and slightly asymmetric posture. Subsequently the photographs have been adjusted in Adobe Photoshop so that all the bodies had the same height.

Bodies without faces. For the third category the same body-stimuli as before were used but with one further adjustment: The faces were scrambled by using the Gaussian blur function in Adobe Photoshop.

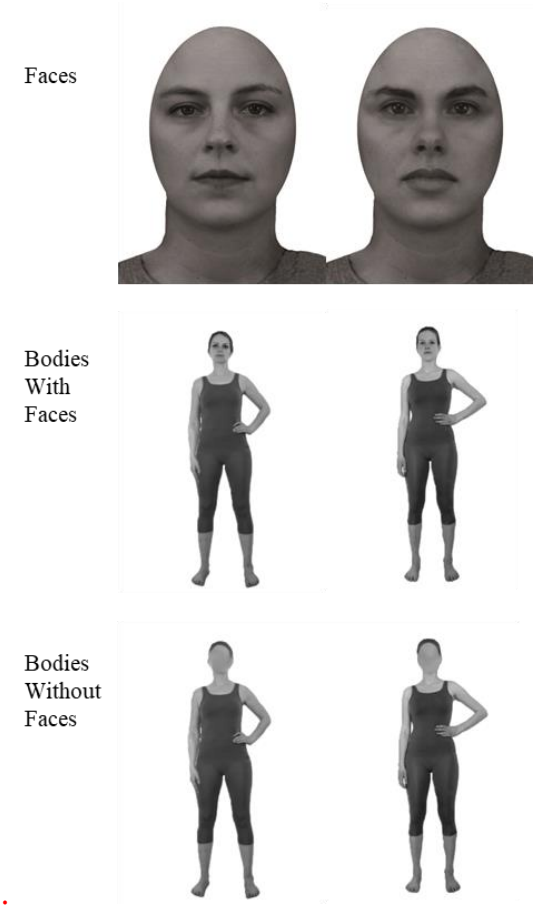

Figure 1. Two examples of stimuli for each of the three categories.

Experimental Task

In the main experiment the participants were instructed to complete three blocks of different inversion tasks at the computer based on the three stimulus categories: face inversion task, body (with faces) inversion task and body (without faces) inversion task. The blocks were presented in a counterbalanced order between the participants. Each block contained 120 trials, with each stimulus of that category presented 20 times (10x as target, 10x as distractor).

The inversion tasks were realized in a delayed matching-to-sample task: Participants saw one face, body with face or body without face in an upright or inverted position in the center of the screen for 250 ms followed by a random-dot mask (450 x 610 pixels) for 500 ms. The duration time was in line with previous studies testing body inversion (Urgesi et al., 2014; Minnebusch et al., 2008; Reed et al., 2006; Yovel et al., 2010). Since body- and face-stimuli differed in luminance, the luminance of the random dot mask was matched to the luminance of the respective stimuli category. As soon as the mask disappeared, two stimuli from the same category appeared next to each other in an upright or inverted position and remained on the target screen until a response was made. One of the two stimuli was the same as the one shown in the beginning of the trial (target), whereas the other one was a distractor. For each trial the stimulus category and stimulus orientation remained the same, e.g. if an inverted face was shown on the first screen, the target screen showed two inverted faces. Participants were supposed to indicate the position of the stimulus, which was presented before the mask, by pressing the left or right arrow key on the keyboard as fast as possible. The stimulus-presentation timing and randomization were realized using OpenSesame Version 3.2.4 (Mathôt, Schreij, & Theeuwes, 2018). For further explanation see Figure 2.

To ensure that the stimuli and the experimental procedure were suitable and that the task had an appropriate level of difficulty in order to effectively discriminate between different recognition performances, the task was administered to six test subjects (healthy persons, ages ranging from 21 to 29) in a pilot study. No ceiling effects were found and the mean accuracy rates for the different categories were around 85% (face_upright: M = 88.50 %, SD = 4.32; face_inverted: M = 83.00 %, SD = 6.13; bodyface_upright M = 88.00 %, SD = 6.39; bodyface_inverted: M = 83.83 %, SD = 5.91; body_upright: M = 87.33 %, SD = 7.37; body_inverted: M = 82.50 %, SD = 6.35). The computation of an ANOVA revealed a significant main effect in orientation ($F(1, 5) = 10.63$, $p = .02$, $\eta_p^2 = .68$) but no main effect of category ($F(2, 10) = 0.08$, $p = .93$, $\eta_p^2 = .02$) and a non-significant interaction between category and orientation ($F(2, 10) = .30$, $p = .75$, $\eta_p^2 = .06$). Therefore, the task is considered as a suitable measurement to detect differences in performances and show inversion effects.

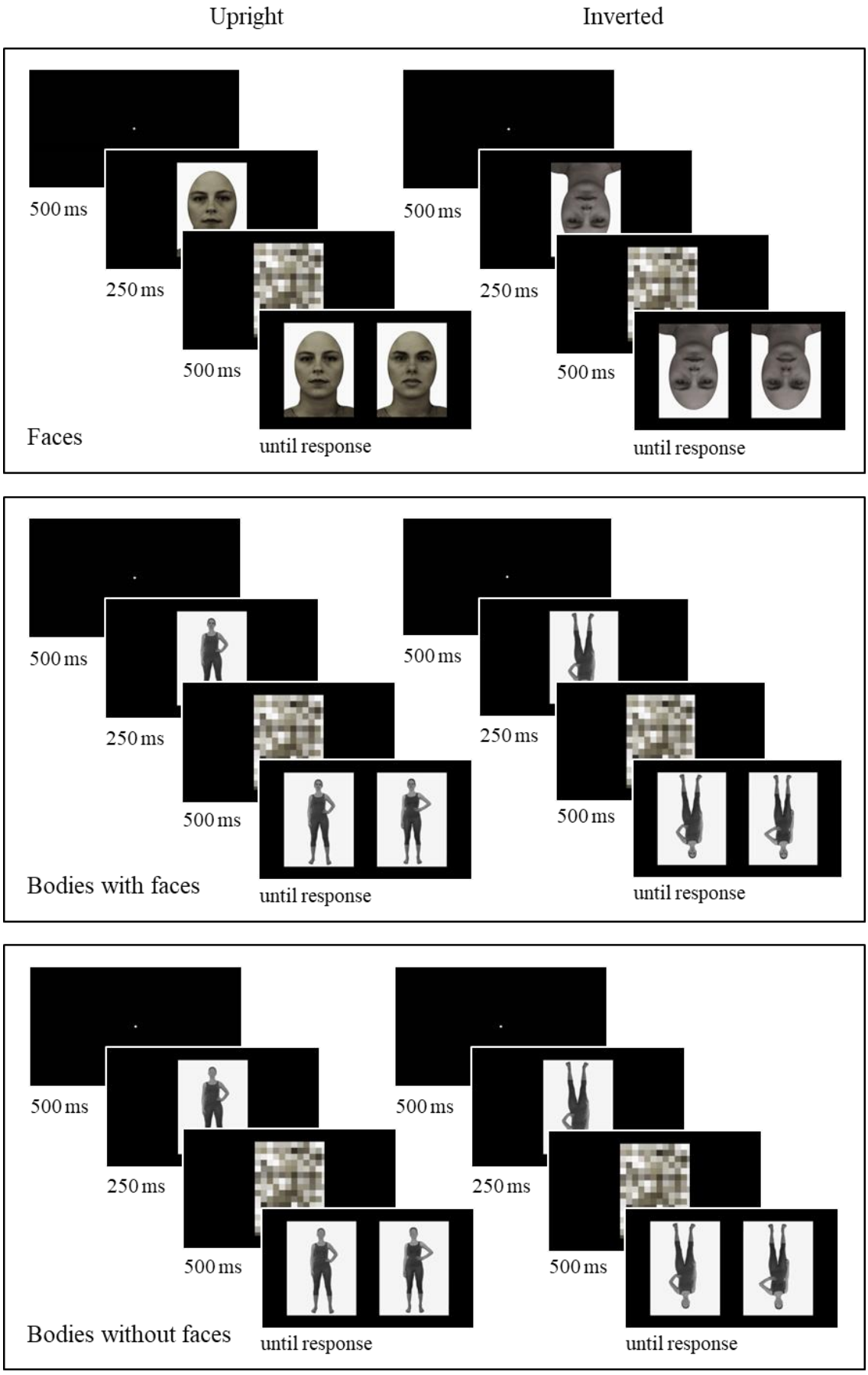

Figure 2. Examples of trials of the delayed matching-to-sample task. One example is shown for both orientations within the three different stimulus categories.

Procedure

Before the participants were able to sign up for the study, they needed to fill out an online screening questionnaire on SoSci Survey Version 2.5.00-i1142 (Leiner, 2018). The questionnaire consisted questions about the exclusion criteria and the German adaptation of the EDE-Q (Hilbert et al., 2007) in order to screen for ED symptoms and ED behavior. If the participants met the necessary criteria, they were contacted in order to make an appointment for a single experimental session lasting approximately 50 minutes in a laboratory at the Faculty of Psychology of the University of Vienna.

After arrival at the laboratory, each participant was provided with written information about the study and was asked to sign a consent form and to fill out the German adaptation of the PANAS. Afterwards the participants were asked to sit down in front of a computer and to position their head in a chin rest. Before the actual experiment was conducted the participants completed 20 test trials per inversion task to get used to the task and to clarify any prior questions or problems.

The experiment session finished with the completion of the questionnaires and the assessment of the participant's body measures (weight, height, girth). Finally, the participant was paid 20€ and debriefed about the purpose of the study. The whole procedure is shown in Figure 3.

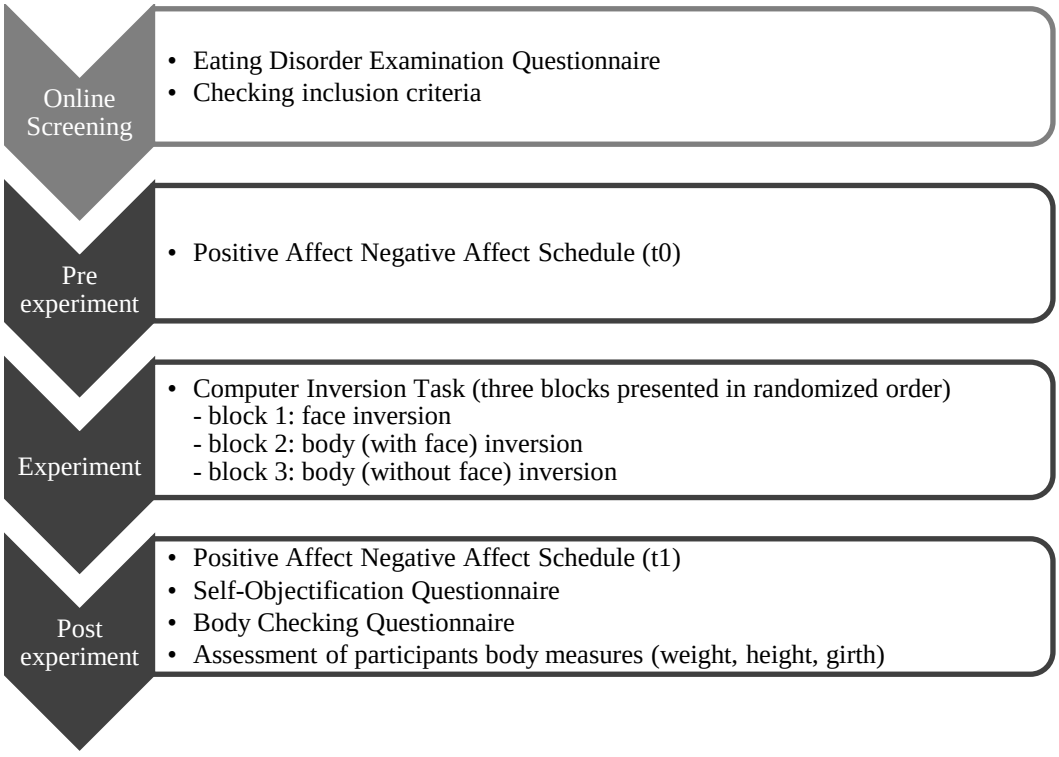

Figure 3. Overview of the experimental procedure and prior screening phase.

Design

The study constituted a cross-sectional quasi-experiment with a 2 (patients with BN vs. healthy controls) x 3 (body vs. body without face vs. body with face) x 2 (upright vs. inverted) design. The group membership was a between-subject factor, whereas the stimuli category and the orientation were within-subject factors. The drop of performance (operationalized as reaction time and accuracy rate) following the inversion of stimuli represented the dependent variable in the analysis.

Data Handling

Questionnaires

The three questionnaires (PANAS, BCQ, SOQ) have been used to gather essential information about factors, which might affect the participants performance in the inversion task and therefore help understanding the outcome of analyses. To check if there have been any significant group differences in body checking behavior, self-objectification and emotional state during the experiment, four two-tailed t-tests have been computed: One comparing the BCQ-scores, one comparing the SOQ-scores and two for the comparison of the two scores resulting from the PANAS (change in positive affect and in negative affect before and after inversion task). Since the BCQ-data did not meet all statistical assumptions for a *t*-test, we calculated a Mann-Whitney-U-test instead.

There were no significant outliers in the questionnaire data except for two values in the negative affect scale of the PANAS (Figure 4). Since the mean and standard deviation are generally sensitive to extreme values and might distort the outcome of the *t*-test, the winsorizing method was used to reduce the impact of the two extreme values. Accordingly, the two extreme values were replaced by the maximum and minimum values at the threshold.

The Shapiro-Wilk test confirmed the normality assumption for the positive affect scale of the PANAS (controls: $p = .98$; BN patients: $p = .31$), the negative affect scale of the PANAS (controls: $p = .52$; BN patients: $p = .36$), the SOQ score (controls: $p = .78$; BN patients: $p = .69$) and for the BCQ score in BN patients ($p = .47$). However, the normality assumption for the BCQ was rejected in the control group ($p = .01$).

Furthermore the variance homogeneity was confirmed by the Levene-Test for all of the questionnaires (PANAS_positive: $p = .59$; PANAS_negative: $p = .10$; SOQ: $p = .83$) expect for the BCQ ($p = .01$).

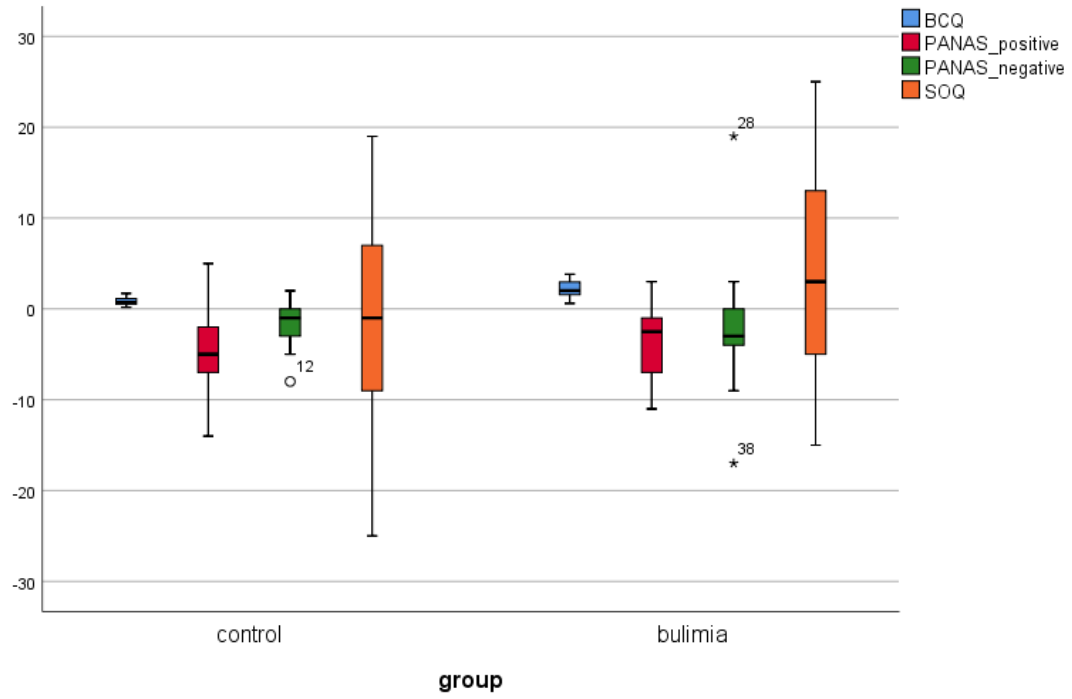

Figure 4. Box-plot diagram displaying the measures of central tendency and measures of variation of the BCQ scores, SOQ scores and the two scores of the PANAS in each group before winsorizing. The diagram reveals two significant outliers in the BN patients group on the negative affect score of the PANAS.

Inversion Tasks

The following paragraphs will describe the handling of the data from the experimental inversion task. After describing the process of the data preparation, it will be explained which steps were administered to check if the collected data corresponds to the necessary assumptions for the analysis and how violation of those assumptions were handled. In the end, the subsequent computing steps of the analysis will be outlined.

Data preparation. The data of two participants had to be excluded from the analysis since their BMI was too low. For each of the remaining 38 participants (19 per group) the mean proportion of correct responses (accuracy rate) and the mean reaction time for correct responses were calculated for each category and orientation. Basically, this would have added up to 60 trials per cell but not all trials were included in the data analysis: Trials with a reaction time lower than 200 ms and higher than 5000 ms were considered as invalid and were removed from the computation of both accuracy and reaction time (RT) values. The identification of those trials resulted into the deletion of 0.19 % of the total trials in the experimental group and 0.35% of the total trials in the control group.

The resulting mean accuracy rates and mean RT for correct responses were entered into two separate SPSS files and transformed into a wide format with seven variables: One variable indicating the group affiliation and the other six representing the six experimental conditions. The six conditions result from the combinations of the two within-subject factors category (faces, bodies with faces, bodies without faces) and orientation (upright, inverted): face-up, face-inv, bodyface-up, bodyface-inv, body-up and body-inv.

Statistical assumptions. Prior to the analysis it was checked if the data fulfills the necessary requirements for the analysis: First, important outliers in the mean accuracy rate and mean RT for each experimental condition within each group were identified. Whereas there were no important outliers in the RT data (Figure 6), the box-plot revealed important outliers in the accuracy data (Figure 5): The data from one BN patient was found to be an outlier in all six conditions. Furthermore, there was another outlier for one control person in one condition (body-up). We deleted important outliers and marked them as missing values. In the following, the results for the mean accuracy rates including and excluding outliers will be reported.

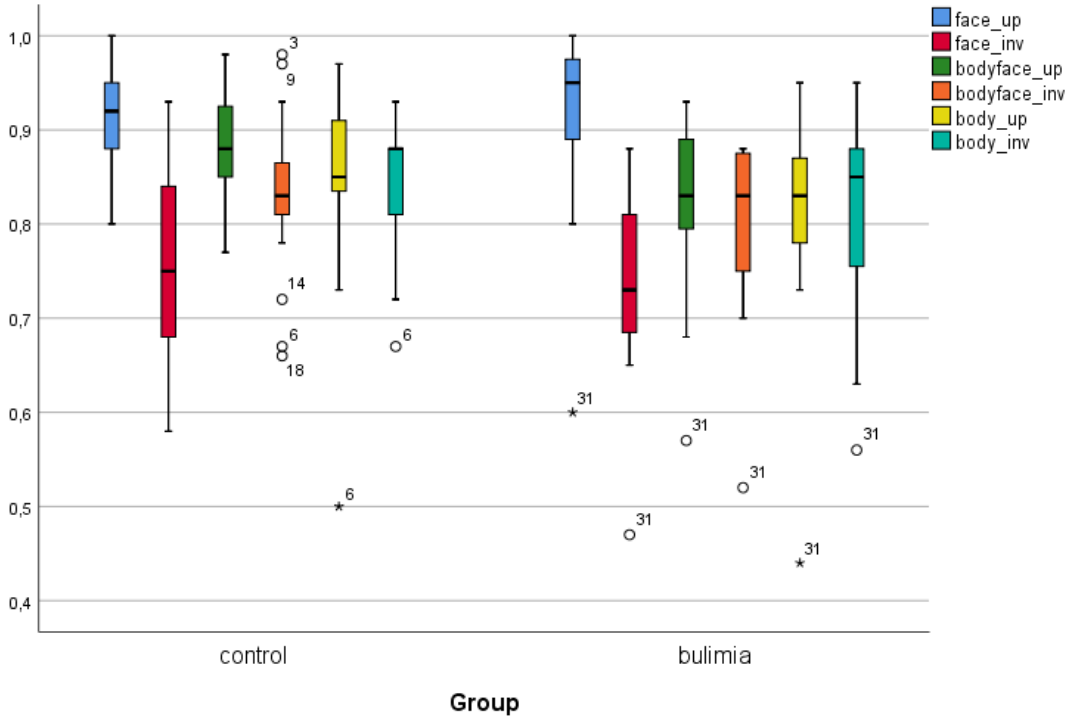

Figure 5. Box-plot diagram displaying the measures of central tendency and variation of the mean accuracy rates in the six experimental conditions for both groups. The diagram reveals one significant outlier in the control group and six outliers in the BN patients group.

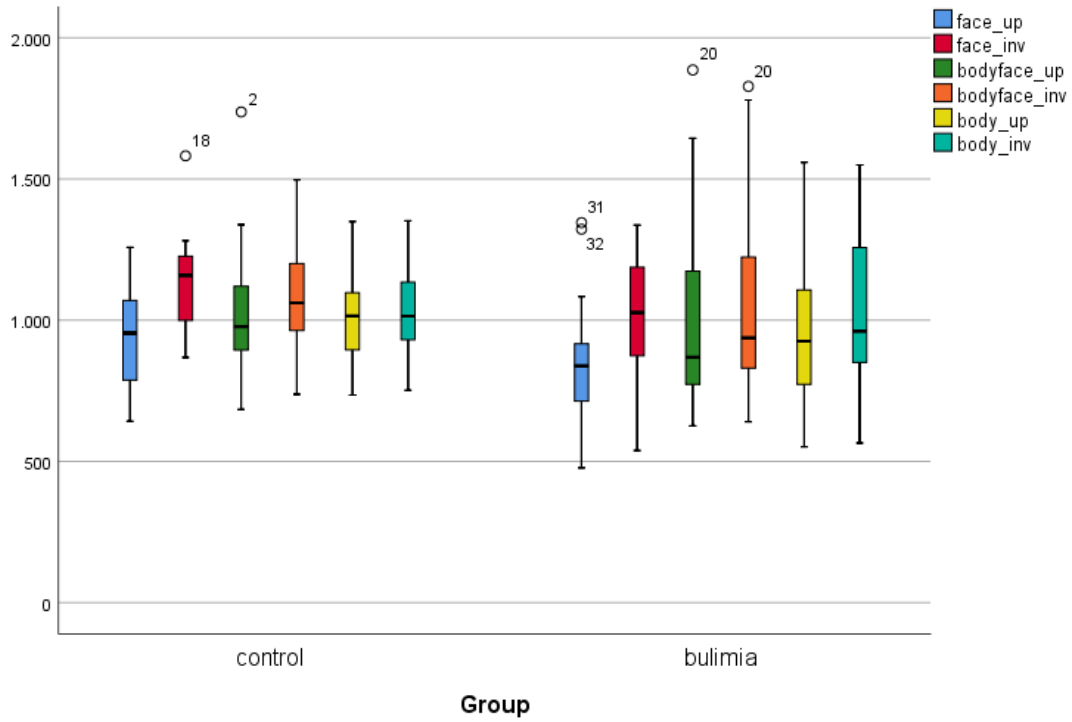

Figure 6. Box-plot diagram displaying the measures of central tendency and variation of the mean reaction times in the six experimental conditions for both groups. The diagram reveals no significant outliers.

Since the multivariate normal distribution cannot be checked directly in SPSS, the univariate normal distribution of each group in each dependent measure was tested instead. The Shapiro-Wilk test did not confirm the normality assumption for the accuracy data in two of the six conditions in the control group (body-up, body-inv) and in four of the six conditions in the experimental group (face-up, bodyface-up, bodyface-inv, body-up). After removing the outliers from the accuracy data, the normality assumption was not given for one of the six conditions in the control group (body-inv) and in three of the six conditions in the experimental group (face-up, bodyface-inv, body-inv). Concerning the RT data the Shapiro-Wilk test confirmed the normality assumption in all of the six conditions of the control group but not for two of the six conditions in BN patients (bodyface-up, bodyface-inv).

The Levene test confirmed variance homogeneity for the accuracy and most of the RT data, except for the body-inv condition in the experimental group (p = .02).

Since the stimulus category depicts a factor with more than two levels, the homoscedasticity of that factor was tested and confirmed with the Mauchly test for sphericity.

Additionally, it has to be noted that we found a small ceiling effect of 5.26% in both groups for the mean accuracy rate in the face-up condition.

Since the *F*-statistic of the ANOVA is quite robust against violations of the normality assumption as long as the group sizes are equal (Field, 2013), the violations are considered as negligible for the following analysis.

Data analysis. We applied different strategies in SPSS in order to analyze the data. All of the following steps were computed three times: Once for mean RT and twice for the mean accuracy rates (with and without outliers). Firstly, a three-factor mixed ANOVA with one between-subject factor (group) and two within-subject factors (category and orientation) was used to test for significant inversion effects in each group for the different stimulus categories. Thereby it is possible to compare directly the performance of BN patients and controls in the matching of upright and inverted stimuli. For a better interpretation of the results, we used pairwise comparisons for all interactions as post-hoc tests. Secondly, an ANCOVA, similar to the ANOVA calculated before but this time including the body checking behavior as a covariate, was computed. This was done to control for a possible effect of the body checking behavior on the body inversion effect.

Thirdly, three new variables describing the inversion effect in each stimulus category directly were computed by subtracting the mean accuracy rate/RT in discriminating inverted stimuli from that in discriminating upright stimuli. To directly compare the inversion effects between the groups, the new variables were entered into a two-factor mixed (3 categories x 2 groups) ANOVA.

Lastly, since the literature suggested a negative correlation between the body checking behavior and the body inversion effect and furthermore a positive correlation between the extent of self-objectification and the body inversion effect, we tested correlations between the three inversion effects and the BCQ- and SOQ-score. In order to investigate if the BMI or changes in the emotional state had any effect on the results, we also tested the correlations of BMI and PANAS-scores with the inversion effects. Correlations were calculated over both groups and for each group separately.

Results

Inversion Task

For the following analyses we applied a significance level of .05.

Accuracy. The analysis of the mean accuracy rates in the recognition of upright and inverted faces, bodies with faces and bodies without faces of BN patients and controls revealed one significant main effect of orientation ($F(1, 36) = 90.38$, $p \leq .00$, $\eta_p^2 = .72$). Significant main effects of group ($F(1, 36) = 1.80$, $p = .19$, $\eta_p^2 = .05$) or category ($F(2, 72) = .25$, $p = .78$, $\eta_p^2 = .01$) have not been detected. The significant main effect of orientation has

been further qualified by a significant two-way interaction between category and orientation ($F(2, 72) = 42.16$, $p \leq .00$, $\eta_p^2 = .54$), which is presented in Figure 7.

Pairwise comparisons regarding the significant two-way interaction revealed that there is a large significant face inversion effect ($F(1, 36) = 121.06$, $p \leq .00$, $\eta_p^2 = .77$), indicating a higher accuracy for faces presented upright ($M = 91.42$, $SD = 1.30$) compared to inverted (M = 75.37, SD = 1.60). Furthermore a smaller but also significant body inversion effect for bodies with faces ($F(1, 36) = 12.53$, $p \leq .00$, $\eta_p^2 = .26$) has been found (upright: $M = 85.58$, $SD = 1.20$ > inverted: $M = 81.55$, $SD = 1.40$). On the contrary we found no significant body inversion effect for bodies without faces ($F(1 ,36) = .04$, $p = .84$, $\eta_p^2 = .00$).

Accordingly, the two-factor mixed ANOVA based on the three calculated variables for each inversion effect, revealed a significant main effect of category ($F(1, 36) = 42.16$, $p \leq .00$, $\eta_p^2 = .54$). Pairwise comparisons showed that the face inversion effect in both groups was significantly higher than both body inversion effects ($p \leq .00$), and that the inversion effect for bodies with faces was significantly higher than for bodies without faces ($p = .04$).

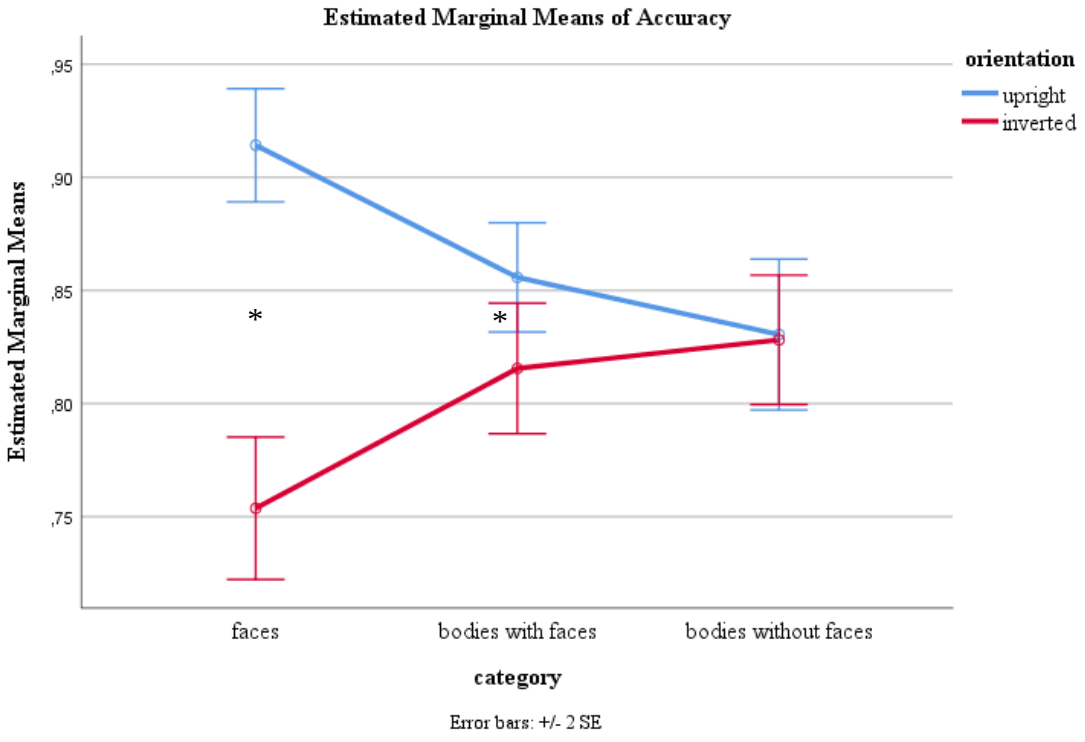

Figure 7. Inversion effect in the stimulus categories based on the mean accuracy rates. The graphic shows significant inversion effects (higher accuracy in the upright compared to the inverted condition) for faces and bodies with faces but not for bodies without faces.

Based on the initially computed three-factor mixed ANOVA, we found no significant two-way interactions between group and orientation (p = .85), group and category (p = .33) or three-way interaction between group, category and orientation (p = .40). However, within the non-significant three-way interaction we found indications for group differences: Pairwise comparisons revealed that the control group shows a significant face inversion effect ($p \leq .00$) and a significant body inversion effect for bodies with faces ($p \leq .00$) but not for bodies without faces (p = .90), whereas BN patients show only a face inversion effect ($p \leq .00$) but no body inversion effect, neither for the bodies with faces (p = .12) nor for the bodies without faces (p = .87). The inversion effects in the different categories are compared between the groups in Figure 8. Additionally, we found a significant group difference in the discrimination of upright bodies ($F(1, 36) = 5.764$, p = .02, η_p^2 = .14) . It has to be noted that the difference between groups is not significant since the interaction itself is not significant.

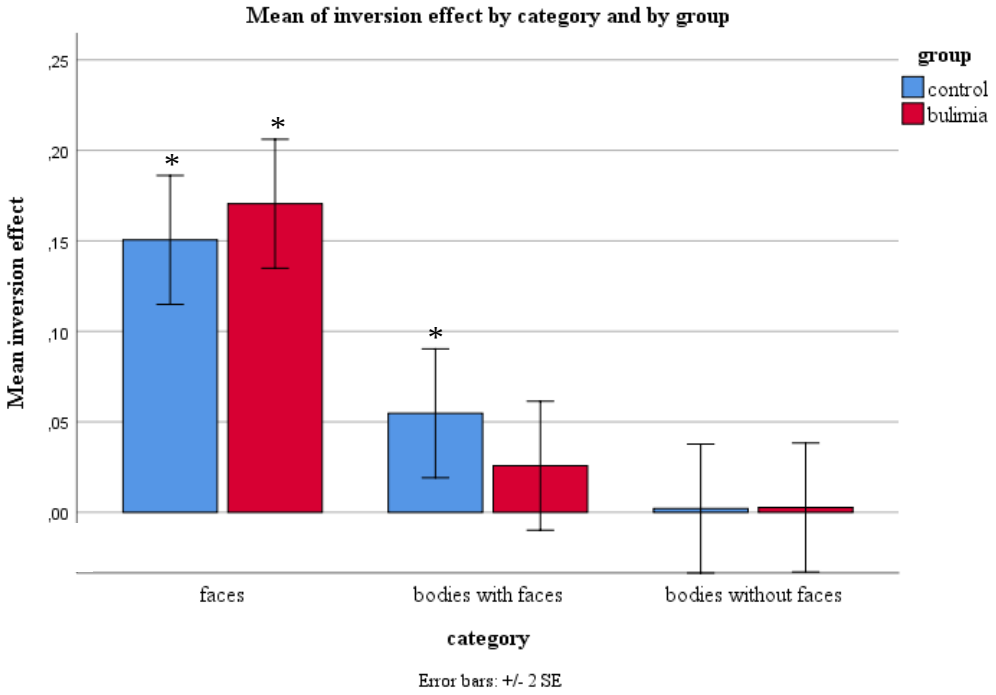

Figure 8. Comparison of the inversion effects based on the mean accuracy rates in the different stimulus categories between the two groups. No significant group differences have been found. Both groups have a large face inversion effect. The control group showed a significant inversion effect for bodies with faces but not for bodies without faces. BN patients showed no inversion effect for each of the body stimuli.

The mean accuracy rates and standard errors are summed up in Table 3. There was no meaningful difference in the significance of results and effect sizes between the accuracy analysis with and without outliers, therefore only the results including outliers are presented.

Table 3

Mean accuracy rates (%) with 95%-confidence intervals and standard error in the six experimental conditions across both groups and for both groups separately.

	patients with BN	control group	both groups
	M [CI]	*M* [CI]	*M* [CI]
	SE	*SE*	*SE*
face-up	91.11 [86.47, 95.74]	91.74 [89.24, 94.24]	91.42 [88.92, 93.93]
	2.20	1.19	1.24
face-down	74.05 [69.36, 78.75]	76.68 [72.02, 81.34]	75.37 [72.19, 78.55]
	2.24	2.22	1.57
bodyface-up	82.68 [78.36, 87.01]	88.47 [85.84, 91.11]	85.58 [82.98, 88.17]
	2.06	1.25	1.28
bodyface-down	80.11 [75.64, 84.57]	83.00 [78.89, 87.11]	81.55 [78.63, 84.48]
	2.13	1.95	1.44
body-up	81.32 [76.30, 86.33]	84.79 [79.89, 89.69]	83.05 [79.67, 86.44]
	2.39	2.33	1.67
body-down	81.05 [76.12, 85.99]	84.58 [81.16, 88.00]	82.82 [79.90, 85.73]
	2.35	1.63	1.44

The calculation of the ANCOVA including body checking behavior as a covariate, revealed no meaningful differences in the significance of the results or the effect sizes in comparison to the previous ANOVA. Therefore, the body checking behavior does not seem to have any effect on the results and we abstain from reporting the exact statistics.

Reaction time. The analysis of mean RTs in the recognition of upright and inverted stimuli also revealed a significant main effect of orientation ($F(1, 36) = 94.15$, $p \leq .00$, $\eta_p^2 = .72$) but not of group ($F(1, 36) = .52$, $p = .48$, $\eta_p^2 = .01$) or category ($F(2, 72) = 2.47$, $p = .09$, $\eta_p^2 = .06$). Similar to the analysis of the mean accuracy rates, one significant interaction between category and orientation was found ($F(1, 36) = 86.08$, $p \leq .00$, $\eta_p^2 = .71$), suggesting that the degree of inversion effect differs across the categories (Figure 9).

Across the two groups, pairwise comparisons showed significant inversion effects in all of the three categories, with different effect sizes: Whereas the inversion effect for faces was highly significant and had the largest effect size ($F(1, 36) = 86.08$, $p \leq .00$, $\eta_p^2 = .71$), the significant inversion effect for bodies with faces ($F(1, 36) = 8.93$, $p = .01$, $\eta_p^2 = .20$) and bodies without faces ($F(1 ,36) = 5.27$, $p = .03$, $\eta_p^2 = .13$) showed smaller effect sizes.

Accordingly, the two-factor mixed ANOVA based on the three calculated variables for each inversion effect, revealed a significant main effect of category ($F(1, 36) = 25.30$, $p \leq .00$, $\eta_p^2 = .41$). Pairwise comparisons showed that the face inversion effect in both groups was significantly higher than both body inversion effects ($p \leq .00$), and that the inversion for bodies with faces was significantly higher than for bodies without faces ($p = .51$).

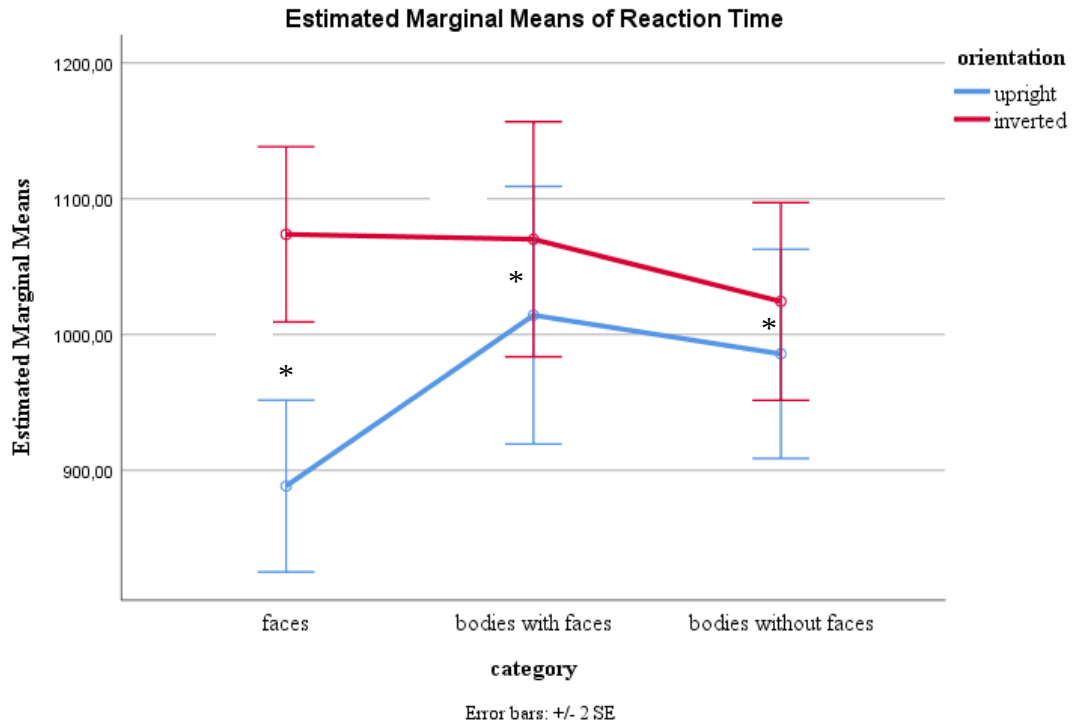

Figure 9. Inversion effect across the stimulus categories based on the reaction times. The graphic shows significant inversion effects (lower reaction time in the upright compared to the inverted condition) for all stimulus categories.

Similar to the results of the non-significant three-factor mixed ANOVA regarding mean accuracies, we found no significant interactions between group and orientation ($p = .93$), group and category ($p = .36$) or three-way interaction between group, category and orientation ($p = .43$). Nevertheless, pairwise comparisons of the non-significant three-way interaction revealed that controls show a significant face inversion effect ($p \leq .00$) and inversion effect for bodies with faces ($p = .04$) but not for bodies without faces ($p = .36$). In contrast the BN patients showed significant inversion effects in all stimulus categories (face: $p \leq .00$; bodies with faces: $p = .04$; bodies without faces: $p = .03$). The inversion effects in the different categories are compared between the groups in Figure 10. However, it has to be mentioned that here as well the interaction was not significant and therefore the group differences cannot be considered as meaningful.

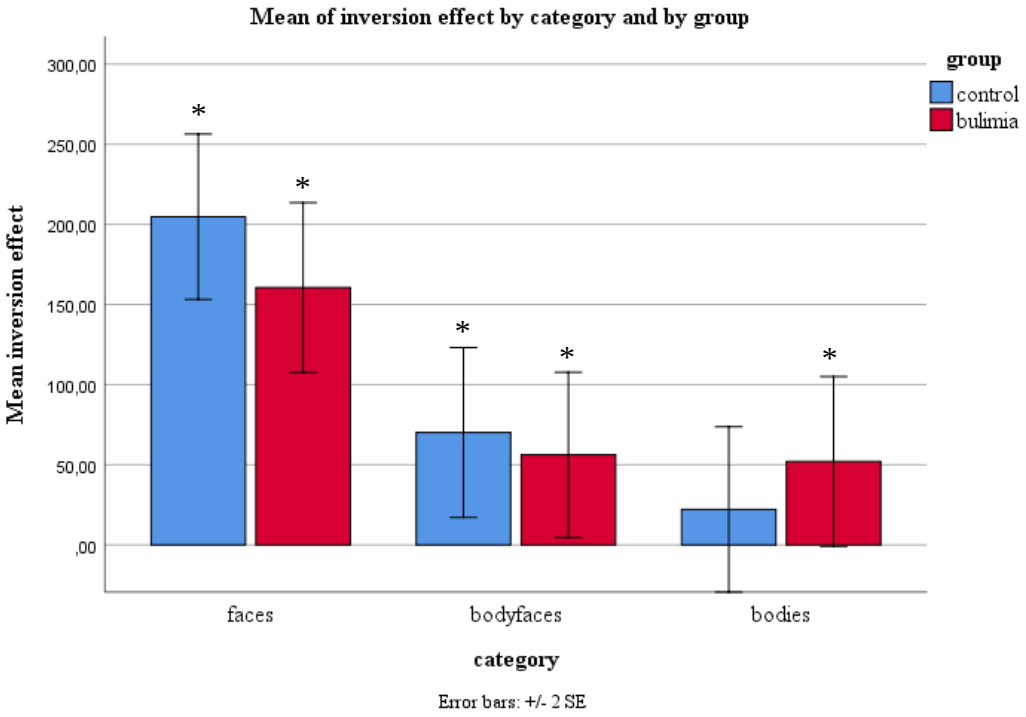

Figure 10. Comparison of the inversion effects based on the mean reaction times in the different stimulus categories between the two groups. No significant group differences have been found. Whereas BN patients show significant inversion effect in all stimulus categories, the control group showed no significant inversion effect for bodies without faces.

The mean RTs and standard errors are summed up in Table 4. In all categories mean RT was higher for inverted than upright stimuli. Same as in the accuracy, the computation of the ANCOVA of the mean RTs including body checking behavior as a covariate did not reveal any meaningful differences in the results, which are therefore not reported.

Table 4

Mean reaction times (ms) with 95%-confidence intervals and standard error in the six experimental conditions across both groups and for both groups separately.

	patients with BN	control group	both groups
	M	*M*	*M*
	[CI]	[CI]	[CI]
	SE	*SE*	*SE*
face-up	850.90	925.92	888.41
	[746.85, 954.96]	[843.08, 1008.76]	[823.93, 952.89]
	49.53	39.43	31.83

face-down	1016.88	1130.68	1073.78
	[910.49, 1123.27]	[1046.61, 1214.76]	[1006.55, 1141.01]
	50.64	40.02	33.18
bodyface-up	997.00	1031.47	1014.24
	[834.47, 1159.53]	[916.08, 1146.86]	[919.25, 1109.22]
	77.36	54.92	46.88
bodyface-down	1053.15	1087.18	1070.17
	[898.03, 1208.28]	[992.31, 1182.04]	[983.49, 1156.84]
	76.84	45.15	42.77
body-up	968,387	1003.13	985.76
	[831.27, 1105.50]	[917.23, 1089.04]	[908.58, 1062.94]
	65.26	40.88	38.09
body-down	1023.44	1025.29	1024.36
	[889.16, 1157.72]	[952.03, 1098.55]	[951.61, 1097.12]
	63.91	34.87	35.91

Questionnaires

The Mann-Withney-*U*-test revealed one significant group difference concerning body checking behavior ($U(1, 35) = 32.00$, $p \leq .00$) indicating more frequent body checking behavior in BN patients. In contrast to our hypothesis the *t*-test on the SOQ scores provided no evidence for a higher self-objectification in BN patients ($t(1, 34) = -1.45$, $p = .15$). Furthermore there were no group differences regarding changes of the emotional state during the experimental setting (PANAS_positive: $t(1, 36) = -.40$, $p = .69$; PANAS_negative: $t(1, 36) = .22$, $p = .83$).

Correlation Analysis

The correlation analysis over both groups revealed positive correlations between body checking behavior and self-objectification ($r = .53$, $p \leq .00$) as well as between body checking behavior and BMI ($r = .35$, $p = .03$), suggesting that a more frequent body checking behavior relates to a higher self-objectification and a higher BMI. Interestingly we found another positive correlation between the two PANAS-scores (positive and negative emotions) ($r = .38$, $p = .03$), which means that if negative emotions occurred during the experimental trial also positive emotions emerged. Furthermore a positive correlation between the face inversion effect based on the mean RT and self-objectification was found ($r = .334$, $p < .05$), meaning that a high self-objectification is associated with a higher face inversion effect in RT.

In the correlation analysis split by groups, similar positive correlations have been found in the control group between body checking behavior and self-objectification ($r = .55$, $p = .017$), between the two scores of the PANAS ($r = .46$, $p < .05$) and between BMI and body checking behavior ($r = .61$, $p = .01$). In comparison to the correlations across groups, we did not find a correlation between the face inversion effect and the self-objectification in the control group. Instead we found a positive correlation between BMI and the inversion effect of bodies without faces based on mean RTs ($r = .46$, $p < .05$).

In the data of the BN patients we also found a positive correlation between body checking behavior and self-objectification ($r = .67$, $p \leq .00$) and between self-objectification and the face inversion effect based on mean RTs ($r = .54$, $p = .02$). Furthermore we found correlations between the negative score of the PANAS and the face inversion effect based on mean RTs ($r = -.48$, $p = .04$), as well as between the negative score of the PANAS and the face inversion effect based on the mean accuracy rates ($r = .47$, $p = .04$). Furthermore we found a negative correlation between the face inversion effect and the inversion effect of bodies with faces based on mean RTs ($r = -.60$, $p = .01$).

Discussion

In this study we investigated if BIDs in women with BN are associated with an altered visual perception of human bodies and self-objectification. Theoretical models and empirical findings suggest that persons with BID process bodies only analytically, whereas an additional configural processing facilitates body processing in healthy individuals. Consequently, BIDs might comprise a strong focus on single body parts and hence the inability to perceive a body in its entirety. In addition, if BN patients perceive human bodies analytically rather than configurally, they process bodies in the same way as objects. Therefore we assumed that BN patients show a higher self-objectification meaning that they think of their bodies as objects. Investigating these potential alterations in visual perception and cognitive processing is elemental to gain more insight in the mechanisms underlying BID.

Hereafter, the results of the inversion task and the SOQ with respect to the previously stated hypotheses are discussed. Additionally, we discuss unexpected outcomes concerning the magnitude of inversion effects depending on the different stimulus categories, as well as correlations between all of the assessed variables (inversion effects, self-objectification, body checking behavior, emotional state and demographic information). Finally, we will address limitations of the study and point out implications for future research.

Configural vs. Analytical Processing and Self-Objectification

Our first three hypotheses (H1-H3) refer to the existence and the quality of group differences based on the recognition performance in the inversion tasks. With respect to previous studies, we hypothesized to find a reduced body inversion effect in BN patients compared to healthy controls (H1). We assumed that BN patients show a lower accuracy and a higher RT in the upright condition compared to healthy controls (H2). Therefore, the difference between performances in the upright condition compared to performances in the inverted condition were expected to be smaller in patients with BN than in healthy controls. On the contrary, healthy controls were expected to show a larger performance drop between the upright and inverted condition. Consequently, they were hypothesized to show a significant weaker performance in the inverted condition than in the upright condition. Based on previous results (Urgesi et al., 2014) we assumed that the difference between the groups is selective for the two body stimuli (without face and with face) and that it will not be present in the face inversion task (H3).

Our fourth hypothesis (H4) referred to self-objectification, which was expected to be higher in BN patients compared to healthy controls. In case that BN patients process bodies analytically, this would mean they observe bodies like objects. This is supported by the theoretical framework of Fredrickson and Roberts (1997), suggesting that persons with ED not only perceive their bodies as objects but also think of their bodies as objects.

The results of our study cannot provide evidence for any of the hypotheses: Although we found significant inversion effects for faces and bodies with faces, we found no significant results concerning the in-between-subject factor (group). Therefore, our results of the inversion tasks showed no meaningful group differences, neither in mean accuracy rates nor in mean RTs. Furthermore, the SOQ scores revealed no significant differences in self-objectification between BN patients and healthy controls.

Since our study is underpowered due to the small sample size, our findings do not necessarily imply that there really are no differences between the two groups. We calculated the optimal sample size based on the findings by Urgesi et al. (2014), who found a very large effect in a small group of AN patients in the way that AN patients showed a significantly weaker performance in the recognition of upright bodies compared to healthy controls. However, this effect might not be as large in the BN population as in the AN population. Some previous studies indicate, that effects found in regard to ED populations are more extreme in AN than in BN populations (Bauer et al., 2017; Blechert et al., 2010). Furthermore, previous studies found that the quality of perceptual impairments and other

symptoms differs between AN and BN patients (Blechert et al., 2010; Blechert et al., 2011). According to these differences, it could be assumed that the questioned effect in the BN population is only medium instead of large. In this case our study design would be underpowered with 66.57 % and might be unable to detect a significant group difference.

Indeed, we found some indications for existing group differences: A closer look in the unsignificant three-way interaction (including category, orientation and group) revealed that the control group showed an inversion effect for faces and bodies with faces, whereas BN patients only showed inversion effects for faces. Additionally, the pairwise comparisons revealed that BN patients discriminated upright bodies with faces with a lower mean accuracy compared to controls. These group differences match the findings by Urgesi et al. (2014) and would partially confirm our hypotheses. Consequently, this would mean that BN patients show indeed a reduced body inversion effect compared to healthy controls (H1) to the effect that BN patients show a lower accuracy rate in the upright condition compared to healthy controls (H2). This group difference has been found for bodies with faces (H3) but not for bodies without faces.

Whereas findings based on mean accuracies indicated group differences in line with our hypotheses, findings based on mean RTs indicated group differences contrary to our hypotheses. While healthy controls showed inversion effects in the recognition of faces and bodies with faces, BN patients showed inversion effects for all three stimulus categories.

A possible explanation for the contrary findings could be that the impairment in configural processing only concerns the accuracy but not the speed with which a body is recognized. However, as mentioned before, the potential but unsignificant group differences in our study cannot be interpreted as meaningful since the three-way interaction itself was not significant. Therefore, the contrary findings might as well be completely random and meaningless, indicating that BN patients simply have no impairment in configural body processing.

Explanatory approach for missing groups differences. Apart from the low statistical power, there are other possible explanations for the fact that we did not find the group differences, which were expected based on the previously findings of other studies (e.g. Dakanalis, Clerici et al., 2017; Fitzsimmons-Craft et al., 2011; Mundy & Sadusky, 2014; Urgesi et al., 2014): One reason might be that an impaired configural processing only corresponds to BIDs in patients with AN but not patients in BN. For instance, Blechert et al. (2010) found that AN patients reacted significantly faster in a dot-probe task when the cue was a picture of the own body compared to when the picture showed another person’s body.

Such an attentional bias was not found for patients with BN. The BN group even showed a reverse pattern with an unsignificant faster reaction towards another person's body. Blechert et al. (2010) argued that the pictures activate different neural structures in BN patients compared to AN patients. Accordingly, whereas photos of the own body activate neural structures associated with a fear response in patients with BN, they activate neural structures associated with attention and somatosensoric processing in patients with AN (Beato-Fernández et al., 2009). These results suggest that the underlying processes of BIDs are different in patients with AN and BN. Further evidence for essential differences in BN and AN patients is provided by Blechert et al. (2011), who found that associations between shape and weight concern and non-appearance-related self-evaluation of interpersonal relationships and achievement/performance is more distinctive for BN patients compared to other ED groups. Therefore, the role of appearance and body size may not be as crucial in BN as in AN. Taken together, these findings might explain why Urgesi et al. (2014) found group differences concerning the body inversion effect in patients with AN, while we could not find them for patients with BN. However, this study does not provide evidence for this hypothesis since it included no AN control group.

In case that BN patients actually show an impairment in configural body processing, a reason why we did not find group differences might be that this impairment in BN patients is limited to the perception of the own body and not bodies in general. Blechert et al. (2010) discussed that BN patients might feel more threatened by confrontation with the own body compared to AN patients, since BN patients "realize that their BMIs are above the ones suggested by the current cultural body shape ideal" (p. 583). If this is true, it might be possible that a perceptual distortion like an impairment in configural processing mostly affects the perception of the own body but not the bodies of others. Accordingly, patients with BN might only objectify their own body but not bodies of others. However, there is some contradicting evidence to this hypothesis: Firstly, BN patients in our study did not report a significantly higher self-objectification than healthy controls, which would have indicated that BN patients perceive or think of their own bodies differently. Secondly, Bosbach et al. (2006) investigated the matter of embodiment in the perception of bodies and estimation of body sizes. They hypothesized that body posture recognition and therefore body inversion effects are not based on visual information alone but also rely on proprioceptive inputs. Contrary to this hypothesis, they found that a patient, who lost afferent inputs to his internally based representation, also used configural body processing like the control group. Therefore,

embodied stimulation may not be necessary for body posture recognition. This might indicate that persons process bodies similarly, regardless of whether they embody the body or not.

The fact that we could not replicate the findings of Urgesi et al. (2014) in the BN patients group might also be due to differences in the applied inversion tasks: Regarding the stimuli, the persons depicted in our body stimuli wore form-fitting clothes, which covered the upper body and three-quarters of the legs, whereas the persons in the body stimuli used by Urgesi et al. (2014) just wore underwear. That clothing can impact the results of the body recognition task has been shown by Horndasch et al. (2012), who found that ED patients have an attentional bias towards unclothed body parts. This could implicate that BN patients in our study focused on other body parts or were not as much affected by the attentional bias for unclothed body parts as the AN patients in the study conducted by Urgesi et al. (2014). Another and even more important difference between the inversion tasks used in this study and the tasks used by Urgesi et al. (2014) is that we used an identity-based approach in all three stimulus categories, whereas Urgesi et al. (2014) used, unlike any other study before (Bosbach et al., 2006; Brandman & Yovel, 2010; Reed et al., 2003; Reed et al., 2006; Yovel et al., 2010), a mixed posture- and identity-based approach for bodies and a solely identity-based approach for the two control conditions (faces and objects). Concerning their body inversion task, it means that target and distractor differed not only in identity but also in posture (different individuals with slightly different postures e.g. shifted arm), whereas faces and objects differed in identity only. Therefore, the reported effect might also be a result of deviant difficulty levels concerning the discrimination of the different stimulus categories: Participants had to discriminate the body stimuli on two levels, whereas stimuli in the control categories only required discrimination performance on one level. However, in our study we standardized the posture in our body stimuli, so that participants only had to discriminate between identities as in the other stimulus categories. This difference is very important, since the recognition of bodies based on their posture or identity might require different strategies of configural processing. Taken together the definitions of configural processing by Piepers and Robbins (2012) and Maurer et al. (2002), we could assume that the recognition of body postures requires especially the detection of first-order relations, whereas the recognition of identities is based on the processing of second-order relations. Furthermore, Rhodes (2013) suggests that there is another component within the configural model, which might play an important role: *Higher-level features* require a combination of several first- and/or second-order features. One example for a higher-level feature is age as a function of hair coverage, skin tension and so forth. Also weight has been identified as a higher-level factor by Rhodes

(2013). If posture and identity-based discrimination tasks really assess different configural processing strategies, that would mean that our body inversion task is not comparable to the one used by Urgesi et al. (2014).

However, independent from the findings of other studies, our results indicate that BN patients other than AN patients indeed show no impairment in configural processing. As mentioned before though, the results of this study do not represent the characteristics of the general BN population due to the underpowered study design.

Impact of body checking behavior and emotional state. The analysis of the questionnaire data revealed that the group showed different scores in the BCQ, indicating that BN patients engage in significantly more frequent body checking behavior compared to healthy controls. As mentioned in the theoretical background, body checking behavior has been assessed in order to check if one group is „more expert“ in the observation of human bodies, which might influence the body inversion effect. To check if the body checking behavior has any effect on our data, we computed an ANCOVA in which we included the body checking behavior as a covariate. Since there were no meaningful differences between the results of the ANOVA and the ANCOVA, we assume that body checking behavior had no influence on the inversion effect.

Since there were no group differences in the PANAS scores, we further assume that there has been no distortion of results caused by differences in the emotional state.

Evidence for domain-general hypothesis. Apart from the results concerning our hypotheses (group differences), our data analysis revealed interesting findings regarding differences in the magnitude of inversion effects based on the three stimulus categories. In all categories, mean accuracies were higher and mean RTs were lower in the upright conditions, which indicate inversion effects.

Based on the face-specific hypothesis (e.g. Susilo et al., 2013) we expected that healthy controls (and since there are no group differences we would expect the same for BN patients) show similar inversion effects in all stimulus categories. Instead, we only found inversion effects in faces and bodies with faces, whereby the face inversion effect has been significantly larger than the inversion effect found in bodies with faces. There was no inversion effect found for bodies without faces based on mean accuracy.

These results are in line with the domain-general hypothesis, stating that the body inversion effect is mediated by facial information (e.g. Brandman & Yovel, 2010, 2016). Consequently, the body inversion effect actually seems to represent a face inversion effect.

Considering this, it is questionable if body inversion tasks are a suitable method to investigate body-selective impairments in the configural processing in persons with ED.

Correlations

Additional to the results of the inversion tasks, we found some correlations between the assessed variables including the three inversion effects, self-objectification, BMI, body checking behavior and emotional state.

Body checking behavior, self-objectification and body mass index. The data of both groups taken together revealed a positive correlation between body checking behavior and self-objectification. Furthermore, more frequent body checking behavior is associated with a higher BMI. Those findings are in line with the literature, as body checking behavior has been found to be associated with self-objectification (Dakanalis, Timko, Clerici, Riva, & Carrà, 2017) and interpreted as an indicator for high body concerns and bodily dissatisfaction (Mercurio & Rima, 2011) which are in turn correlated with BMI (Striegel-Moore et al., 2004; Yates, Edman, & Aruguete, 2004). That the BMI might have an impact on the perception of body size has been previously shown for AN patients (Striegel-Moore et al., 2004). Additionally, Babiloni et al. (2009) found that a higher body fat percentage in normal weight adults is associated with an attentional cortical response to body image in the precortex. These associations might apply to BN patients as well. However, calculating the correlations for each group separately, the positive correlation between BMI and body checking behavior disappeared for patients with BN. Interestingly, we found that a higher BMI was also associated with a higher inversion effect for bodies without faces in the control group. This finding is not in line with the literature and could be further investigated although it has to be noted, that this correlation might not be meaningful since it barely reached significance.

Emotional state and inversion effects. Taking both groups together, another positive correlation has been found between the two PANAS scores, meaning that the increase of positive emotions was accompanied with an increase in negative emotions. This could mean that the participants became overall more or less emotional during the experiment without any specific valence of these emotions. However, this correlation disappeared for BN patients, when we analysed each group separately. Since there have been no group differences regarding the PANAS scores, we can assume that the emotional state had no effect on our data.

Another positive correlation has been found between the face inversion effect and self-objectification in both groups together and for BN patients only when correlations were calculcated for each groups separatly. The fact that high self-objectification is correlated with

a higher face inversion effect in BN patients but not in the control group might indicate that self-objectification does not affect or even enhance the configural processing of faces. However, this hypothesis is not further supported by our data and requires further investigation.

More correlations have been found for BN patients but not for the control group: A negative correlation between the negative PANAS score and face inversion effect, as well as a negative correlation between the inversion effects based on faces and faces with bodies. The latter association shows that face and body inversion effects are somehow related, although the negative value of the correlation is unexpected and not in line with the domain-general-hypothesis. Therefore, the relation between face inversion and body inversion needs to be further investigated in the future.

Alternative Causes for Body Image Disturbances

Assuming that BN patients in fact have no impairment in configural body processing, it remains to consider other possible explanations for the existence of distorted body images.

Another theory, which aims to explain BIDs in ED patients, is the *cognitive fusion* hypothesis (Ferreira, Trindade, Duarte, & Pinto-Gouveia, 2015). Cognitive fusion means that individuals strongly focus on and trust in the contents of their mind (e.g. thoughts, memories, beliefs, images), while neglecting sensual experiences. Following, these individuals respond to their own mindset as if the contents represent true facts rather than a subjective interpretation of reality (Babiloni et al., 2009).With respect to the bodily perception, cognitive fusion might result in a body image which is not shaped by sensual experiences but by a subjective belief system. For example AN patients are believed to "tend to get fused with negative thoughts about their body image, which increase impact of these cognitions and results in the attempt of controlling them through rigid behavioral and attitudinal patterns typical of these disorders" (Ferreira et al., 2015, p. 305). Consequently, ED patients might form a body image which is not based on visual and proprioceptive information but on internalised ideals, which emphasize the importance of a thin body to define self-worth (Ferreira et al., 2015).

Furthermore, Riva (2012) formulated the *allocentric lock* hypothesis in order to explain BIDs in ED patients. According to the allocentric lock hypothesis, BIDs are associated with impairments in spatial cognition and memory. Riva (2012) argues that spatial representations of the own body influence how oneself perceives and remembers the body. He distinguished two forms of spatial representation: the allocentric and the egocentric representation. This differentiation is supported by fMRI studies, which found differences in

allocentric and egocentric processing (Galati et al., 2000). Furthermore Riva (2012) suggested that patients with ED are locked within an allocentric representation of their body, which they are not able to update although the body has changed.

However, the two briefly described hypotheses are just examples, which shall demonstrate that there are still many alternative theories which try to explain the underlying mechanisms in BIDs apart from an impairment in configural processing.

Limitations

The fact that our results are not in line with the findings of other studies, might also be due to deficiencies in our study design: As mentioned above, the study is underpowered, meaning that our sample is too small to detect medium or small effect sizes. In regard to the sample, there are some more limitations: Participants were invited to the study online and therefore the group of participants was highly self-selective and not recruited at random. Especially the experimental group of BN patients might not be representative regarding the BN population: Within the population there is a high variance for example regarding the acceptance or denial of the ED, feeling ashamed of the ED or talking openly about it and the motivation to recover or seeking treatment. The BN patients in our sample showed differences in the severity of their symptoms but apart from that they might represent only a small homogenous subgroup: We assume that our sample mainly consisted of BN patients who accept their diagnosis, do not feel too ashamed to talk about it and are motivated to support research in this field since they might currently be trying to recover. Therefore, the degree to which we can generalize our findings to the BN population is limited. However, the investigation of this selective group in regard to our hypotheses is still meaningful, since a higher self-objectification and increased malleability of the bodily self has even been found for partially recovered patients (Eshkevari, Rieger, Longo, Haggard, & Treasure, 2014; Fitzsimmons-Craft et al., 2011).

Additionally, the emotional state has only been assessed by a subjective self-report questionnaire. Since Schmidt, Jiwany, and Treasure (1993) found that ED are more alexithymic than healthy controls, it could be that BN patients actually experienced changes in the emotional state but did not report them because they were not aware of the emotional arousal. Therefore, emotional state might still have influenced the results although the analysis of the PANAS scores showed no group differences.

Furthermore, the study design may be critized in regard to the applied body inversion task. Our results suggest that the body inversion effect does not really exist, only as the

byproduct of the face inversion effect. If this is true, our task would be unsuitable to investigate configural processing regarding bodies.

In addition, the inversion effect in general is an indirect measure of configural versus analytical processing. Although the inversion effect has been assumed to be a robust indicator for configural processing, it is not entirely clear if this assumption is justified. There is no consensus yet about the question what exactly causes the inversion effect (e.g. is the inversion caused by the distortion of first-order or/and second-order relations?). Therefore it may be interesting, to adress our research question within a different paradigm.

Implications for Future Research

In future studies it would be worthwhile to investigate our research question by using a direct rather than indirect measure of configural processing (e.g. composite effect or part-whole). Still and regardless of the paradigm, it is necessary to develop a clear definition of configural processing and the associated mechanisms to avoid misinterpretations and to ensure the comparability of studies. For example it is unclear if posture-based and identity-based approaches both assess the same aspects in configural processing.

For instance Bosbach et al. (2006) suggested to investigate moving bodies in order to gain more information about holistic and configural processing.

Furthermore, there might be still many nonbody aspects (e.g. clothes) which have not been considered sufficiently as confounding factors (Robbins & Coltheart, 2012a).

In order to gain more insight in the underlying processes of body processing in ED patients it would be interesting to assess eye movements in addition to the behavioral task. Previous eye-tracking studies already showed that BN patients have a tendency towards an upward comparison (Blechert et al., 2009). Therefore, it would be expected that BN patients are more likely to selectively fixate and dwell on the subjectively recognized beautiful body parts of others (Jansen et al., 2005). Thomsen et al. (2012) even suggested that social comparison might lead to BIDs. Following, a combination of a behavioral task assessing configural processing, eye-tracking and an assessment of disliked and liked body parts might provide meaningful results for the body processing in ED patients.

Furthermore, study designs investigating a multimodal spatial body representation could provide more information about the interaction between visual and other (e.g. proprioceptive) information.

In order to control for changes in emotional state which might influence the results of a behavioral task (Johnson & Fredrickson, 2005), future studies should include more

objective measurement like heart rate or skin conductance rather than self-report measures to control for emotional arousal.

Furthermore, it becomes more important to investigate BIDs in men as well as in women. So far mostly women have been investigated, which seems legit due to their higher prevalence for ED. Nevertheless, Strother, Lemberg, Stanford, and Turberville (2012) found that there is a notible increase in the number of men suffering from EDs.

Lastly, since studies identified media as an important contributing factor for self-objectification and bodily dissatisfaction (Calogero et al., 2004; Fredrickson & Roberts, 1997; Legenbauer & Vocks, 2014; Stice, 2016), it would be interesting to investigate cultural differences: Are the mechanisms, which account for BIDs in Western societies the same as in Eastern societies?

Conclusion

All in all, our data revealed no group differences in the self-objectification measure or in the inversion tasks. Therefore we found no evidence for an impairment of configural body processing in patients with BN. Since the study can be considered as underpowered, it might be that there actually is a difference but that our study design was unable to detect it due to the small sample size. Besides, our findings are in line with the domain-general hypothesis, which claims that the body inversion effect is only the byproduct of the face inversion effect. Accordingly, we only found inversion effects for faces and bodies with faces but not for bodies without faces. However, BIDs have been identified as an important factor contributing to the etiology, maintenance and relape of ED and need to be further investigated. Since our findings indicate that the body inversion effect might not be the most suitable measure to assess impairments in configural processing, this research question could be further investigated based on other paradigms. Furthermore, other theories, which aim to explain the development of distorted body images should be considered.

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Index of Abbreviations

AN = anorexia nervosa

BCQ = Body Checking Questionnaire

BID = body image disturbances

BMI = body mass index

BN = bulimia nervosa

EBA = extrastriate body area

ED = eating disorder

EDE-Q = Eating Disorder Examination Questionnaire

FBA = fusiform body area

FFA = fusiform face area

OFA = occipital face area

PANAS = Positive Affect Negative Affect Schedule

RT = reaction time

SOQ = Self-Objectification Questionnaire

TMS = transcranial magnetic stimulation

Appendix

Abstract

Body image disturbances (BID) have been identified as an important factor contributing to the maintenance of eating disorders (EDs). BID are associated with an attentional bias towards specific body parts and self-objectification. Therefore, it is hypothesized that persons with EDs process bodies only analytically, whereas the body processing in healthy controls is facilitated by an additional configural processing. In this study, we investigated if women with bulimia nervosa (n = 19) show impairments in configural processing by comparing their performance in an inversion task with performances of healthy controls (n = 19) and if this impairment is accompanied by a higher self-objectification. The inversion task consisted of three parts with different stimulus categories (bodies with faces, bodies without faces and faces). A three-factor mixed ANOVA revealed no significant group differences in the mean accuracy rates and reaction times resulting from the inversion tasks. Also the self-objectification self-report measurement revealed no group differences. The groups only differed in the way that persons with bulimia nervosa reported a more frequent body checking behavior. However, in both groups we found significant inversion effects for faces and bodies with faces but not for bodies without faces. This is in line with the domain-general-hypothesis, stating that there is only a face inversion effect but no body inversion effect. Our findings suggest that impairments in configural processing do not account for BID in women with bulimia nervosa. However, the results might not be meaningful, since the study design is underpowered.

Keywords: body image disturbances, bulimia nervosa, eating disorder, inversion effect, analytical processing, detail-based processing, configural processing, holistic processing, self-objectification.

Abstract - German

Körperbildstörungen tragen nachweislich zu der Aufrechterhaltung von Essstörungen bei. Körperbildstörungen stehen im Zusammenhang mit einer automatischen Lenkung der Aufmerksamkeit hin zu bestimmten Körperteilen sowie Selbst-Objektifizierung, Daher wird vermutet, dass Personen mit Essstörungen Körper vorrangig analytisch verarbeiten, während die Verarbeitung von Körperstimuli bei gesunden Kontrollpersonen durch eine zustätzliche konfigurale Verarbeitung erleichtert wird. In dieser Studie wurde untersucht, ob die konfigurale Verarbeitung bei Frauen mit Bulimia Nervosa (n = 19) beeinträchtigt ist. Dafür wurde ihre Leistung in einer Inversionsaufgabe mit der Leistung von gesunden Kontrollpersonen (n = 19) verglichen. Zudem wurde untersucht, ob diese Beeinträchtigung mit einer höheren Selbst-Objektifizierung einhergeht. Die Inversionsaufgabe bestand aus drei Teilen mit unterschiedlichen Stimulus Kategorien (Körper mit Gesichtern, Körper ohne Gesichter und Gesichter). Eine dreifaktorielle ANOVA zeigte, dass es keine signifikanten Unterschiede in der Leistung der Gruppen in Bezug auf die Inversionsaufgabe gab, weder im Vergleich der Genauigkeitsrate noch im Vergleich der Reaktionszeit. Auch die Analyse der Antworten im Selbstbeurteilungsfragebogen zur Selbst-Objektifizierung ergaben keine Gruppenunterschiede. Die Gruppen unterschieden sich lediglich darin, dass Personen mit Bulimia Nervosa mehr Kontrollverhalten in Bezug auf Körper angaben. In beiden Gruppen wurden jedoch signifikante Inversionseffekte für Gesichter und Körper mit Gesichtern gefunden, allerdings nicht für Körper ohne Gesichter. Die Ergebnisse lassen vermuten, dass Körperbildstörungen bei Frauen mit Bulimia Nervosa nicht mit einer Beeinträchtigung in der konfiguralen Verarbeitung zusammenhängen.

Schlüsselbegriffe: Körperbildstörungen, Bulimia Nervosa, Essstörungen, Inversionseffekt, analytische Verarbeitung, konfigurale Verarbeitung, holistische Verarbeitung, Selbst-Objektifizierung.

Study Invitations

Einladung zur Teilnahme an einer bezahlten Studie zum Thema: Körperwahrnehmung bei Patientinnen mit Bulimia Nervosa (Bulimie)

Sehr geehrte Damen,

wir laden Sie dazu ein, an einer Studie in dem Fachbereich der Psychologie an der Universität Wien teilzunehmen. Die Testung wird **60 bis 90 Minuten** dauern und in den Räumlichkeiten der **Fakultät für Psychologie (Liebiggasse 5, 1010 Wien)** stattfinden.

Zweck und Nutzen der Studie

In dieser Studie untersuchen wir Besonderheiten in der visuellen Wahrnehmung von Körpern und Gesichtern bei Personen mit der Diagnose Bulimia Nervosa im Vergleich zu gesunden Personen. Mit Ihrer Teilnahme können Sie zu dem **Erkenntnisgewinn für die Forschung** beitragen. Die Ergebnisse dieser Studie sollen wichtige Daten über die Entstehung und Aufrechterhaltung einer veränderten Körperbildwahrnehmung von Personen mit der Diagnose Bulimia Nervosa liefern und somit in weiterer Folge die Weiterentwicklung von Therapieansätzen für Personen mit Essstörungen ermöglichen.

Ablauf der Studie

Im Rahmen der Studie werden Sie gebeten eine **Computeraufgabe** durchzuführen, während Ihre **Herzrate** und ihre Augenbewegungen aufgezeichnet werden. Des Weiteren werden Sie gebeten einige **Fragebögen** zu Ihrer Befindlichkeit und Ihrem körperlichen Selbstkonzept auszufüllen. Außerdem werden die **Körpermaße** (Gewicht, Größe, Taillenumfang) vor Ort gemessen.

Datenschutz

Die gewonnen Daten werden **anonymisiert**. Ihr Name erscheint somit weder bei der Auswertung, noch bei der Veröffentlichung der Daten. Die Daten dienen lediglich der statistischen Auswertung und werden dementsprechend ausschließlich zu statistischen Zwecken weitergegeben.

Teilnahmekriterien

Für die Teilnahme ist es wichtig, dass Sie folgende Kriterien erfüllen:

- **Weiblich**
- **Alter: 18-40**
- **Body Mass Index (BMI): 18.5 – 24.5 (den BMI können Sie online berechnen: www.bmi-rechner.net)**
- **Aktuelle klinische Diagnose: Bulimie / Bulimia Nervosa**
- **Kein regelmäßiger Alkohol- oder Drogenmissbrauch**
- **Kein Diabetes**
- **Keine neurologische Störung (z.B. Epilepsie)**
- **Keine aktuelle Einnahme von Medikamenten, die zu Gewichtsschwankungen führen (z.B. Cortison)**
- **Keine Schwangerschaft**

Bei Interesse oder bei Fragen senden Sie bitte eine E-Mail an:
neele.kroeger@univie.ac.at

Einladung zur Teilnahme an einer bezahlten Studie zum Thema Körperwahrnehmung

Sehr geehrte Damen,

wir laden Sie dazu ein, an einer Studie in dem Fachbereich der Psychologie an der Universität Wien teilzunehmen. Die Testung wird **60 bis 90 Minuten** dauern und in den Räumlichkeiten der **Fakultät für Psychologie (Liebiggasse 5, 1010 Wien)** stattfinden.

Zweck und Nutzen der Studie

In dieser Studie untersuchen wir Besonderheiten in der visuellen Wahrnehmung von Körpern und Gesichtern bei Personen mit der Diagnose Bulimia Nervosa im Vergleich zu gesunden Personen. Mit Ihrer Teilnahme können Sie zu dem **Erkenntnisgewinn für die Forschung** beitragen. Die Ergebnisse dieser Studie sollen wichtige Daten über die Entstehung und Aufrechterhaltung einer veränderten Körperbildwahrnehmung von Personen mit der Diagnose Bulimia Nervosa liefern und somit in weiterer Folge die Weiterentwicklung von Therapieansätzen für Personen mit Essstörungen ermöglichen.

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Datenschutz

Die gewonnen Daten werden **anonymisiert**. Ihr Name erscheint somit weder bei der Auswertung, noch bei der Veröffentlichung der Daten. Die Daten dienen lediglich der statistischen Auswertung und werden dementsprechend ausschließlich zu statistischen Zwecken weitergegeben.

Teilnahmekriterien

Für die Teilnahme ist es wichtig, dass Sie folgende Kriterien erfüllen:

- **Weiblich**
- **Alter: 18-40**
- **Body Mass Index (BMI): 18.5 – 24.5 (den BMI können Sie online berechnen: www.bmi-rechner.net)**
- **Keine diagnostizierte Essstörung aktuell oder in den letzten 10 Jahren**
- **Kein regelmäßiger Alkohol- oder Drogenmissbrauch**
- **Kein Diabetes**
- **Keine neurologische Störung (z.B. Epilepsie)**
- **Keine aktuelle Einnahme von Medikamenten, die zu Gewichtsschwankungen führen (z.B. Cortison)**
- **Keine Schwangerschaft**

Bei Interesse oder bei Fragen senden Sie bitte eine E-Mail an:

neele.kroeger@univie.ac.at

Screening

Screeningfragebogen - Teilnehmerinneninformation

Sehr geehrte Teilnehmerin,

vielen Dank, dass Sie unsere Studie "Körperwahrnehmung bei Personen mit Bulimia Nervosa" durch Ihre Teilnahme unterstützen möchten. Für die Studie suchen wir Personen mit Bulimie und Personen ohne Bulimie. Um festzustellen, ob Sie als Testperson für unsere Studie in Frage kommen, bitten wir Sie vorab einige Fragen zu Ihrer Person und zu Ihrem Essverhalten zu beantworten.

Das Ausfüllen des Fragebogens dauert ca. 10-15 Minuten. Bitte lesen Sie sich die Fragen aufmerksam durch und versuchen Sie, diese wahrheitsgetreu sowie möglichst genau zu beantworten.

Sämtliche in dieser Studie erhobenen Daten werden streng vertraulich behandelt und nicht an Dritte weitergegeben. Die Antworten aus diesem Fragebogen werden zwecks der Auswahl geeigneter Testperson ausgewertet und auf einem passwortgesicherten Laptop gespeichert. Sie können jederzeit die Löschung der von Ihnen erhobenen Daten verlangen.

Vielen Dank!

Einverständniserklärung

- ☐ Hiermit bestätige ich, dass ich über den Ablauf und den Inhalt der folgenden Befragung, und meine Rechte aufgeklärt wurde und an der Befragung teilnehmen möchte.
- ☐ Ich erkläre mich mit der beschriebenen Verarbeitung und Speicherung meiner Daten einverstanden.

Im Folgenden bitten wir Sie einige Fragen zu Ihrer Person zu beantworten:

Wie alt sind Sie? ☐ Jahre

Sie sind ... [Bitte]

Im Folgenden finden Sie einige Aussagen. Bitte wählen Sie „ja“ aus, wenn diese Aussage auf Sie zutrifft und bitte wählen Sie „nein“ aus, wenn diese Aussage nicht auf Sie zutrifft.

Ich bin derzeit diagnostiziert mit Bulimia Nervosa bzw. ich habe derzeit Bulimie. [Bitte]

Ich bin zurzeit schwanger. [Bitte]

Ich bin an Diabetes (Diabetes Mellitus) erkrankt. [Bitte]

Ich leide unter einer neurologischen Störung (z.B. Epilepsie). [Bitte]

Ich nehme zur Zeit Medikamente, die Gewichtschwankungen verursachen (z.B. Kortison). [Bitte]

Ich habe nehme regelmäßig Drogen. [Bitte]

Ich trinke täglich oder mehrmals die Woche größere Mengen an Alkohol. [Bitte]

Die folgenden Fragen beziehen sich ausschließlich auf die letzten vier Wochen (28 Tage). Bitte lesen Sie jede Frage sorgfältig durch und beantworten Sie alle Fragen. Vielen Dank.

Bitte klicken Sie die zutreffende Anzahl der Tage rechts daneben an. Denken Sie daran, dass sich die Fragen nur auf die letzten 4 Wochen (28 Tage) beziehen.

An wie vielen der letzten 28 Tage...	ein Tag	k -5 Tage	1 jeden Tag	6-12 Tage	13-15 Tage	16-22 Tage	23-27 Tage
Haben Sie bewusst versucht, die Nahrungsmenge, die Sie essen, zu begrenzen, um Ihre Figur oder Ihr Gewicht zu beeinflussen (unabhängig davon, ob es Ihnen tatsächlich gelungen ist)?	○	○	○	○	○	○	○
Haben Sie über längere Zeitspannen (8 Stunden oder mehr) überhaupt nichts gegessen, um Ihre Figur oder Ihr Gewicht zu beeinflussen?	○	○	○	○	○	○	○
Haben Sie versucht, Nahrungsmittel, die Sie mögen, von Ihrer Ernährung auszuschließen, um Ihre Figur oder Ihr Gewicht zu beeinflussen (unabhängig davon, ob es Ihnen tatsächlich gelungen ist)?	○	○	○	○	○	○	○
Haben Sie versucht, festgelegte Regeln hinsichtlich Ihres Essens (z.B. eine Kaloriengrenze) zu befolgen, um Ihre Figur oder Ihr Gewicht zu beeinflussen (unabhängig davon, ob es Ihnen tatsächlich gelungen ist)?	○	○	○	○	○	○	○
Hatten Sie den deutlichen Wunsch, einen leeren Magen zu haben, mit dem Ziel, Ihre Figur oder Ihr Gewicht zu beeinflussen?	○	○	○	○	○	○	○
Hatten Sie den deutlichen Wunsch, einen völlig flachen Bauch zu haben?	○	○	○	○	○	○	○

An wie vielen der letzten 28 Tage...	kein Tag	1-5 Tage	6-12 Tage	13-15 Tage	16-22 Tage	23-27 Tage	jeden Tag
Hat das Nachdenken über Nahrung, Essen oder Kalorien es Ihnen sehr schwer gemacht, sich auf Dinge zu konzentrieren, die Sie interessieren (z.B. arbeiten, einem Gespräch folgen oder lesen)?	○	○	○	○	○	○	○
Hat das Nachdenken über Figur oder Gewicht es Ihnen sehr schwer gemacht, sich auf Dinge zu konzentrieren, die Sie interessieren (z.B. arbeiten, einem Gespräch folgen oder lesen)?	○	○	○	○	○	○	○
Hatten Sie eine deutliche Angst, die Kontrolle über das Essen zu verlieren?	○	○	○	○	○	○	○
Hatten Sie eine deutliche Angst, dass Sie an Gewicht zunehmen könnten?	○	○	○	○	○	○	○
Haben Sie sich dick gefühlt?	○	○	○	○	○	○	○
Hatten Sie einen starken Wunsch abzunehmen?	○	○	○	○	○	○	○

Die folgenden Fragen beziehen sich ausschließlich auf die letzten vier Wochen (28 Tage). Bitte lesen Sie jede Frage sorgfältig durch und beantworten Sie alle Fragen. Vielen Dank.

Bitte tragen Sie die passende Zahl rechts daneben an. Denken Sie daran, dass sich die Fragen nur auf die letzten 4 Wochen (28 Tage) beziehen.

Während der letzten vier Wochen (28 Tage)...

Wie oft haben Sie während der letzten 28 Tage eine Nahrungsmenge gegessen, die andere Menschen als ungewöhnlich groß ansehen würden (unter ähnlichen Umständen)?	
In wie vielen dieser Situationen, in denen Sie zu viel gegessen haben, hatten Sie das Gefühl, die Kontrolle über Ihr Essverhalten verloren zu haben (während des Essens)?	
An wie vielen **TAGEN** der letzten 28 Tage ist es vorgekommen, dass Sie eine ungewöhnlich große Nahrungsmenge gegessen haben und das Gefühl hatten, die Kontrolle über Ihr Essverhalten verloren zu haben?	
Wie oft haben Sie während der letzten 28 Tage Erbrechen selbst herbeigeführt, um Ihre Figur oder Ihr Gewicht zu kontrollieren?	
Wie oft haben Sie während der letzten 28 Tage Abführmittel einngenommen, um Ihre Figur oder Ihr Gewicht zu kontrollieren?	
Wie oft haben Sie während der letzten 28 Tage in einer „getriebenen“ oder „zwanghaften“ Weise Sport getrieben, um Ihr Gewicht, Ihre Figur oder den Körperfettabteil zu kontrollieren oder Kalorien zu verbrennen?	

Bitte klicken Sie die zutreffende Antwort an. Bitte beachten Sie, dass für diese Fragen der Begriff „Essanfall“ bedeutet, eine Nahrungsmenge zu essen, die andere Menschen unter ähnlichen Umständen als ungewöhnlich groß ansehen würden, begleitet von einem Gefühl des Kontrollverlusts über das Essverhalten.

Während der letzten vier Wochen (28 Tage)...	kein Tag	1-5 Tage	6-12 Tage	13-15 Tage	16-22 Tage	23-27 Tage	jeden Tag
An wie vielen Tagen der letzten 28 Tage haben Sie heimlich (d. h. im Verborgenen) gegessen? *(Zählen Sie Essanfälle nicht mit)*	○	○	○	○	○	○	○

Während der letzten vier Wochen (28 Tage)...	niemals	in seltenen Fällen	in weniger als der Hälfte der Fälle	in der Hälfte der Fälle	in mehr als der Hälfte der Fälle	in den meisten Fällen	jedes Mal
In wie vielen der Situationen, in denen Sie gegessen haben, hatten Sie wegen der Auswirkungen auf Ihre Figur oder Ihr Gewicht Schuldgefühle (d. h. das Gefühl etwas Falsches getan zu haben)? *(Zählen Sie Essanfälle nicht mit.)*	○	○	○	○	○	○	○

Während der letzten vier Wochen (28 Tage)...	überhaupt nicht		leicht		mäßig		deutlich
Wie beunruhigt waren Sie während der letzten 28 Tage, wenn andere Menschen Sie essen sahen? *(Zählen Sie Essanfälle nicht mit.)*	○	○	○	○	○	○	○

Bitte klicken Sie die zutreffende Antwort rechts daneben an. Denken Sie daran, dass sich die Fragen nur auf die letzten 4 Wochen (28 Tage) beziehen.

Während der letzten vier Wochen (28 Tage)...	überhaupt nicht		leicht		mäßig		deutlich
Hat Ihr Gewicht einen Einfluss darauf gehabt, wie Sie über sich selbst als Person denken (urteilen)?	○	○	○	○	○	○	○
Hat Ihre Figur einen Einfluss darauf gehabt, wie Sie über sich selbst als Person denken (urteilen)?	○	○	○	○	○	○	○
Wie stark hätte es Sie aus der Fassung gebracht, wenn Sie aufgefordert worden wären, sich in den nächsten vier Wochen einmal pro Woche zu wiegen (nicht mehr oder weniger häufig)?	○	○	○	○	○	○	○
Wie unzufrieden waren Sie mir Ihrem Gewicht?	○	○	○	○	○	○	○
Wie unzufrieden waren Sie mit Ihrer Figur?	○	○	○	○	○	○	○
Wie unwohl haben Sie sich gefühlt, wenn Sie ○ Ihren Körper gesehen haben (z. B. im Spiegel, Ihr Spiegelbild im Schaufenster, beim Ausziehen, Baden oder Duschen)?	○	○	○	○	○	○	
Wie unwohl haben Sie sich gefühlt, wenn ○ andere Ihre Figur gesehen haben (z. B. in Gemeinschaftsumkleideräumen, beim Schwimmen oder beim Tragen enger Kleidung)?	○	○	○	○	○	○	

Wie viel wiegen Sie derzeit? *(Bitte schätzen Sie so gut wie möglich.)* ☐

Wie groß sind Sie? *(Bitte schätzen Sie so gut wie möglich. Angabe in cm, z.B. 1,70m = 170 cm)* ☐

Ist Ihre Regelblutung während der letzten drei bis vier Monate ausgeblieben? ☐

Haben Sie die „Pille“ eingenommen? ☐

Sie haben die letzte Frage zum Ausbleiben Ihrer Regelblutung mit „ja“ beantwortet. Die folgende Frage baut auf diese Antwort auf:

Wie viele Regelblutungen sind ausgeblieben?

Vielen Dank für das Ausfüllen des Fragebogens!

Sie erhalten innerhalb von zwei Tagen eine Rückmeldung, ob Sie die Voraussetzung für die Studienteilnahme erfüllen. In diesem Fall würden wir einen Termin für die Studienteilnahme mit Ihnen vereinbaren.

Einladung zum SoSci

Das nicht-kommerzielle SoSci Panel würde Sie künftig gerne zu interessanten Onlinebefragungen einladen. Wir würden uns sehr freuen, wenn Sie die wissenschaftliche Forschung durch Ihre Teilnahme unterstützen.

E-Mail: Am Panel

Die Teilnahme am SoSci Panel ist freiwillig und kann jederzeit widerrufen werden, Sie gehen mit der Teilnahme keinerlei Verpflichtungen ein.

Wenn Sie Ihre E-Mail-Adresse eintragen, erhalten Sie zunächst eine Bestätigungs-Mail. In dieser E-Mail finden Sie einen Link, um die Teilnahme am SoSci Panel zu bestätigen sowie weitere Informationen zum strengen Datenschutz im SoSci Panel.

Wir senden Ihnen selbstverständlich keine Werbung und geben Ihre E-Mail-Adresse nicht an Dritte weiter.

Der Fragebogen, den Sie gerade ausgefüllt haben, wurde gespeichert. Sie können das Browserfenster selbstverständlich auch schließen, ohne am SoSci Panel teilzunehmen.

Informed Consent

Information und Einwilligungserklärung zur Teilnahme an der Studie:

Körperwahrnehmung bei Patientinnen mit Bulimia Nervosa

Sehr geehrte Teilnehmerin,

wir laden Sie ein, an der oben genannten Studie teilzunehmen. Im Folgenden werden Sie über die Rahmenbedingungen (Ablauf, Datenschutz usw.) der Studie informiert. Des Weiteren erhalten Sie ausführlichere Informationen über den Zweck der Studie im Anschluss an die Testung.

Ihre Teilnahme an dieser Studie erfolgt freiwillig. Sie können jederzeit, ohne Angabe von Gründen, Ihre Bereitschaft zur Teilnahme ablehnen oder auch im Verlauf der Studie zurückziehen. Die Ablehnung der Teilnahme oder ein vorzeitiges Ausscheiden aus dieser Studie hat keine nachteiligen Folgen für Sie.

Diese Art von Studien ist notwendig, um verlässliche neue *wissenschaftliche* Forschungsergebnisse zu gewinnen. Unverzichtbare Voraussetzung für die Durchführung von Studien ist jedoch, dass Sie Ihr Einverständnis zur Teilnahme an dieser Studie schriftlich erklären. Bitte lesen Sie den folgenden Text als Ergänzung zum Informationsgespräch sorgfältig durch und zögern Sie nicht, Fragen zu stellen.

Bitte unterschreiben Sie die Einwilligungserklärung nur
- wenn Sie Art und Ablauf der Studie vollständig verstanden haben,
- wenn Sie bereit sind, der Teilnahme zuzustimmen und
- wenn Sie sich über Ihre Rechte als Teilnehmer/in an dieser Studie im Klaren sind.

Zweck der Studie

In dieser Studie untersuchen wir Besonderheiten in der visuellen Wahrnehmung von Körpern und Gesichtern bei Personen mit der Diagnose Bulimia Nervosa im Vergleich zu gesunden Personen. Eine veränderte visuelle Wahrnehmung von menschlichen Körpern könnte ein Faktor bei der Entstehung und Aufrechterhaltung von Körperbildstörungen sein. Die Erkenntnisse aus dieser Studie sollen dazu beitragen die Ursachen und die Auswirkungen von Essstörungen, insbesondere Bulimia Nervosa, besser zu verstehen.

Ablauf der Studie

Die Studie wird in den Räumlichkeiten der Fakultät für Psychologie (Universität Wien) durchgeführt. Insgesamt ist geplant, dass 40 Personen (20 Personen mit Bulimia Nervosa, 20 gesunde Kontrollpersonen) an der Studie teilnehmen. Die Testung dauert ungefähr 60 bis 90 Minuten. Der Ablauf wird wie folgt sein:

1. Selbsteinschätzung Ihrer aktuellen Befindlichkeit.
2. Computertestung: Sie bekommen Bilder von Gesichtern/Körpern aufrecht oder dem Kopf stehend dargeboten. Ihre Aufgabe wird es sein, einen vorher angezeigten/s Körper/Gesicht wiederzuerkennen.
3. Ausfüllen zweier Fragebögen zum Thema körperliches Selbstkonzept
4. Erneute Selbsteinschätzung der Befindlichkeit
5. Erhebung der Körpermaße (Gewicht, Größe, Taillenumfang)

Nutzen der Teilnahme an der Studie?

Es ist nicht zu erwarten, dass Sie aus Ihrer Teilnahme an dieser Studie einen persönlichen (z.B. gesundheitlichen) Nutzen ziehen werden. Allerdings tragen Sie mit Ihrer Teilnahme zu dem

Erkenntnisgewinn für die wissenschaftliche Forschung bei. Die Ergebnisse dieser Studie sollen wichtige Daten über die Entstehung und Aufrechterhaltung einer veränderten Körperbildwahrnehmung von Personen mit der Diagnose Bulimia Nervosa liefern und somit in weiterer Folge die Weiterentwicklung von Therapieansätzen für Personen mit Essstörungen ermöglichen.

Auswirkungen während und nach Durchführung der Studie

Durch die Teilnahme an der Studie sollte es in der Regel nicht zu Beschwerden oder Begleiterscheinungen kommen. Falls sich dennoch Beschwerden während der Testung einstellen, z.B. wenn Sie sehr unangenehme negative Gefühle oder Spannungen erleben, teilen Sie dies bitte der Versuchsleitung rechtzeitig mit. In diesem Fall wird diskutiert ob Sie die Testung nach einer Pause fortsetzen oder ob Sie die Teilnahme abbrechen möchten. Für den Fall, dass Sie Beschwerden oder sonstige Auswirkungen nach der Teilnahme feststellen, wenden Sie sich bitte an die Versuchsleiterin (siehe untenstehende Kontaktdaten).

Vorzeitige Beendigung der Testung

Sie können die Teilnahme jederzeit ohne Angabe von Gründen widerrufen oder abbrechen, ohne dass daraus Nachteile für Sie entstehen. Die Versuchsleitung kann entscheiden die Teilnahme einer Person zu beenden. Mögliche Gründe hierfür können sein:

- Die Teilnehmerin erfüllt nicht die Einschlusskriterien für die Teilnahme an der Studie.
- Die Studienleitung hat den Eindruck, dass eine weitere Teilnahme an der Studie nicht im Interesse des bzw. der Teilnehmer/in ist.

Datenverarbeitung und -aufbewahrung

Die gewonnen Daten werden nach Unterzeichnung der Einverständniserklärung für alle weiteren Schritte anonymisiert. Dies geschieht in dem wir Ihnen eine ID-Nummer zuweisen, anhand derer kein Rückschluss auf Ihre Person möglich ist. Ihr Name erscheint somit weder bei der Auswertung, noch bei der Veröffentlichung der Daten. Die Daten dienen lediglich der statistischen Auswertung und werden dementsprechend ausschließlich zu statistischen Zwecken weitergegeben.

Nur das an der Studie mitwirkende Personal hat Zugang zu den Daten und ist zudem zur Verschwiegenheit verpflichtet. Die Daten werden in einem Ordner für 5 Jahre in dem persönlichen Büro von der Projektleitung (Giorgia Silani) aufbewahrt. Sie können jederzeit die Löschung Ihrer Daten verlangen (siehe untenstehende Kontaktdaten).

Vergütung

Für die Teilnahme an dieser Studie erhalten Sie nach Beendigung bzw. nach Abbruch der Testung eine Aufwandsentschädigung über 20,00€. Durch Ihre Teilnahme entstehen für Sie keinerlei Kosten.

Möglichkeit zur Diskussion weiterer Fragen

Für weitere und nachträgliche Fragen im Zusammenhang mit der Studie können Sie gerne die Versuchsleiterin oder die Projektleiterin auch nach Beendigung der Teilnahme kontaktieren.

Kontaktdaten:

Projektleiterin	Name: Giorgia Silani, PhD E-Mail: giorgia.silani@univie.ac.at
Versuchsleiterin	Name: Neele Kröger, BSc E-Mail: neele.kroeger@univie.ac.at

Einwilligungserklärung

Name der teilnehmenden Person in Druckbuchstaben: .....

Geb. Datum: .....

Ich erkläre mich bereit, an der Studie *Körperwahrnehmung bei Personen mit Bulimia Nervosa* teilzunehmen.

Ich bin von der Versuchsleiterin *Neele Kröger* ausführlich und verständlich über Zielsetzung, Bedeutung und Tragweite der Studie und die sich für mich daraus ergebenden Anforderungen aufgeklärt worden. Ich habe darüber hinaus den Text dieser TeilnehmerInneninformation und Einwilligungserklärung gelesen, insbesondere den 4. Abschnitt (Gibt es Risiken, Beschwerden und Begleiterscheinungen?). Aufgetretene Fragen wurden mir von der Studienleitung verständlich und ausreichend beantwortet. Ich hatte genügend Zeit, mich zu entscheiden, ob ich an der Studie teilnehmen möchte. Ich habe zurzeit keine weiteren Fragen mehr.

Ich werde die Hinweise, die für die Durchführung der Studie erforderlich sind, befolgen, behalte mir jedoch das Recht vor, meine freiwillige Mitwirkung jederzeit zu beenden, ohne dass mir daraus Nachteile entstehen. Sollte ich aus der Studie ausscheiden wollen, so kann ich dies jeder Zeit schriftlich oder mündlich bei der Versuchsleiterin *Neele Kröger* veranlassen.

Ich bin zugleich damit einverstanden, dass meine im Rahmen dieser Studie erhobenen Daten aufgezeichnet und ausgewertet werden.

Ich stimme zu, dass meine Daten dauerhaft in anonymisierter Form elektronisch gespeichert werden. Die Daten werden in einer nur der Projektleitung zugänglichen Form gespeichert, die gemäß aktueller Standards gesichert ist.

Sollte ich zu einem späteren Zeitpunkt, die Löschung meiner Daten wünschen, so kann ich dies schriftlich oder telefonisch ohne Angabe von Gründen bei *Neele Kröger (neele.kroeger@univie.ac.at)* oder *Giorgia Silani (giorgia.silani@univie.ac.at)* veranlassen.

Den Aufklärungsteil habe ich gelesen und verstanden. Ich konnte im Aufklärungsgespräch alle mich interessierenden Fragen stellen. Sie wurden vollständig und verständlich beantwortet.

Eine Kopie dieser TeilnehmerInneninformation und Einwilligungserklärung habe ich erhalten. Das Original verbleibt bei der Studienleitung.

☐ Ich möchte nach Abschluss der Studie über die Forschungsergebnisse per Mail informiert werden. Meine Mailadresse dafür lautet:

(Datum und Unterschrift der/des Teilnehmerin/Teilnehmers)

.....

(Datum, Name und Unterschrift der Studienleitung)

.....

Questionnaires

Body Checking Questionnaire

Teilnehmerkennung:

Body Checking Questionnaire

(Reas, Whisenhunt, Netemeyer & Williamson, 2002; Vocks, Moswald & Legenbauer, 2008)

Sehr geehrte Teilnehmerin,

vielen Dank, dass Sie unser Forschungsprojekt unterstützen.
Wir bitten Sie die folgenden beschriebenen Verhaltensweisen anhand vorgegebener Antwortalternativen zu beurteilen. Bitte kreuzen Sie die Zahl an, die am ehesten beschreibt, wie häufig Sie die unten beschriebenen Verhaltensweisen aktuell zeigen:

0 = nie 1 = selten 2 = manchmal 3 = oft 4 = sehr oft

Selbstverständlich werden Ihre Angaben **streng vertraulich** behandelt. Es haben ausschließlich die ProjektmitarbeiterInnen der Universität Wien Einblick in die erhobenen Daten.

		nie	selten	manch-mal	oft	sehr oft
1	Ich überprüfe, ob meine Oberschenkel breiter werden, wenn ich mich hinsetze.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
2	Ich kneife in meinen Bauch, um zu überprüfen, wie dick er ist.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
3	Ich besitze bestimmte Kleidungsstücke, die ich anprobiere, um sicherzugehen, dass sie noch passen.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
4	Ich kontrolliere den Durchmesser meines Handgelenkes, um sicherzugehen, dass es dieselbe Größe hat wie vorher.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
5	Ich überprüfe mein Spiegelbild in Glastüren oder Autofenstern, um festzustellen, wie ich aussehe.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
6	Ich kneife in meine Oberarme, um zu überprüfen, wie dick sie sind.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
7	Ich berühre mich unterhalb des Kinns, um sicherzugehen, dass ich kein „Doppelkinn" habe.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
8	Ich schaue andere Leute an, um meine Figur mit deren Figur zu vergleichen.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
9	Ich reibe oder berühre meine Oberschenkel während ich sitze, um zu überprüfen, ob sie zu dick sind.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
10	Ich kontrolliere den Durchmesser meiner Beine, um zu überprüfen, ob sie die gleiche Größe haben wie vorher.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4

1 von 2

Teilnehmerkennung:

		nie	selten	manch-mal	oft	sehr oft
11	Ich frage andere nach ihrem Gewicht oder ihrer Kleidergröße, um mein eigenes Gewicht und meine eigene Kleidergröße mit ihnen vergleichen zu können.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
12	Ich überprüfe, wie mein Po im Spiegel aussieht.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
13	Ich setze und stelle mich in verschiedenen Positionen hin, um auszuprobieren, wie ich in jeder dieser Positionen aussehe.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
14	Ich überprüfe, ob meine Oberschenkel aneinander reiben.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
15	Ich versuche, Anderen Kommentare darüber zu entlocken, wie dick ich bin.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
16	Ich kontrolliere, ob mein Fett wippt.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
17	Ich ziehe meinen Bauch ein, um zu sehen, wie es ist, wenn mein Bauch ganz flach ist.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
18	Ich kontrolliere, ob meine Ringe genauso gut passen wie vorher.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
19	Ich überprüfe, ob ich im Sitzen Cellulitis an meinen Oberschenkeln habe.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
20	Ich lege mich auf den Fußboden, um zu überprüfen, ob ich spüren kann, dass meine Knochen den Boden berühren.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
21	Ich ziehe meine Kleidung so, dass sie möglichst eng anliegt, um zu überprüfen, wie ich aussehe.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
22	Ich vergleiche mich mit Models im Fernsehen oder in Zeit-schriften.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
23	Ich kneife in meine Wangen, um zu überprüfen, wie dick sie sind.	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4

Quellen

- *Englischsprachige Originalversion:*
  Reas, D. L., Whisenhunt, B. L., Netemeyer, R. & Williamson, D. A. (2002). Development of the body checking questionnaire: A self-report measure of body checking behaviors. *International Journal of Eating Disorders, 31*, 324–333.
- *Deutschsprachige Version:*
  Vocks, S., Moswald, C. & Legenbauer, T. (2008). Psychometrische Überprüfung einer deutschsprachigen Fassung des Body Checking Questionnaire (BCQ). *Zeitschrift für Klinische Psychologie und Psychotherapie, 37* (2), 131–140.

Positive and Negative Affect Schedule

Teilnehmerkennung:

Positive Affect Negative Affect Schedule

(Watson, Clark & Tellegan, 1988; Grühn, Kotter-Grühn & Röcke, 2010)

Sehr geehrte Teilnehmerin,

vielen Dank, dass Sie unser Forschungsprojekt unterstützen.
Im Folgenden finden Sie eine Liste mit 20 Wörtern, die Gefühle und Emotionen beschreiben. Bitte lesen Sie jedes Wort und beurteilen sie anhand der vorgegebenen Antwortalternativen wie sehr dieses Gefühl/ diese Emotion auf Ihren momentanen Gefühlszustand zutrifft:

0 = kaum oder gar nicht 1 = ein wenig 2 = mäßig 3 = ziemlich 4 = sehr

Selbstverständlich werden Ihre Angaben **streng vertraulich** behandelt. Es haben ausschließlich die ProjektmitarbeiterInnen der Universität Wien Einblick in die erhobenen Daten.

	Kaum/gar nicht	Ein wenig	mäßig	ziemlich	sehr
Interessiert	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Bedrückt	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Freudig erregt	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Verärgert	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Stark	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Schuldig	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Verängstigt	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Feindselig	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Begeistert	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Stolz	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4

	Kaum/gar nicht	Ein wenig	mäßig	ziemlich	sehr
Angeregt	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Reizbar	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Hellwach	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Beschämt	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Nervös	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Entschlossen	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Aufmerksam	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Unruhig	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Aktiv	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4
Ängstlich	❒ 0	❒ 1	❒ 2	❒ 3	❒ 4

Quellen

- *Englischsprachige Originalversion:*
  Watson, D., Clark, L. A., & Tellegan, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070
- *Deutschsprachige Version:*
  Grühn, D., Kotter-Grühn, D., & Röcke, C. (2010). Discrete affects across the adult lifespan: Evidence for multidimensionality and multidiretionality of affective experiences in young, middle-aged and older adults. *Journal of Research in Personality, 44*, 492-500.

Self-Objectification Questionnaire

Teilnehmerkennung:

Sehr geehrte Teilnehmerin,

wir sind daran interessiert, wie Menschen über ihren Körper denken. Die untenstehenden Fragen beziehen sich auf 10 verschiedene Körpereigenschaften. Wir bitten Sie diese Eigenschaften in eine Rangordnung zu bringen: Von der Eigenschaft, die den größten Einfluss auf Ihr körperliches Selbstkonzept hat (stufen Sie diese mit „9" ein), bis zu der Eigenschaft, die den geringsten Einfluss auf Ihr körperliches Selbstkonzept hat (stufen Sie diese mit „1" ein).

Beachten Sie: Es spielt keine Rolle wie Sie sich in Hinsicht auf diese Eigenschaft selbst beschreiben würden. Zum Beispiel „körperliches Fitness Level" kann einen großen Einfluss auf das körperliche Selbstkonzept haben, unabhängig davon ob Sie sich als körperlich fit, körperlich nicht fit oder irgendwas dazwischen einschätzen.

Bitte berücksichtigen Sie erst alle Eigenschaften bevor Sie eine Entscheidung treffen. Dokumentieren Sie Ihre Rangordnung, in dem Sie die entsprechende Zahl neben die Eigenschaft schreiben:

9 = größter Einfluss
8 = nächstgrößter Einfluss
...(Und so weiter)...
1 = nächstgeringster Einfluss
0 = geringster Einfluss

WICHTIG: Vergeben Sie nicht denselben Rang / dieselbe Zahl für mehrere Eigenschaften!

Welchen Rang ordnen Sie der **körperlichen Koordination** zu?	
Welchen Rang ordnen Sie der **Gesundheit** zu?	
Welchen Rang ordnen Sie dem **Gewicht** zu?	
Welchen Rang ordnen Sie der **Stärke** zu?	
Welchen Rang ordnen Sie dem **Sex Appeal** zu?	
Welchen Rang ordnen Sie der **körperlichen Attraktivität** zu?	
Welchen Rang ordnen Sie dem **Energielevel** (z.B. Kondition/Ausdauer) zu?	
Welchen Rang ordnen Sie **festen/geformten Muskeln** zu?	
Welchen Rang ordnen Sie dem **körperlichen Fitnesslevel** zu?	
Welchen Rang ordnen Sie **Körpermaßen** (z.B. Brust, Taille, Hüfte) zu?	

Quelle:

Fredrickson, B. L., Roberts, T. A., Noll, S. M. Quinn, D. M., & Twenge, J. M. (1998). That swimsuit becomes you: Sex differences in self-objectification, restrained eating, and math performance. *Journal of Personality and Social Psychology, 75*, 269-284.