

Master's Thesis

The association of media body-image exposure with an individual's self-esteem and body dissatisfaction and Orthorexia-related symptomology: An experience sampling study

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Abstract

Background. Orthorexia Nervosa (ON) is a potential new form of eating disorder in which individuals suffer from a pathological obsession with healthy eating. There is inconclusive information regarding the associations with several psychosocial variables including self-esteem and body dissatisfaction, as well as a person's sociocultural attitudes towards his appearance. This is hindering the development of diagnostic criteria for ON. Only a handful of studies have investigated these associations further contributing to a lack of understanding about the nature of ON.

Objective. The current research focuses on the potential associations between ON with self-esteem and body dissatisfaction. First, a cross-sectional association was researched to examine how ON is related to self-esteem and body dissatisfaction. Furthermore, the present research examined whether sociocultural attitudes towards appearance influence self-esteem and body dissatisfaction levels. Second, experience sampling was used to test the association between social media usage on trait and state body dissatisfaction, self-esteem levels and ON levels. Additionally, researchers were also interested in investigating associations between trait and state body dissatisfaction and self-esteem on ON.

Methods. 40 participants ($M = 20.23$, $SD = 2.05$, 62.9 % female, 8.6 % male, 62.9 % German, 8.6 % Dutch) took part in an 8-day study consisting of two different phases. At baseline (phase 1), four psychological questionnaires measuring ON symptoms, sociocultural attitudes towards appearance, self-esteem and body dissatisfaction. Next, 39 participants moved on to the 7 day experience sampling phase that measured momentary social media use, as well as trait and state levels of self-esteem, body dissatisfaction and ON (phase 2). Ethical approval was permitted by the university committee. Data was analysed using SPSS to perform preliminary analyses and

main analyses on both the cross-sectional and the experience sampling data set to test the hypotheses of the present research. Linear regression analyses were used to examine baseline data and linear mixed models were used to investigate the experience sampling data.

Results. First, analysis of the cross-sectional, baseline measures revealed no significant association between self-esteem ($\beta = .16$, $SE = .37$, $p > .05$) and body dissatisfaction ($\beta = .19$, $SE = .32$, $p > .05$) onto ON. Marginally significant results between sociocultural attitudes, self-esteem ($\beta = .27$, $SE = .06$, $p = .09$) were established, but a non-significant association was found with body dissatisfaction ($\beta = .17$, $SE = .07$, $p > .05$). Second, data analysis of the experience sampling found no significant results between general social media usage and momentary levels of ON ($\beta = .04$, $SE = .10$, $p > .05$) and body dissatisfaction ($\beta = -.07$, $SE = .08$, $p > .05$). A significant relationship was established between social media usage and momentary self-esteem levels ($\beta = .14$, $SE = .05$, $p < .05$). Regarding watching fitness content on social media, no significant relationship was found with self-esteem ($\beta = .01$, $SE = .06$, $p > .05$) and ON ($\beta = .05$, $SE = .10$, $p > .05$), whereas body dissatisfaction was found to be marginally associated with watching fitness-related content ($\beta = .20$, $SE = .11$, $p = .07$). Third, significant results were found regarding trait ($\beta = -.50$, $SE = .04$, $p > .05$) and state levels ($\beta = -.45$, $SE = .03$, $p < .05$) of self-esteem, as well as trait ($\beta = .48$, $SE = .09$, $p < .05$) and state ($\beta = .35$, $SE = .03$, $p < .05$) body dissatisfaction onto ON.

Conclusion. Based on the results, the present research supports the idea that self-esteem and body dissatisfaction are associated with ON on the between-person and the within-person level. These findings provide new insights into the relationship between the variables and can act as a basis for future more in-depth research to examine how these associations are related to one another.

Introduction

In recent scientific literature the combination of behaviours, thoughts, and emotions, related to a potential new eating disorders called Orthorexia Nervosa (ON), have been discovered (McComb & Mills, 2019). There is much debate on the definition of ON and how it develops. On the one hand, ON is described as a new form of eating disorder in which people seem to be obsessed with the consumption of clean and healthy foods as well as significant appearance concerns which have the potential to interfere with an individual's personal health and social life (Cheshire, Berry & Fixsen, 2020). On the other hand, ON is categorized as a preceding stage to known eating disorders or related to obsessive-compulsive disorders (McComb & Mills, 2019).

Problems with regards to the state of research into ON are plenty. A formal diagnosis does not exist in the DSM-V nor the ICD-10, and the debate on the nature of ON is ongoing (Cheshire et al., 2020). Clinicians recognize the rising trend of patients displaying symptoms related to ON (Reynolds & McMahon, 2019). Much research has been conducted on the pathological, obsessive preoccupation with eating a healthy diet, yet much less is known about the appearance and weight concerns of ON, making the development of a diagnosis and therefore prevention and treatment for the sufferers difficult (McComb & Mills, 2019). To strengthen general understanding on ON and to contribute to the development of diagnostic criteria, the theoretical knowledge behind ON needs to be further researched. Much information about, the role of self-esteem and body dissatisfaction in ON remains inconclusive, therefore necessitating further research into these association (McComb & Mills, 2019). The aim of this research is to research the association between ON, self-esteem and body dissatisfaction, and the role of attitudes towards someone's appearance which can lead to higher body dissatisfaction levels and

lower self-esteem levels (Stice & Shaw, 2002; Fairburn, Cooper & Shafran, 2003). This is examined to drive the theoretical understanding of ON and its potential influencers.

Orthorexia Nervosa

Orthorexia Nervosa (ON) is mainly described as a pathological fixation on healthy eating that can develop into an obsessive preoccupation with food and exercise that is physically and socially impairing (Oberle, Samaghabadi & Hughes, 2017). This preoccupation is mainly focused on the consumption of healthy, pure foods (e.g., unprocessed, whole foods like vegetables, fruits, lean sources of meat, etc.), while also coinciding with compulsive behavioural tendencies to avoid unhealthy food, as well as emotional distress and anxiety in relation to the thought of consuming unhealthy food and the negative consequences they cause (Cheshire et al., 2020). Usually, eating patterns to avoid the emotional distress and to reach the desired personal goal of the individual are established. Deviations from these eating patterns correlate with feelings of guilt, shame, and self-hatred (Oberle et al., 2017). Furthermore, the obsessive thoughts and routines revolve around the quality of the food to be consumed, not the quantity as in the case of Anorexia Nervosa (Bratman, 1997). These ON-related symptoms potentially diminish the quality of life since individuals will avoid larger social gatherings involving the consumption of food, self-isolating themselves which can lead to comorbid symptoms of depression and anxiety (Oberle et al., 2017). The preoccupation with eating healthy was initially thought to be the main driving force behind the symptoms, however research assumed that individuals with ON-tendencies also have higher levels of appearance orientation and overweight preoccupation as well (Barnes & Caltabiano, 2017). This seems to coincide with symptoms observed in anorexia and bulimia cases who also display similar concerns (Barnes & Caltabiano, 2017). Implication from these discoveries seem to suggest that this exaggerated focus on appearance and the fear of

gaining weight are the actual reason behind the preoccupation with eating healthy, rather than a pure fixation on health and feelings of purity commonly associated with ON. Eating healthy is the sufferers way to achieve the desired body ideal aspired by the individual, which is different from for example Anorexia Nervosa, where caloric restriction is the main component to achieve the desired appearance or control weight (Bratman & Dunn, 2017; Barnes & Caltabiano, 2017).

That makes the development of a diagnosis even more difficult as there is significant overlap between ON and other eating disorders, as well as OCD-related disorders (Dunn & Bratman, 2016). Overlap regarding the pathological preoccupation with appearance, weight, and shape concerns that seem to drive the healthy eating (Dunn & Bratman, 2016; Barnes & Caltabiano, 2017). These symptoms of appearance orientation and overweight anxieties arise out of thinness/muscular internalization processes are thought to arise out of appearance internalization, as well as the perceived pressure to strive for these appearance ideals (Király, Gajdos, Román, Vass & Rigó, 2019).

Regarding the development, ON tends to manifest itself as a normal concern with one's health and body, that has the potential to slowly develop into an obsession (Király et al., 2019). The onset of orthorexia starts rather innocently usually pertaining to several goals related to health in some form including weight loss, breaking free from bad habits or curing a physical illness (Oberle et al., 2017). Over time, these health-conscious behaviours can become more obsessive, when the initial preparation, purchasing, planning and consumption of food interferes with a person's social life (Oberle et al., 2017). It can lead to the progressive restrictions of entire food groups in order to achieve the health goal the person wants to achieve. Current research is examining the psychosocial risk factors that contribute to the progression and symptoms associated with ON (Valente, Brenner, Cesuroglu, Bunders-Aelen & Syurina, 2020). This

progression from healthy eating to ON-related symptoms to clinical orthorexia seem to be heavily influenced by internal and external factors (Chesire et al., 2020). Internal factors like the personality are predisposing factors to the onset of ON, whereas external factors within the person's social environment seem to be the main influencers onsetting the symptoms associated with ON (Chesire et al., 2020).

Sociocultural Attitudes Towards Appearance & ON

The individual's external environment plays a significant role in the development of certain attitudes, that can influence a person's perception of the ideal body image, which further shapes the person's eating habits as a way to attain these body image ideals (Schaefer et al., 2015).

The orientation towards appearance and the preoccupation with overweight or weight gain are heavily influenced by the social (media) environment, in the form of perceived social pressure and internalization of what are considered to be the ideal body types and images (Turner & Lefevre, 2017). Clinicians observed a recent trend, in which society is becoming fixated with healthy eating and concerns about the ideal appearance, contributing to the growth of more rigid, "healthy" forms of dieting (Chesire et al., 2020). Being perceived as "healthy" in terms of eating is equated to being more attractive and successful, driving these dietary behaviours and thoughts (Chesire et al., 2020). However, these body ideals are unrealistic to attain (Király et al., 2019). The integration of social media networks like Instagram, result in constant media exposure to these ideals. This is further driving the excessive internalization processes commonly found in individuals with eating pathologies, ON included. That in turn can increase negative self-evaluations about the persons own body when comparing themselves to these (social) media body ideals (Király et al., 2019; Stice & Shaw, 2002).

This perceived sociocultural pressure towards appearance ideal internalization has been linked to eating disturbances found in ON and other eating disorders (Király et al., 2019). In addition, these internalization processes have been associated with higher levels of body dissatisfaction and lower levels of self-esteem as well (Rodgers et al., 2021). Higher degrees of internalization are significantly linked to a higher desire to attain these unreachable ideals and one way to achieve the desired outcome is the establishment of strict rules about what can and cannot be eaten. Individuals with ON-related symptoms reported that by adhering to a strict, healthy diet, the body ideal they were striving for was more reachable (Király et al., 2019).

Furthermore, the role of social media has been consistently linked to the formation of people's perception especially in relation to health messages and body image (Menzel et al., 2010). Perceived pressure from social media sources like YouTube and Instagram are associated with higher eating pathology tendencies, proving that even brief exposure to media-portrayed body ideals and potentially the positive reaction towards these ideals from society, can result in significantly higher levels of negative self-evaluations further progressing the shift from health-conscious eating to behaviours associated with ON (Turner & Lefevre, 2017; Király et al., 2019). Additionally, algorithms on these platform work in such a way, that people get increasingly exposed to content they clicked on and intentionally are seeking out. This funnelling can lead individual to assume that the unrealistic body ideals are more common and therefore more reachable. Regarding dietary behaviours, it normalizes these restrictive, extreme forms of dieting and makes them appear as if they are more common (Kim & Chock, 2015; Fardauly, Diedrichs, Vartanian, & Halliwell, 2015).

While sociocultural pressure by the use of media platforms were proven to be directly linked to ON, the role of other variables like self-esteem and body dissatisfaction remains

inconclusive (McComb & Mills, 2019; Barthels et al., 2017; Oberle et al., 2017), especially when examined in association with appearance orientation and overweight preoccupation found in ON (Barnes & Caltabiano, 2017).

Self-Esteem & Eating Pathologies

Self-esteem refers to the person's level of self-acceptance which results from an individual's evaluation and appraisal of his self-worth, attractiveness, competence, and ability to achieve one's own aspirations (Robson, 1988). Regarding eating pathologies in general, self-esteem is significantly lower in individuals showing any form of eating disorder or minor eating and body-image disturbances (Fairburn, Cooper & Shafran, 2003). It suggests that self-esteem is a powerful maintaining mechanism of eating disorder symptoms exacerbating shape and weight concerns, as well as dietary restrictions (Ciarra & Mathews, 2017).

Additionally, individuals displaying disordered eating behaviours tend to have a more global negative view of themselves which maintains these eating behaviours, thoughts, and emotions and further increase the symptoms (Fairburn et al., 2003). The "core low self-esteem" is significantly associated with individuals pursuing control overeating, body shape and weight with high levels of goal-determination further enhancing the self-condemnation and negative perceptions towards themselves which correlates with their engagement in more pathological eating patterns (Fairburn et al., 2003).

According to the review by McComb and Mills, research into the role of self-esteem regarding onset and development of ON has been lacking (McComb & Mills, 2019). Only two studies examined the potential effects of self-esteem yet found no significant correlation between ON-related symptoms and the person's level of self-esteem (Oberle et al., 2017; Barnes & Caltabiano, 2017).

When comparing the general mechanisms of self-esteem in relation to eating pathologies, it could be assumed that self-esteem operates similarly in individuals displaying ON-related symptoms. Individuals who internalized a specific body-type image pressured on them through social media, might have lower levels of the “core self-esteem” leaving the individual more vulnerable to internalize unrealistic body ideals. This might further drive the progress from healthy eating to ON-related symptoms. Many aspects of ON, the restrictive dietary habits, and the high need for control over their diet could be a result of that lower self-esteem, further increasing the rigid dieting, appearance orientations, and overweight preoccupations (Barnes & Caltabiano, 2017). Lastly, individuals with ON display higher levels of emotional distress in the form of feelings of guilt, shame and anxieties when deviating from their rigid protocol (Oberle, Nadai & Madrid, 2020). This could coincide with lower levels of self-esteem since it is the evaluative component of a person’s feeling of competence and having the ability to achieve their goals. Deviations could be interpreted as the individual evaluating themselves and their efforts more negatively. However, further research into the role of self-esteem and ON-related symptoms and their development is needed (Ciarma & Mathew, 2017).

Body Dissatisfaction (BD) & Eating Pathologies

In addition to self-esteem, the role of body dissatisfaction in the onset and development of ON-related symptoms could be of equal importance. Body dissatisfaction is defined as a negative attitude towards one’s own appearance assumed to originate from a perceived discrepancy between the actual physical appearance and the desired ideal state of the body (Heider, Spruyt & De Houwer, 2018). Past research confirms that ON sufferer did not express body image disturbances commonly associated with anorexia in which the individual has the biased perception of being larger than in reality (Barthels, Meyer, Huber, Pietrowski, 2017). However,

body dissatisfaction is distinguishable from body image distortions. The few studies conducted into ON and body image seem to suggest that greater importance is placed on appearance and weight potentially indicating body dissatisfaction to play a more significant role in the progression of ON-related symptoms (McComb & Mills, 2019).

Risk factors for the development of body dissatisfaction seem to arise primarily from sociocultural pressures to be either thin or muscular. The influence of media on body image seems to be one of the most pervasive promoters of appearance internalization processes (Grabe, Ward & Hyde, 2008). The negative effect of media on internalization and perceived pressure expresses itself through increased body dissatisfaction levels. This influence seems to be prevalent throughout society and is prevalent to a similar degree in both the female and male population (Rodgers et al., 2021, Rodgers, Ganchou, Franko & Chabrol, 2012, Rodgers, Chabrol & Paxton, 2011, Grabe et al., 2008, Stice & Shaw, 2002). The elevated perceived pressure to be thin in females or muscular in males is directly associated with higher degrees of body dissatisfaction (Rodgers et al., 2011; Rodgers et al., 2012). Media portrayed body ideals resulted in acute and immediate increases in body dissatisfaction and both the perceived pressure of appearance internalization and media-portrayed body ideals were progressively increasing the level of body dissatisfaction in individuals (Rodgers et al., 2021; Posovac, Posovac & Weigel, 2001). This suggest that body dissatisfaction levels are directly influenced by the person's sociocultural attitude towards his appearance. Previous research was able to establish that sociocultural pressure did directly influence ON-related symptoms, which means we could assume a potential association between sociocultural pressure via mass media, body dissatisfaction and the symptoms observed in ON (Király et al., 2019).

Consequences of increased levels of BD have been significantly linked to subsequent increases in risk for developing eating pathologies (Graber, Brooks-Gunn, Paikoff & Warren, 1994). Higher levels of BD have been associated with increased dieting behaviour, which also is one of the main symptoms of ON. This increased dieting is adopted because individuals believe that this an effective way to control their weight and shape their appearance (Stice & Shaw, 2002). Potentially, it can spiral into the development of an eating pathology if an individual's effort is not met with the desired success or if the success is heavily reinforced by peers and potentially reactions on social media in the form of positive comments or increased likes gained from a post.

Research clearly links BD with the risk for developing an eating pathology, yet not much is known about the role of BD when it comes to ON, clearly indicating the need to examine the association between the two variables to determine the potential influence (Király et al., 2019; McComb & Mills, 2019).

The Present Study

The present research tries to examine the potential associations between ON-related symptoms and an individual's level of self-esteem and body dissatisfaction in association to the exposure to mass media pressuring the individual to attain a certain body ideal. The study aims to explore this relationship to reveal potential associations between the constructs to contribute to the research into ON (McComb & Mills, 2019). To examine this association, data collection will be done via traditional cross-sectional methods and through momentary, ecological methods. Cross-sectional research is used to determine direct associations of ON-related symptoms and sociocultural attitudes towards appearance with self-esteem and body dissatisfaction. Experience sampling is used to observe how ON-related symptoms might occur within the daily context of an

individual by examining whether social media use is associated with ON, while also examining its effect on self-esteem and body dissatisfaction.

The first question explores the associations between a person's general body dissatisfaction and self-esteem levels and ON, as well as the association between sociocultural attitudes towards appearance. The direct associations will be examined. For both hypotheses one and two, the association of self-esteem and body dissatisfaction levels with ON are researched. **(H1)** *“Higher levels of body dissatisfaction will predict higher levels of ON among adult students.”* **(H2)** *“Lower core levels of self-esteem will predict higher levels of ON among adult students.”* Hypotheses three and four will test the association between sociocultural attitudes towards appearance on a person's general body dissatisfaction and self-esteem levels. **(H3)** *“Higher sociocultural attitude towards appearance scores will predict higher body dissatisfaction levels among adult students”.* **(H4)** *“Higher sociocultural attitude towards appearance scores will predict lower core levels of self-esteem among adult students.”*

The second research question proposed is interested in the potential momentary associations of social media use and the individuals momentary level of self-esteem, body dissatisfaction, and their overall ON-related symptoms. The research question examines whether social media usage, particularly watching fitness-related content is associated with negative effects on self-esteem, body image in the form of body dissatisfaction, and ON. First, the effect of social media usage on self-esteem is examined. **(H1)** *“Social media usage is negatively associated with momentary emotional responses related to ON.”* The second hypothesis explores the effect of social media on body dissatisfaction levels. **(H2)** *“Social media usage is negatively associated with momentary body dissatisfaction levels.”* Third, the effect of using social media

and its effects on ON-related emotional responses will be researched. **(H3)** ” *Social media usage is negatively associated with momentary levels of self-esteem.* ”

The third research question tries to examine whether there is an association between momentary ON-related symptoms and concurrent self-esteem and body dissatisfaction levels and whether that effect is present on the between/within-person level. The between-person level describes the person’s overall level of self-esteem and body dissatisfaction. This level stays stable and is not dependent on the context of the individual. The within-person level describes momentary fluctuations of self-esteem, body dissatisfaction and ON based on the context the individual is in. **(H1)** ” *Higher/lower levels of self-esteem are associated with higher/lower ON scores on the between/within-person level*”. **(H2)** ” *Higher/lower body dissatisfaction levels are associated with higher/lower ON scores on the between/within-symptom level.* ”

Methods

Participants

In total, 40 participants in the age range of 18-30 were included ($M = 20.23$, $SD = 2.05$). Regarding demographical information, gender distribution was 62.9 % females, 8.6 % males and 2.9 % who indicated others as their gender. 54.3 % of the sample had German nationality, 14.3 % Dutch and 5.7 % detailed other nationality as their answer.

Participants were contacted through the universities sign-up system (i.e., Sona-Systems) or through direct contact from the researcher. Participants were rewarded with 0.5 credits for their participation, whereas participants contacted from outside the university did not receive any reward upon completion. Before the quantitative study started participants signed the informed

consent providing information about the aim of the research, information regarding anonymity and the general structure of the study.

Materials

Ethica

Ethica is a smartphone software able to gather momentary, ecological data. It was designed for researchers to develop, deploy, and make necessary adjustments to any form of survey. The application functions as a platform on which participants can join the study via their smartphones and complete the questionnaires. Ethicadata.com was the website used by the researcher to make potential adjustments to the survey, while also observing the participant flow and their response rates (Ethica, 2020). The mobile app can be installed on all recent smartphone hardware, including iOS and Android. On the researcher website, questions can be grouped into surveys examining the constructs (e.g., body dissatisfaction survey). On the website, these surveys are named activities. These surveys can be published for participants to access them on their smartphones. Triggering logics can be added to these surveys to determine when and how often participants will need to fill out the survey. Notifications can be enabled to notify participants of upcoming surveys that need to be completed. The entire survey was in English regardless of the participants nationality.

Cross-Sectional Research

Orthorexia Nervosa

The EHQ was used to examine the related symptomatology of orthorexia (Oberle et al., 2017). The EHQ consisted of 21-items distributed over the three components of ON. Items were statements which had to be answered using a 5-point Likert scale (1 = strongly disagree, 2 =

mostly disagree, 3 = neither agree nor disagree, 4 = mostly agree, 5 = strongly agree). 8 items measured behaviours commonly associated with orthorexia (e.g., “The way my food is prepared is important in my diet”; Cronbach’s alpha = .87). 9 items measured the problems which are associated with ON-related symptoms (e.g., “I spend more than 3h a day thinking about healthy food”; Cronbach’s alpha = .79). The last subscale measured the emotional responses of individuals with ON-related symptoms and consisted of 4 items in total (e.g., “I feel great when I eat healthy”; Cronbach’s alpha = .73). Overall, the EHQ proved good, reliable levels of internal consistency (Cronbach’s alpha = .9) indicating its reliability to measure ON-related symptomatology (Oberle et al., 2017).

Sociocultural Attitudes Towards Appearance

The SATAQ-4 was used to examine an individual’s sociocultural attitude towards his appearance along 5 factors (Király et al., 2019). The first two factors examined appearance internalization. The thin-factor included 5 items (e.g., “I want my body to look very lean”; Cronbach’s alpha = .88). Secondly, the muscular factor included 5 items and examined attitudes towards levels of muscularity (e.g., “I think a lot about looking muscular”; Cronbach’s alpha = .89). The remaining three factors examined perceived pressure from family (Cronbach’s alpha = .84), media (Cronbach’s alpha = .92) and peers (Cronbach’s alpha = .85). All items were answered using a 5-point Likert scale (1 = definitely disagree, 2= mostly disagree. 3= neither agree nor disagree, 4= mostly agree, 5= definitely agree) (Schaefer et al., 2015).

Self-Esteem

The RSES was a 10-item questionnaire which examined an individual’s self-esteem by measuring global self-worth through both negative and positive feelings about the self (Rosenberg, 1965). Statements regarding self-worth were answered using a 5-point Likert scale

(1= strongly agree, 2= agree, 3 = neither agree nor disagree, 4= disagree, 5= strongly disagree) and included items such as “I wish I could have more respect for myself”. Internal consistency proved reliable with a Cronbach’s alpha of .86.

Body Dissatisfaction

The ABISS consisted of 16 items assessing three main components of an individual’s evaluation of their body image and shape (Leone, Maurer-Stark, Mullin & Rovito, 2014). Items were answered using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The first subcomponent of the questionnaire examined positive emotions in association with a person’s body image, called *body competence* (e.g., “I am satisfied with my body”). Secondly, the ABISS measured negative evaluations and feelings towards a person’s body image. This subcomponent measured the *body inadequacy* level of an individual (e.g., “I am unattractive”). Lastly, the internal conflict component examined the overall level of balance between positive and negative perceptions of the ideal body image, as well as over and under investment into body image concerns (e.g., “I want the “*perfect*” body”). Internal consistency of all three subscales ranged from .64 to .82 proving acceptable to good levels of reliability in measuring body (dis)satisfaction.

Experience Sampling Method (ESM).

The ESM questionnaire consisted of a total of 13 items divided over four scales. The first dichotomous items asked about the most recent social media use “Did you use any form of social media in the last 2 hours?”. This was followed by four items examining the current level of self-esteem. Items answered on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and the mean score of all four items would provide information on the momentary self-

esteem levels. Cronbach's alpha of .7 showed acceptable levels of internal consistency (Thewissen, Bental, Oorschot, Campo, Lierop, van Os & Myin-Germeys, 2011).

The second part of the ESM questionnaire examined the body dissatisfaction levels and consisted of 4 items answered on a 5-point Likert scale (1 = strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, 5 = strongly agree). Items were used from the Body-Image Concern Inventory which had been used in previous research to examine body dissatisfaction levels in an ESM study (Littelton, Axsom & Pury, 2005). Internal Consistency proved reliable (Cronbach's alpha = .93).

The remaining items examined the momentary level of ON tendencies. 4 items derived from the Orthorexia Nervosa Inventory (ONI) were used (e.g., "I much guilt and self-loathing when I stray from my healthy diet") and statements had to be answered using a 5-point Likert scale (1= strongly disagree, 2= mostly disagree, 3= neither agree not disagree, 4= mostly agree, 5 = strongly agree). Total Cronbach's alpha proved good internal consistency of .94 (Oberle, De Nadai & Madrid, 2020).

Procedure

Following approval from the Ethical Committee at the University of Twente (Request nr. 201331), recruitment of the participants started by uploading the study to the universities sign-up system or by sending out invitations to potential participants. With regards to personal invitations, a web link was provided directing participants to the first page of the study. In the beginning participants read through the informed consent explaining the structure and general aim of the study in plain language. After agreeing to the terms and conditions participants received instructions on how to download the app used to collect the ESM data in phase 2 of the

study. Instructions highlighted the necessary steps to download the app (Ethica) via the iTunes Appstore and Google Play.

After the download was completed participants were directed to the next page containing information about phase 1 of the study. Approximate completion time of the first phase was also given. Before completing each questionnaire, participants received a small paragraph informing them about what each questionnaire was measuring and how they had to fill out the questionnaires. All participants had to complete all four questionnaires before being able to move to Phase 2 (ESM). This was done to ensure that baseline measures, used to test the hypotheses 1-4 of the first research question, were collected before the ESM data. Phase 2 collected the ESM data over 7 consecutive days and consisted of 4 reminder notifications per day at fixed intervals between 9:00am to 10:30pm. Each assessment was set several hours apart and structured to sample the entire day covering potential fluctuations of the variables of interest.

Each of the reminder prompts were available for 90 minutes to the participants, and instances in which the ESM questionnaire was not filled out was coded as a missing value. The time window ensured that participants would complete the assessment at the intended times avoiding the potentiality that they would fill out all 4 assessments at one point in time (Colautti; Fuller-Tyszkiewicz, Skouteris, McCabe, Blackburn & Wyett, 2011). In case of complications or questions regarding the ESM data collection, the mail address of the researcher was provided account for these eventualities.

Each data collection would start with the first item asking whether participants used any form of social media in the past two hours. Notification on the upcoming data collection was provided in the end before participants would close the survey. If participants answered “yes” they would be directed to the next part of the questionnaire. The first part contained all four items

of the self-esteem subscale examining the momentary self-esteem measures. Instructions on how to fill out the items was provided at the beginning, before participants were directed to the actual items. This was done for all three subscales of the questionnaire in Phase 2. After finishing the self-esteem items, participants were directed to the four body dissatisfaction items, followed by the remaining ON-related symptom items.

The researcher completed a three-day pilot testing before the data collection procedure started. Triggering logics and notification functionality were tested to examine whether participants would get notified about upcoming surveys at the designated time points. Over the course of the three days, researchers were able to confirm that participants would receive the notifications at the predetermined time points.

Data Analysis

Cross-sectional and experience sampling data were downloaded via Ethica as a CSV file and imported into SPSS for further statistical analyses. SPSS version 25.0 and two-tailed tests with a significance level of $< .05$ were used. To conduct both main analyses for the first and second phase, the data set had to be prepared by merging the four data sets from the SATAQ-4, EHQ, RSES and ABISS into one data set. The ESM data set was separately imported, prepared, and analysed. Regarding the ESM data, participants with a response rate of above 50 % were included in the data analyses process. This cut-off point is in accordance with previous literature concerning ESM research (Connor & Lehmann, 2012). Preliminary analyses in the form of assumption tests, factor analyses and reliability analyses were conducted on the scores of the Phase 1 cross-sectional questionnaires. Descriptive statistics were used to calculate mean scores and standard deviations regarding the demographical data (gender, age, nationality), as well as

the mean scores of the body dissatisfaction, self-esteem, sociocultural attitudes towards appearance, and ON-related symptoms, tested in the cross-sectional research.

To test the associations between sociocultural attitudes towards appearance and ON-related symptoms on self-esteem and body dissatisfaction levels, four independent linear regression analyses were conducted. The first regression analysis analysed the association between self-esteem, which was used as the independent variable and ON scores, used as the dependent variable. The second linear regression analysis used body dissatisfaction scores as the independent variable, whereas ON remained the dependent variable. The third and fourth regression analysis used sociocultural attitudes as the independent variable in the analyses, and self-esteem scores were used as the dependent variable in the third regression analysis. Mean body dissatisfaction scores were used as the dependent variable in the fourth analysis.

The ESM data consists of two-level information. Level one regards the state self-esteem and state body dissatisfaction levels. Level 2 concerns each participant (Level 2). For all variables, z-scores were calculated to obtain standardized estimates, allowing for statistical comparisons. Since ESM uses multiple data collection points for the participants, there is a need to disaggregate between-person and within-person effects into one model to prevent errors of inference (Curran & Bauer, 2011). Therefore, the average person mean (PM) score was calculated per participant over seven days, for all three variables, to allow for a between-person analysis and test whether social media use is potentially associated with self-esteem, body dissatisfaction and ON-related symptoms. Moreover, the state scores for self-esteem and body dissatisfaction were subtracted from their PM score to get the person mean-centered scores (PM-centered) from each participant. The PM-centered scores reflect momentary deviations in state self-esteem and body dissatisfaction of all participants per timepoint, pointing out how much the state levels at each timepoint differ

from the PM score, allowing for within-person analysis. Regular hypotheses testing analyses are not able to handle large missing values, which are common in ESM data sets. Therefore, the decision was made to test the association by using multiple linear mixed model (LMM) analyses to avoid loss of power and to deal with potentially missing measurement points and to ensure that no data dependency happens.

To examine whether social media usage had an effect on momentary levels of self-esteem, body dissatisfaction and ON-related emotions, multilevel linear mixed model analyses were performed using social media use (yes/no) and watching fitness content (yes/no) as its fixed factors. Self-esteem, body dissatisfaction and ON-related symptoms were used as the dependent variables. Parameters for the fixed effects were included for analysis and means for the fixed factors were calculated in SPSS.

Two linear mixed model analyses were conducted to test for the general association between self-esteem and body dissatisfaction with concurrent levels of ON. ON symptoms scores were used as the dependent variable. In the first analysis, self-esteem was used as the fixed covariate to test whether there was an association between the two constructs. Similarly, the second linear mixed model analysis used body dissatisfaction as the fixed covariate to test a potential association.

Further analyses included two multilevel linear model analysis to disaggregate between the within-person and between person level of both the self-esteem and body dissatisfaction variable. Momentary ON-related symptom scores were used as the dependent variable. PM-centred (within-person) scores and the PM (between-person) scores for state self-esteem as fixed variables were used to examine whether or not the relationship between state self-esteem and momentary ON-related symptom scores was a within-person or a between-person one. This set-up was similar in

the second multilevel linear model analysis, though PM-centred scores (within-person) and PM (between-person) scores of body dissatisfaction were used instead.

To calculate the reliability of the momentary measures, and therefore the stability of the participants responses, a Pearson, or split-half reliability analysis was conducted for all three subscales to test the internal consistency. The longitudinal data set was split in two halves and mean scores between the first and second timepoint were compared using the Pearson correlation analysis. A Pearson coefficient r of $> .1$ ($-.1$) was assumed a weak association, $> .3$ ($-.3$) indicated a moderate correlation, and $> .5$ ($-.5$) was considered a strong correlation (Cohen, 1988).

Results

Phase 1: Psychological Questionnaire Battery

Preliminary Analysis

Preliminary analyses were conducted before the main analyses of Phase 1. To ensure normal distribution across the four variables used in the research, assumption testing was conducted to test for skewness and kurtosis values. A Shapiro Wilk's test ($p > .05$) (Shapiro & Wilk, 1965; Razali & Wah, 2011)) and a visual inspection of the histograms, normal Q-Q plots, and boxplots (Appendix 1) showed that the scores were in fact significantly normally distributed across all four cross-sectional questionnaires (Table 1)

Table 1. Assumption Tests – Cross-Sectional Questionnaires

Inventory	Kurtosis (SE)	Skewness (SE)	Shapiro Wilk's
EHQ	-.15 (.07)	.22 (.37)	.60
SATAQ-4	.49 (.72)	-.68 (.37)	.08
RSES	.08 (.73)	-.34 (.37)	.36
ABISS	-.04 (.73)	.32 (.37)	.48

EHQ (Eating Habits Questionnaire), SATAQ-A (Sociocultural Attitudes Towards Appearance Questionnaire-4), RSES (Rosenberg Self-Esteem Scale), ABISS (Adolescent Body Image Satisfaction Scale)

Factor Analysis

Principal component analyses with varimax rotation were conducted on all four questionnaires. Factor analyses were able to confirm results of previous research indicating that all items of the four questionnaires were loading on their designated factors. Regarding the EHQ, all 21 items loaded across three factors which were able to explain 60 % of the total variance. The SATAQ-4 only used 3 of the 5 subscales, those being thinness and muscular internalization and media pressure. All 14 items loaded on three factors in line with previous research. In total 72 % of the total variance was explained by the factors. Regarding the RSES, the items were equally divided over positive and negative statements associated with global self-esteem. The 5 positive items loaded significantly on factor 1, whereas the 5 negative items loaded on the second factor. 77 % of the total variance was explained by the two factors. Lastly, the ABISS also proved valid in its factor structure, with three factors emerging, able to explain 70 % of the total variance. Items loaded significantly on either of the three factors in line with previous research.

Reliability Analysis

Reliability analysis of the three subscales proved to be similar with previous research (Oberle et al., 2017) with only minor differentiations. Cronbach's alpha for the composite EHQ

was .82, .81 for the EHQ-behaviours subscale, .77 for the EHQ-Problems subscale, and .82 for the EHQ-Feelings subscale. Reliability analysis also proved that the SATAQ-4 and the subscales used in this research has good internal consistency. Cronbach's alpha for the thinness-internalization subscale was .82, .83 for the muscular-internalization subscale, and .93 for the media pressure subscale. Cronbach's alpha for the entire scale proved a good internal consistency with a total value of .82. Previous research was able to establish moderate to good levels of internal consistency with regards to the three subscales of the ABESS (Leone et al., 2014). Cronbach's alpha of the first subscale was .92 showing excellent levels of internal consistency. The second subscale had a Cronbach's alpha of .88. Lastly, Cronbach's alpha for the third scale showed moderate levels of internal consistency with a value of .72.

Main Analysis

Descriptive Statistics

Analysis of the mean scores of all four questionnaires showed that participants were in the medium to high range. Higher scores on the RSES and the ABESS indicated higher levels of self-esteem, as well as a higher satisfaction with the individual's appearance and body image. In the contrast, higher scores on the EHQ and the SATAQ-4 would indicate more ON-related symptoms experienced by the participants, as well as a higher perceived pressure to internalize body ideals and pressure from the media to attain these ideals. Mean score analyses indicate that, self-esteem and body satisfaction levels in the sample were generally positive, whereas the total mean scores of the SATAQ-4 and the EHQ were in the moderate range, with significantly larger SD's when compared to the RSES and ABESS scores. (see Table 1).

Table 2. Descriptive Statistics: EHQ, SATAQ-4, RSES, ABISS

Inventory	N	Minimum (Scale Minimum)	Maximum (Scale Maximum)	Mean	SD
EHQ	40	46 (21)	83 (105)	64.32	8.78
SATAQ-4	40	14 (14)	60(70)	44.82	10.42
RSES	40	23(10)	39(50)	32.37	3.76
ABISS	40	30(16)	73(80)	54.37	9.60

EHQ (Eating Habits Questionnaire), SATAQ-4 (Sociocultural Attitudes Towards Appearance Questionnaire-4), RSES (Rosenberg Self-Esteem Scale), ABISS (Adolescence Body Image Satisfaction Scale)

Regression Analysis

To test the four hypotheses of the research, four separate linear regression analyses have been conducted. Hypothesis 1 assumed that lower levels of self-esteem would be associated with higher levels of ON. This hypothesis had to be rejected based on the results of the regression analysis ($\beta = .16$, $SE = .27$, $p = .33$, $CI [-.38/1.20]$). Hypothesis 2 assumed that higher levels of body dissatisfaction were associated with higher tendencies of ON-related symptoms. Similar to Hypothesis 1, the hypothesis had to be rejected, indicating no significant correlation between the independent and dependent variable ($\beta = .19$, $SE = .32$, $p = .24$, $CI [-.26/1.03]$). Hypothesis 3 stated that higher sociocultural pressure scores, depicted as appearance internalization and perceived media pressure, would significantly predict lower self-esteem scores. Results showed a marginally significant positive, between-person association ($\beta = .27$, $SE = .06$, $p = .09$, $95\% CI [-.02/.22]$). Hypothesis 4 stated that higher levels of perceived sociocultural pressure would predict higher body dissatisfaction levels. Hypothesis 2 had to be rejected since there was no

significant correlation between perceived pressure on sociocultural attitudes and the individual's body dissatisfaction levels ($\beta = .17$, $SE = .07$, $p = .31$, $CI [-.07/.21]$).

Table 3. Regression Analysis Summary for Body Dissatisfaction, Self-Esteem on ON (H1, H2)

Variable	B	95% CI	β	t	p
Body Dissatisfaction*ON	.38	[-.27 1.03]	.19	1.19	.24
Self-Esteem*ON	.37	[-.38 1.12]	.16	.99	.33

Table 4. Regression Analysis Summary for Sociocultural Attitudes Towards Appearance (SATA) on Self-Esteem and Body Dissatisfaction (H3, H4)

Variable	B	95 % CI	β	t	p
SATA*Self- Esteem	.10	[-.02 .22]	.27	1,74	.09
SATA*Body Dissatisfaction	.07	[-.07 .21]	-.17	1.04	.31

Experience Sampling Questionnaire

Participant Flow

In total 42 participants took part in the research. 2 participants had to be excluded from the data set, resulting in $N=40$. In one case, the response rate was below 50 percent, the other was a test subject for the pilot study to examine whether the triggering logistics of the ESM questionnaire were functional.

Preliminary Analysis

Before the main analyses were conducted, a Shapiro-Wilk test was performed to test for normally distributed data across the three variables. Statistical and visual analysis showed mixed results regarding normal distribution. Regarding momentary self-esteem, the subscale showed a skewness value of $-.54$ ($SE = .101$) and a kurtosis value of $-.47$ ($SE = .20$). The p -value was $.00$ indicating that the data was not normally distributed. Q-Q plots and histogram (see Appendix) would indicate a distribution close to normal, however based on the statistical analysis, the null hypothesis had to be accepted. Significance levels of the body dissatisfaction and orthorexia scales also showed p -values $< .05$ also indicating that the data was in fact heavily skewed and kurtotic. Despite that, the body dissatisfaction scale showed skewness and kurtosis values within the range of ± 1.96 with skewness being $.17$ ($SE = .09$) and kurtosis $.28$ ($SE = .19$). Lastly, the orthorexia scale had a skewness value of $.994$ ($SE = .09$) and kurtosis of $.50$ ($SE = .19$)

Split-half reliability analyses were conducted to test the stability of responses per timepoint. Mean scores for the odd timepoints (Timepoint 1, 3, etc.) were calculated per participant. Similarly, participant mean scores for the even timepoints (Timepoint 2, 4, 6, etc.) were aggregated. Both mean score variables were correlated using Pearson's bivariate correlation analysis, yet no results regarding the reliability of the two halves could be established. That leaves the reliability of the experience sampling items of the self-esteem, body dissatisfaction and ON scales unanswered.

Descriptive Statistics

Table 5. Person-Mean Scores – ESM Questionnaire

Scale	N	Mean	SD	Minimum (Scale Minimum)	Maximum (Scale Maximum)
Self-Esteem	928	3.86	.62	3 (1)	5 (5)
Body Dissatisfaction	928	2.72	.67	1 (1)	4 (5)
Orthorexia	928	1.91	.74	1 (1)	4 (5)

Main Analysis

Social Media, Fitness-Content and Self-Esteem, Body Dissatisfaction, and ON

Linear mixed model analyses were conducted to test whether there was an association between social media usage, as well as watching fitness-related content on momentary measures of self-esteem, body dissatisfaction levels and ON-related symptoms. Social media use was found to be a significant factor for momentary self-esteem levels ($\beta = .14$, $SE = .05$, $p = .00$) and had a positive association, indicating that using social media increases the momentary levels of self-esteem. Watching fitness-related content was non-significant factor for momentary self-esteem ($\beta = .01$, $SE = .06$, $p = .85$), indicating that watching content in relation to fitness is not associated with momentary fluctuations in self-esteem.

Social media was not a significantly associated with momentary fluctuations in body dissatisfaction levels ($\beta = -.07$, $SE = .08$, $p = .41$). This indicates that general social media use does not increase in the moment increases in negative body evaluations. However, watching fitness related content had a marginally significant association with body dissatisfaction levels ($\beta = .20$, $SE = .11$, $p = .07$) potentially indicating that watching fitness content and being exposed to certain body ideals does somewhat increase momentary body dissatisfaction levels.

Regarding ON-related symptoms, social media was not significantly associated with it ($\beta = .04$, $SE = .08$, $p = .61$), indicating that using social media does not influence negative emotions typically associated with ON-related symptoms. Additionally, no significant association was established between ON-related symptoms and watching fitness-related content ($\beta = .05$, $SE = .10$, $p = .65$). This seems to indicate that ON-related symptoms are not associated with social media use whatsoever.

ON and state/trait self-esteem and body dissatisfaction

It was examined whether self-esteem and body dissatisfaction were associated with ON-related symptoms and whether there were within-person (PM-centred) and between-person (PM) differences of these associations. Self-esteem significantly predicted ON-related symptoms $F(1, 663.99) = 133.38$, $p < .001$. The results revealed a strong negative association ($\beta = -.52$, $SE = .05$, $p < .001$). Body dissatisfaction also significantly predicted ON-related symptoms $F(1, 676.77) = 133.09$, $p < .001$. The results revealed a strong positive association ($\beta = .38$, $SE = .03$, $p < .001$).

Regarding self-esteem, it was found that PM self-esteem significantly predicted ON-related symptoms $F(1, 59.81) = 35.17$, $p < .001$. PM-centred also proved significantly associated with ON $F(1, 558.96) = 106.14$, $p < .001$. Both PM ($\beta = -.92$, $SE = .15$, $p < .001$) and PM-centred ($\beta = -.49$, $SE = .05$, $p < .001$) results revealed a strong, negative association. This indicates that higher self-esteem levels act as a psychological buffer against ON-related symptoms and vice versa, lower core self-esteem levels, as well as momentary negative fluctuations might increase the potential for ON-related symptoms.

PM body dissatisfaction scores were also significantly predicting ON scores $F(1, 57.70) = 49.06$, $p < .001$, and PM-centred body dissatisfaction scores were also significantly predicting ON scores $F(1, 554.63) = 97.63$, $p < .001$. The results revealed a strong, significant positive

between-person association ($\beta = .67$, $SE = .09$, $p < .001$), as well as a significant, but weaker positive association on the within-person level ($\beta = .35$, $SE = .04$, $p < .001$). This indicates that both overall body dissatisfaction levels, in addition to momentary fluctuations seem to predict more ON-related symptoms, though it seems that trait body dissatisfaction has a higher level of influence.

Discussion

Results

The aim of the present study was to contribute to the literature about ON by exploring the potential associations of ON with self-esteem and body dissatisfaction, as well as examining how sociocultural attitudes towards appearance and social media use would be associated with ON, self-esteem and body dissatisfaction levels. In the cross-sectional research, ON was not associated with self-esteem and body dissatisfaction levels. Sociocultural attitudes towards appearance were only somewhat associated with self-esteem levels, while no relationship between attitudes with body dissatisfaction could be established. In line with previous research, sociocultural attitudes were associated with ON (Király et al., 2019).

The experience sampling research did not confirm potential associations between social media use on momentary levels of self-esteem, body dissatisfaction and ON, however data analysis did confirm that self-esteem and body dissatisfaction levels were associated with ON, on both the state and trait level. Self-esteem did seem to be positively associated with ON, whereas body dissatisfaction was negatively associated with ON. These findings lead to a number of theoretical implications regarding the associations of the variables.

Theoretical Implications

Associations of Sociocultural Attitudes Towards Appearance

While not part of the hypotheses, a direct association between ON and sociocultural attitudes was established. This pattern of results is consistent with previous literature, stating that these attitudes, in the form of thinness internalization for women, and muscular-internalization for men, as well as the perceived pressure through social media are related to eating pathologies and problematic eating behaviours, like those found in ON (Király et al., 2019). Despite that, while previous research was able to confirm the essential role of social media as an influencer in ON development, when examining the role of social media use and watching fitness-related content in the present study, no association was found. This finding is juxtaposing previous literature of social media usage and ON (Turner & Lefevre, 2017). Higher Instagram use was associated with greater ON tendencies, due to the image-based nature of the platform. Specifically, Instagram allows for selective funnelling of content, which may lead users to think that these extreme forms of dieting are more common and feel pressure to conform to these norms in order to reach their goals (Turner & Lefevre, 2017). In addition, the eminence-based practices commonly found on these social media platforms may lead to a continuous reinforcement of these extreme forms of dieting through influencers constantly portraying feed of images regarding the “ideal” physique for men and women or how to eat (Rodgers et al., 2012; Rodgers, Chabrol & Paxton, 2011; Turner & Lefevre, 2017).

In juxtaposition to previous and current research which established a clear association between sociocultural attitudes towards appearance and higher body dissatisfaction (Rodgers, Chabrol & Paxton, 2011; Veldhuis, Alleva, De Vaate, Keijer, & Konjin, 2020), the present research was not able to establish the association of sociocultural attitudes through social media use on body dissatisfaction. Neither the cross-sectional data, nor the experience sampling data

found results. Using social networking sites (SNSs) was established to be directly linked to increased body surveillance and body comparisons (Jean-Marks, De Foe & Collet, 2020) and watching appearance-related content has a direct influence on subsequent and overall levels of body dissatisfaction (Meier & Gray, 2014). Since social media plays a significantly larger role in the everyday life of many people, including self-representation and lurking behaviours (Bij de Vaate, Verldhuis & Konijn, 2020), it is reasonable to assume a potential association between social media usage and state increases in body dissatisfaction. Especially since general media exposure is clearly affecting overall body dissatisfaction levels (Rodgers et al., 2021).

The present results on the role of social media and self-esteem are consistent with previous research, in which it was proven that self-esteem is influenced by different types of social media use (Steinsbekk, Wichstrøm, Stenseng, Nesi, Hygen & Skalická, 2021). Though a negative association was expected in the present research, the positive association found in the present research lends support to the fact that the influence of using social media, even when engaging in appearance-related content, is not solely negative (Pounders, Kowalczyk & Stowers, 2016). Increased self-esteem was associated with self-presentation behaviours like posting selfies to push forward a positive self and presenting it to the external environment (Veldhuis et al., 2020; Steinsbekk et al., 2021). Other-oriented behaviours including viewing, positing and reacting to other's social media was associated with lower levels of self-esteem and more negative body image evaluation however (Steinsbekk et al., 2021). This could indicate that individuals in the present study potentially engaged on more personal-oriented behaviours resulting in subsequent positive increases on state and trait self-esteem.

The Association between ON, Self-Esteem, and Body Dissatisfaction

The current research was able to gain new insights into the association of ON with self-esteem and body dissatisfaction. Whereas past research has found no relationship between self-esteem and ON (Oberle et al., 2017; Barnes & Caltabiano, 2017), the present study lends support to the proposal that there might be a positive association between self-esteem levels and ON. Both previous studies examined the relationship between self-esteem and ON among student samples yet found that the two constructs were not related to each other. One study examined whether high scores of self-esteem predicted higher levels of ON (Barnes & Caltabiano, 2017). They assumed that individuals with ON take pride in their ability to eat healthy and follow a strict diet plan, therefore showing to other individuals that they are having control over their lives. On the other hand, research by Oberle and colleagues (2017) was examining whether ON sufferers would display low core levels of self-esteem. The restriction of food that is deemed unhealthy by the individual with ON tendencies, was proposed to be associated with the desire and pressure to conform to the thin/muscular appearance ideals pushed forward by social media. Individuals with core low levels of self-esteem may have felt additionally pressured to conform to these ideals, as this was their way of achieving a positive feeling of self-worth. Data analysis showed no relationship between the ON and self-esteem, leaving researcher to conclude that ON is distinct from eating pathologies like anorexia (Oberle et al., 2017). When looking at the current results, it suggests a different relationship between self-esteem and ON. Results lend support to the involvement of self-esteem in ON. Trait and state self-esteem were generally high, whereas ON scores were in the lower ranges. This seems to suggest that higher core levels of self-esteem, as well as positive momentary fluctuations might lead to lower overall ON symptoms. Previous research was able to establish that lower core levels of self-esteem are associated with higher risk of developing eating pathologies (Jones, Egan, Howell, Hoiles & Mazzucchelli, 2020; Brechan & Kvaem, 2015). Individuals suffering from eating pathologies place high importance on weight

and shape as part of their self-identity (Fairburn, Shafran & Cooper, 1999; Fairburn, Cooper & Shafran, 2003; Polivy & Herman, 2002). Way to control weight and shape in eating pathologies to reach desired appearance ideals is the sufferers way to improve their overall self-worth (Fairburn, 2008). The present results seem to be in line with previous research, since high core levels of self-esteem would suggest that the individual does not see weight and shape as a defining part of their self-identity, therefore possibly lowering eating pathological symptoms, like those found in ON.

Body dissatisfaction was negatively associated with ON with regards to both the state and trait level. This pattern of results is consistent with previous research into the association of body dissatisfaction and other eating pathologies (Rodgers, et al., 2021). Regarding ON, the role of body dissatisfaction was less clear. Whereas some of the previous studies were able to establish that higher levels of body dissatisfaction were more prevalent in individuals with higher ON tendencies (Barnes & Caltabiano, 2017; Hayes, Wu, De Nadai & Storch, 2017; Oberle & Lipschuetz, 2018), other research was not able to confirm this potential association (Parra-Fernandez, Rodriguez-Cano, Onieva-Zafra, Perez-Haro, Oberle & Fernandez-Martinez, 2018; Brytek-Matera, Fonte, Poggiogalle, Donini & Cena, 2017). The current findings highlight the potential role that body dissatisfaction plays in ON. Generally, body dissatisfaction does seem to have a strong link with eating pathologies in general, having been described as an essential precursor and continuing driver of eating pathologies (Wertheim, Koerner & Paxton, 2001, Polivy & Herman, 2002; Stice & Shaw, 2002; Rodgers et al., 2021). Though body dissatisfaction is a component in the development of eating pathologies, it only becomes an essential driver when the individual places importance on their weight and shape as part of their self-identity and self-worth (Brechan & Kvaem, 2015). Body dissatisfaction is also influenced by momentary interactions leading to state-based increases and consequently more negative body image

evaluations (Fitzsimmons-Craft, Bardone-Cone, Wonderlich, Crosby, Engel & Bulik, 2015).

Previous research indicates a significant link between appearance comparisons and state increases in body dissatisfaction, particularly when an individual engages in upward appearance comparison, meaning comparison against a physically more attractive individual (Fuller-Tyszkiewicz, Chhouk, McCann, Urbina, Vuo, Krug, Ricciardelli, Linardon, Broadbent, Heron & Richardson, 2019).

The results of the present research lend support to this, as the sample did show a negative association between body dissatisfaction and ON, yet also showed self-esteem levels in the higher ranges. This might suggest that the sample was not satisfied with their weight and shape yet did not see their appearance as part of their self-identity, resulting in lower trait and state ON scores.

The results of the present study seem to support the notion that ON is more akin to the other types of eating pathologies like anorexia and bulimia, as self-esteem and body dissatisfaction are associated with ON in some way. This supports the side of the debate arguing that ON is another form of eating pathology, rather than being part of the obsessive-compulsive disorder classification (McComb & Mills, 2019). Though more causal, experimental research into the direction of influence regarding body dissatisfaction, self-esteem and ON is needed to draw more decisive conclusions.

Strengths and Limitations

This study contributes to the research into ON and its potential associations, providing further assistance in first, determining what ON is, and secondly in the development of diagnostic criteria. A first advantage is the use of ESM to assess both the trait and state levels of body dissatisfaction, self-esteem and ON revealing potential insights into how individuals

experience these constructs within their daily context. ESM possess high ecological validity by assessing individuals in their daily lives (Verhagen, Hasmi, Drukker, van Os, & Delespaul, 2016), therefore providing insights into the naturally occurring experiences of an individual in their daily context, which shapes their thoughts, behaviours, and emotions (Verhagen et al., 2016). In addition, cross-sectional research was done as an addition to the ESM measures to establish baseline levels of self-esteem, body dissatisfaction and ON to compare potential differences. In addition, ESM allows for the investigation of between-person and within-person level, which is a special feature when compared to traditional, cross-sectional research into psychological associations, which provides more in-depth information (Csikszentmihalyi, 2014). This provided the current research with insights into association between ON, body dissatisfaction and self-esteem on the trait and state level, resulting in more in-depth information regarding the potential relationships.

Though not part of the study analysis, the application of the ABISS in a female dominant sample was an additional strength of the present study. Whereas previous research was examining the effectiveness of the ABISS in a male sample, age range of 9-12 years, the present research was also able to establish the usability of the inventory in a female sample, mean age 21 years. The ABISS was only used in one prior study and has not been used in any other research since (Leone et al., 2014). Present reliability and factor analysis showed good internal consistency of the three subscales and factor loadings proved to be aligned with the conceptual and theoretical framework proposed by the initial authors. That proves the usability of the ABISS as a general measure for body dissatisfaction in psychological research.

To strengthen generalizability and reliability of the instruments, scales and items of all questionnaires were aligned to have the same 5-point answering scheme, to avoid overburdening

participants with having to adjust to several different answering options. Answering options were also aligned to avoid confusion and response bias during the participation period. Lastly, the decision to align the scales was made, due to the reason that the lay population is more accustomed to answer 5-point Likert scale.

Despite the general strengths of the present study (i.e., solid theoretical basis, use of both cross-sectional and intense longitudinal data sources, experience sampling to examine state/trait measures in the daily context, alignment of scales used in the present study, pilot-testing of the data collection procedure) it had limitations that need to be addressed as well.

A convenient sample was used in the present study in order to examine the associations between the constructs. This resulted in overrepresentation of females in the sample (55 %), making potential inferences from this data set onto the male population difficult. As the sample was not randomized, the generalizability of the results is questionable, as only a specific type of participant was included in the study. Despite that, ON does not have an official categorization nor diagnostic criteria implying that researchers cannot assume that a particular demographic is more vulnerable than another (Haman, Barker-Ruchti, Patriksson & Lingren, 2016). This study used the EHQ and items from the ONI in order to assess the symptom severity level of the sample. While previous reliability and factor analyses indicated good to excellent levels of internal consistency and validity (Oberle et al., 2017; Oberle et al., 2020), their usability within a subclinical sample might have been limited. Both inventories focus on the pathological symptom levels of ON, making their ability to assess ON symptoms in a sample who potentially only displayed less severe symptom states less viable. The development and testing of a subclinical ON symptom inventory could potentially help in future research, assessing in the examination of the progression and precursor symptoms of ON. In addition, the item measuring momentary

levels of ON were not adapted to fit the ESM approach. That could imply that the ability of the ON-subscale of the ESM questionnaire is limited in its ability to properly assess state levels. For example, instead of using the item (“Just the thought of me eating something unhealthy makes me very anxious”) it should have been rephrased to infer about the momentary level (“Right now, just the thought of me eating something unhealthy makes me very anxious”).

Lastly, reliability analysis for the ESM questionnaire could not be accomplished. Though trying to establish a Pearson correlation coefficient between the first and second half of the data set, the statistical program was not able to compute the correlation coefficient. This leaves the reliability of the ESM subscales unanswered, resulting in a cautionary interpretation of the present study results.

Future Directions

In terms of future research it would be useful to include a more diverse sample and other sections of the population, as well as a larger sample size, to test whether the same associations between self-esteem, body dissatisfaction, sociocultural attitudes towards appearance and ON can be found there. By comparing the results from the present study with the other samples, researchers would be able to make more powerful assumptions regarding the observed associations. Although the present study lends support to the association between the constructs, additional analyses and dynamics should be the focus of future research. Since ESM allows for lagged analysis it might be useful to analyse ON, self-esteem and body dissatisfaction levels in the context of watching appearance-related content, as well as content about dietary practices and behaviours on e.g. Instagram. This could be done to measure and compare momentary ON levels sometime after assessing self-esteem and body dissatisfaction levels following the usage of social media. With this, researchers could examine how ON symptoms change when experiencing

certain levels of self-esteem and body dissatisfaction as a result of engaging with social networking sites. Additional future research could organize participants into different subgroups with regards to their overall ON levels (low/medium/high) to examine potential differences regarding the association and expression of self-esteem and body dissatisfaction.

Generally, this ESM study could serve as the basis for future theoretical research into ON and its underlying associations to examine how ON is experienced in the daily context of the individual. For example, prior research found a significant direct effect of health anxiety and need fulfilment with ON symptoms on a cross-sectional level (Király et al., 2019). ESM could be used to examine how these constructs operate on a daily, contextual basis to gain more in-depth information and potentially make causal inferences based on the data. It is viable that more future research is done into ON and its associations to aid in the development of diagnostic criteria and therefore the development of suitable treatment options for individuals suffering from ON.

Conclusion

In summary, the present research lends support to the idea that body dissatisfaction and self-esteem, both on a state and trait level are somehow associated with ON symptoms and how they are potentially experienced by the individual within their daily context. It was established that self-esteem and body dissatisfaction are associated with ON at some level, though the lack of timed-effect analysis make it impossible to make assumptions about the direction of these associations and how they are specifically related to one another. Despite several limitations, this study was able to provide some theoretical information regarding ON within a subclinical sample of students and could act as a basis for future more in-depth research.

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Appendix

Appendix 1

Visualizations – Assumption Tests (Phase 1)

Figure 1.
Histogram Total Orthorexia Symptom Scores

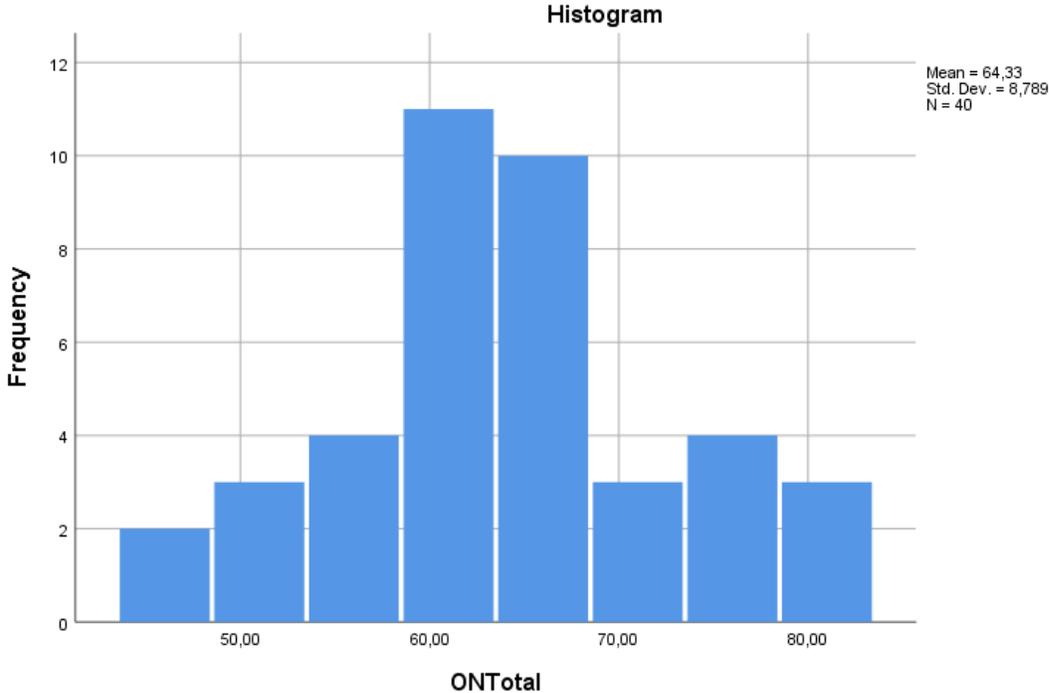


Figure 2.
Q-Q Plot ON Scores

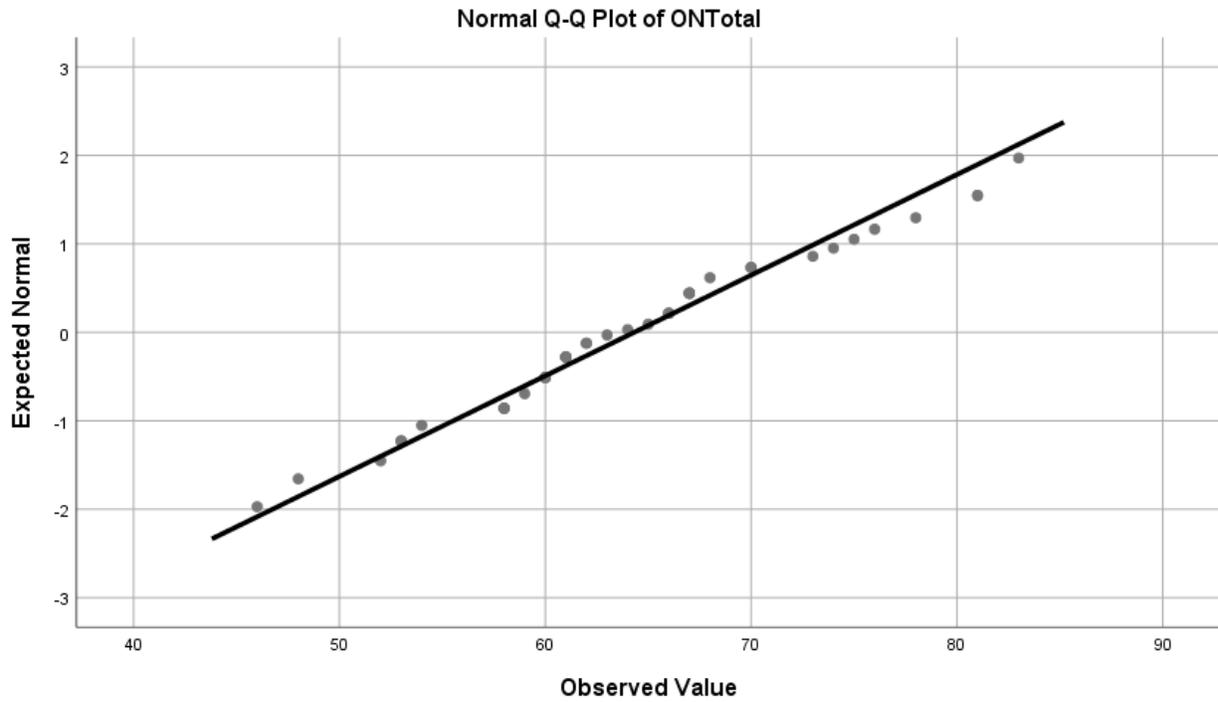


Figure 3.
Histogram Total Sociocultural Attitude Towards Appearance (SATA) Scores

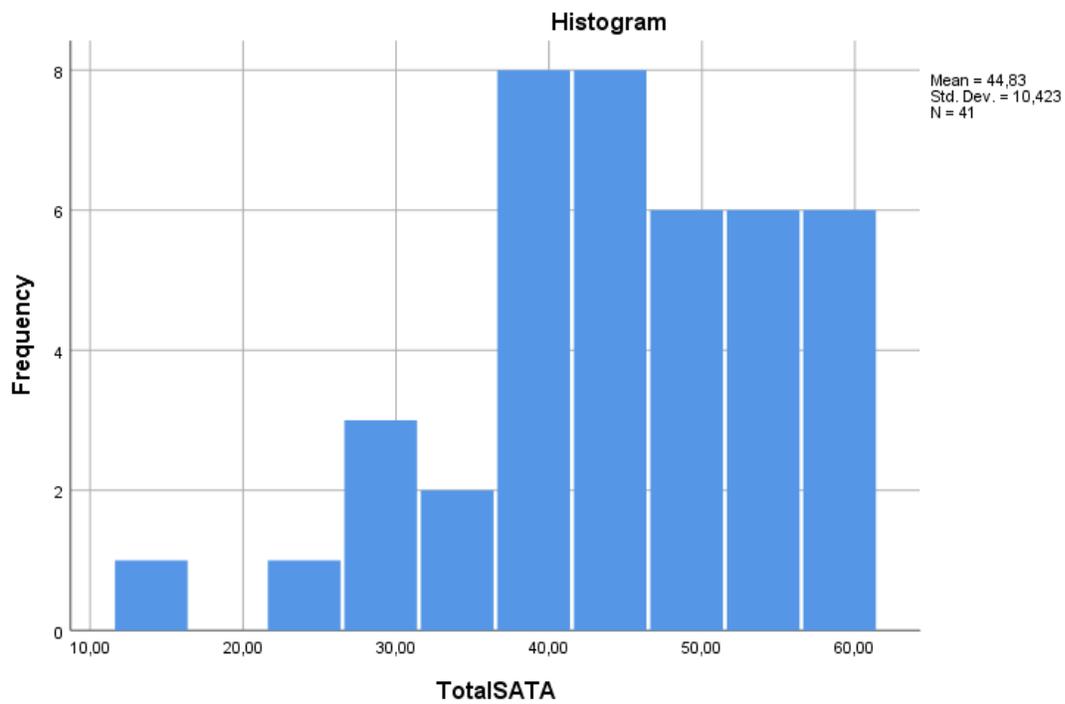


Figure 4.
Normal Q-Q Plot SATA-Scores

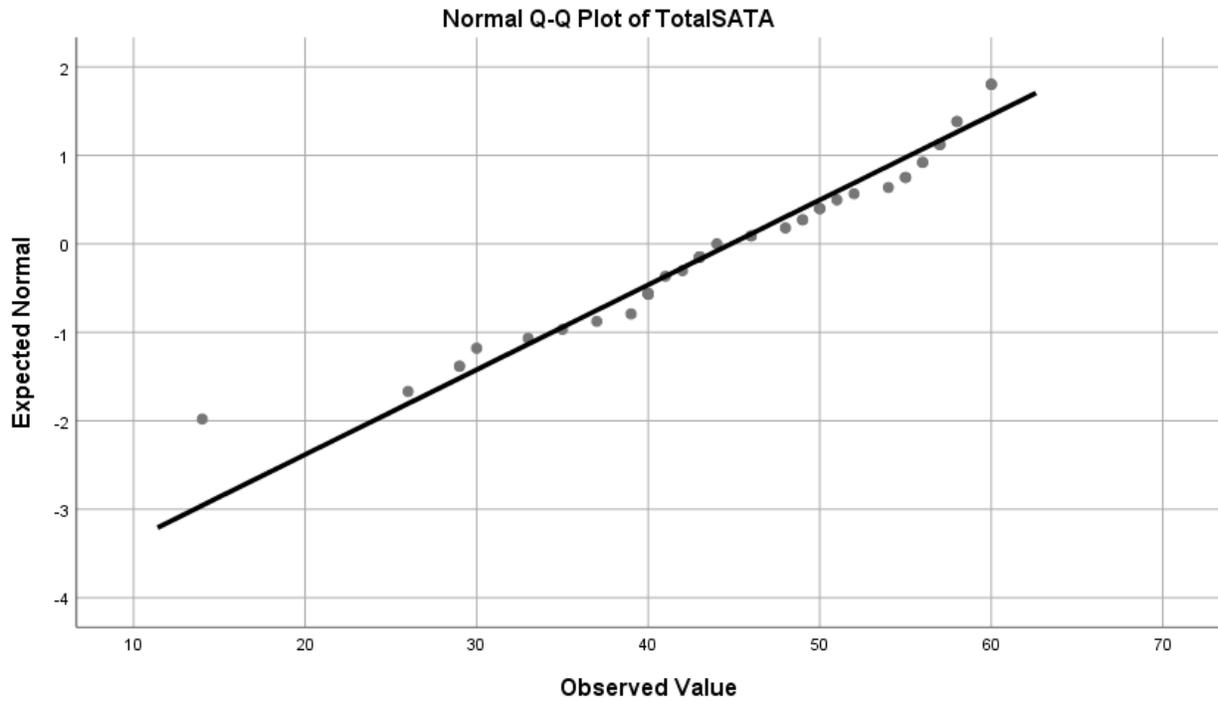


Figure 5.
Histogram Self-Esteem scores

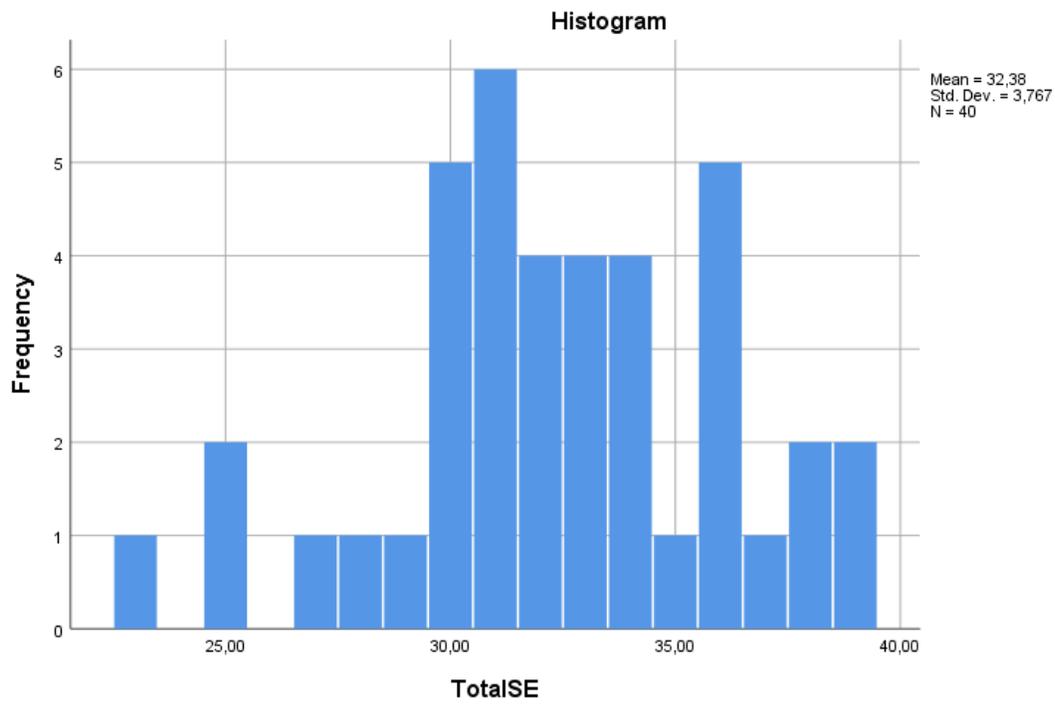


Figure 6
Q-Q Plot Total Self-Esteem Scores

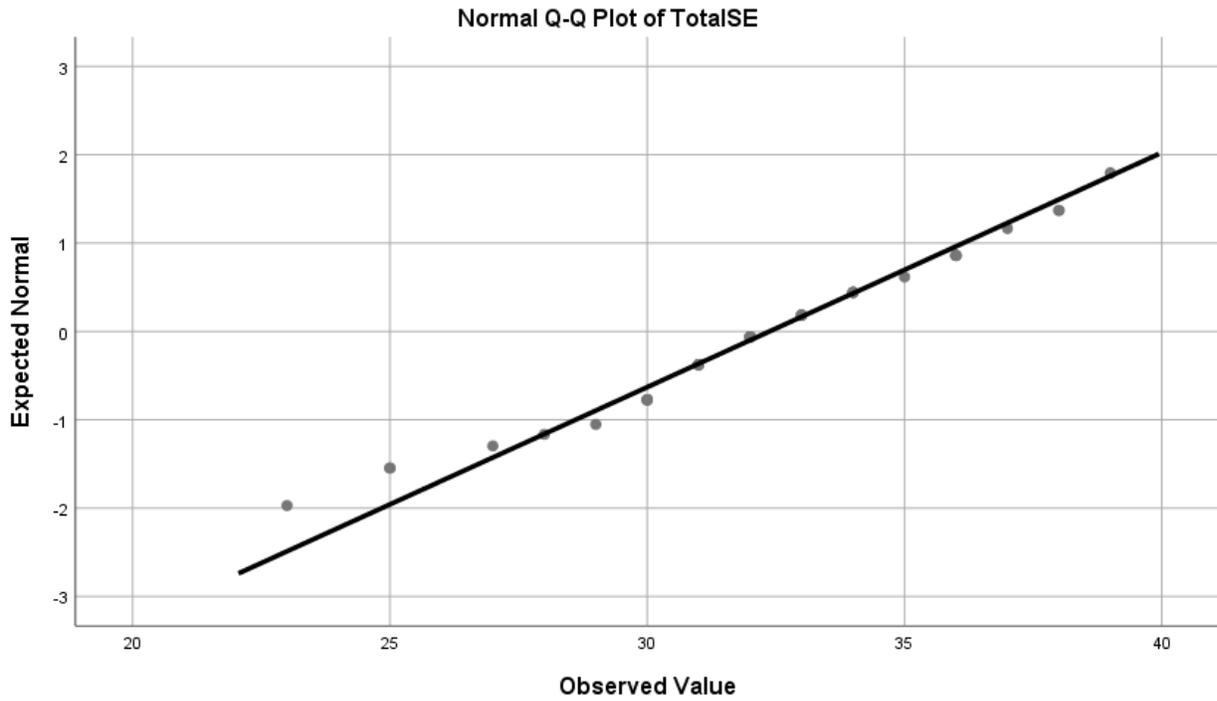


Figure 7.
Histogram Total Body Dissatisfaction Scores

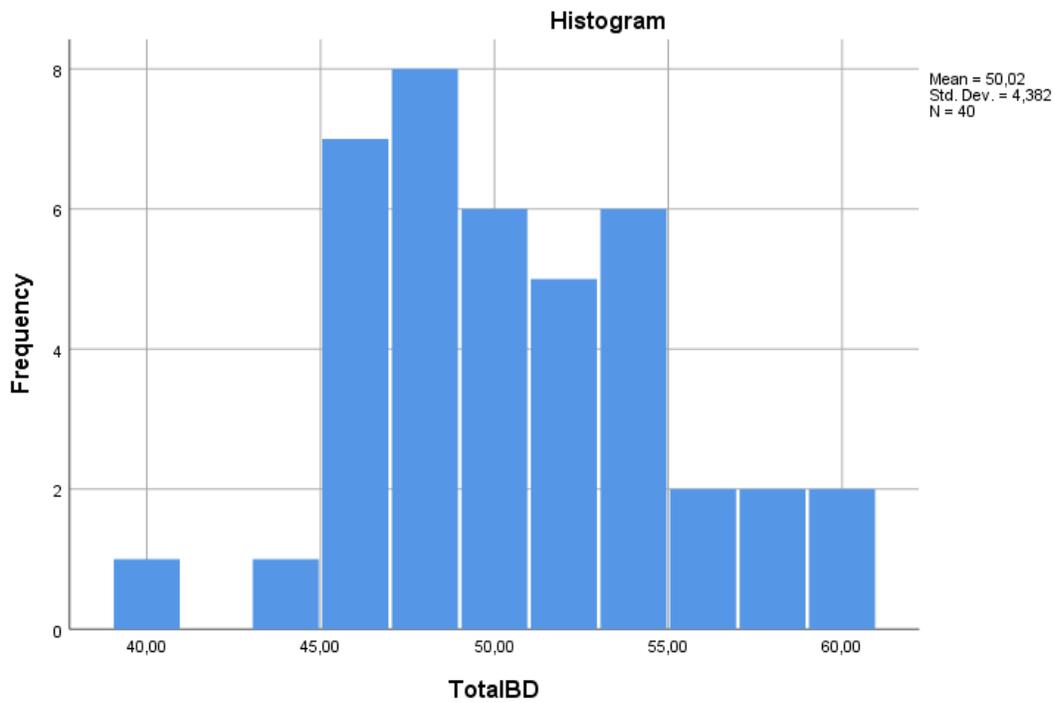


Figure 8.
Q-Q Plot Total Body Dissatisfaction Scale

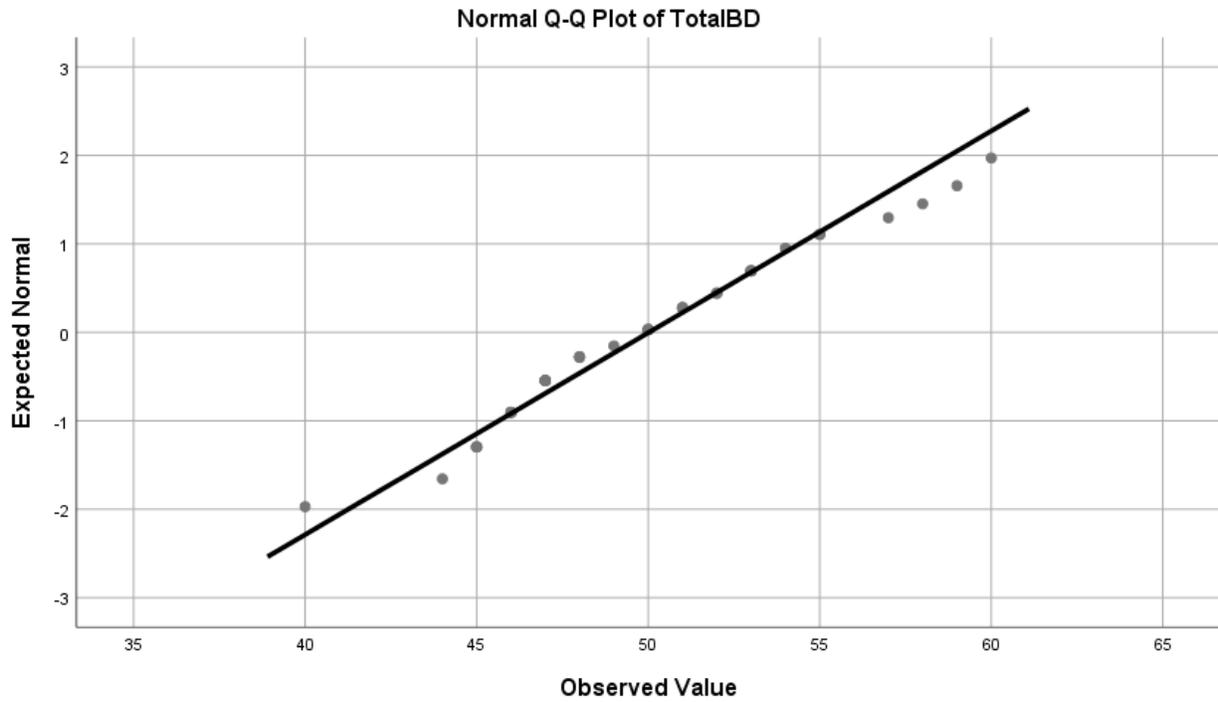


Figure 9.

Histogram: Momentary Self-Esteem Distribution

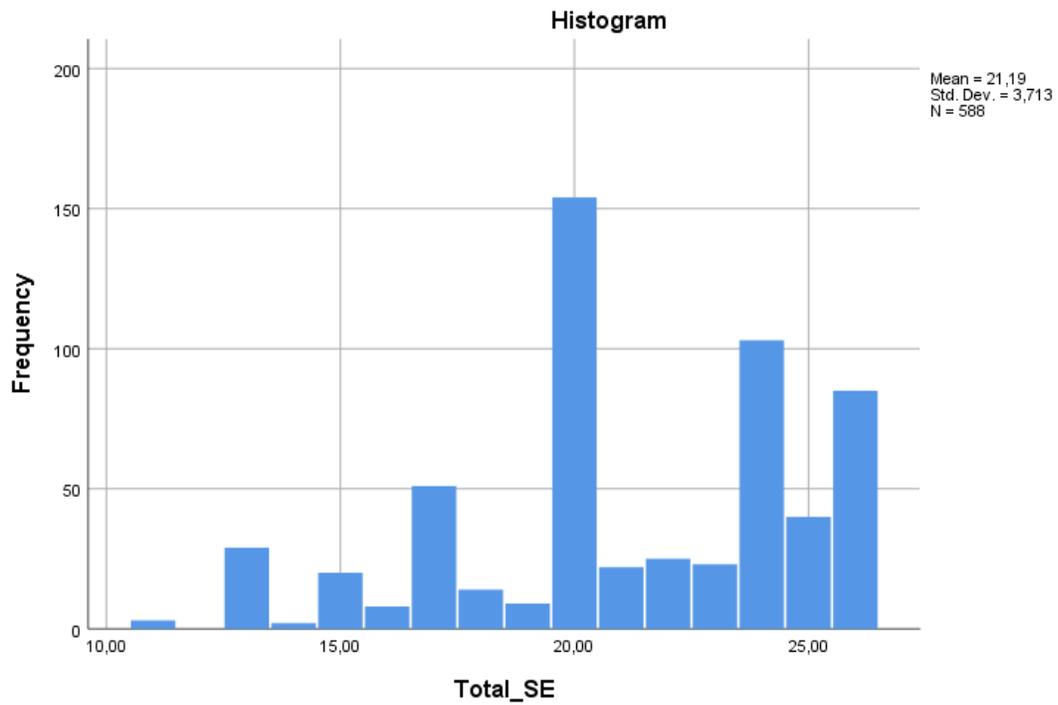


Figure 10.

Histogram: Body Dissatisfaction Distribution

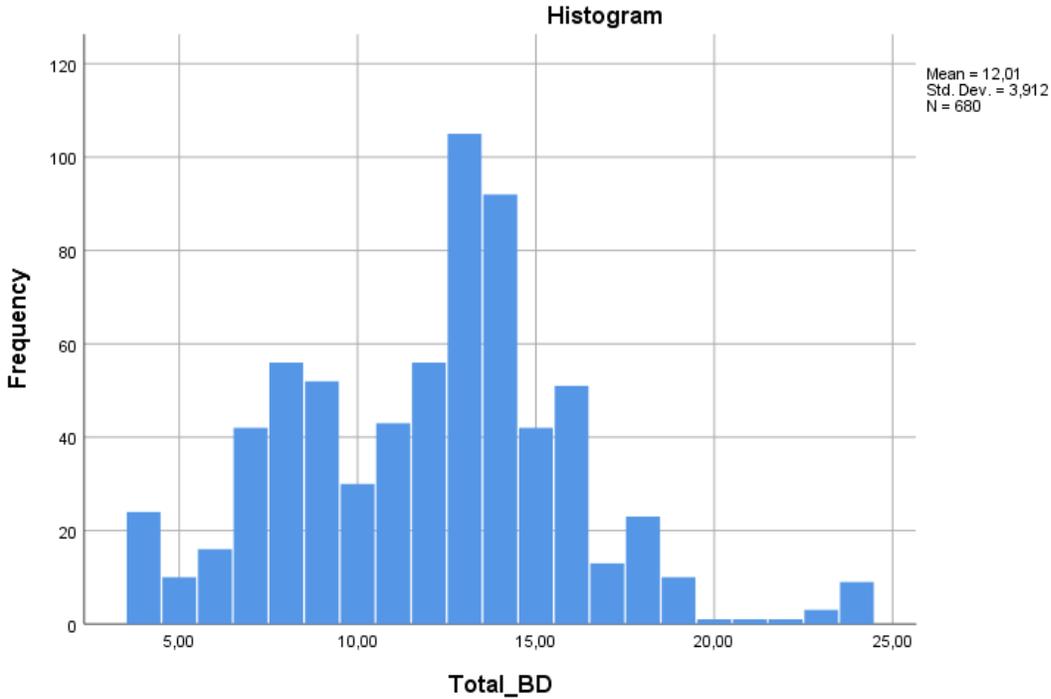
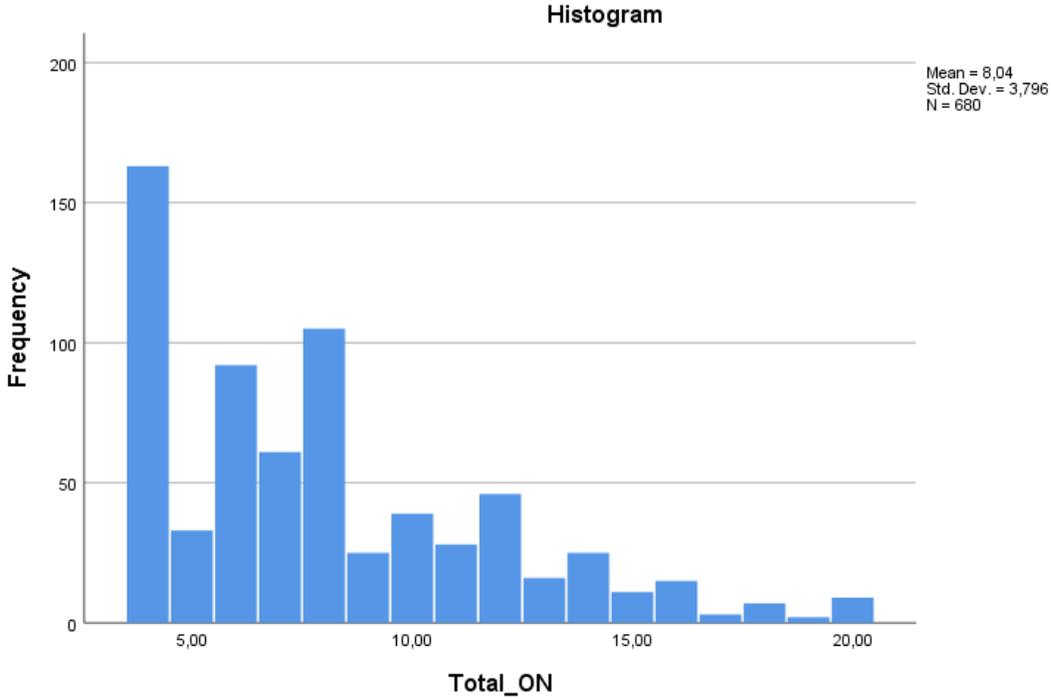


Figure 11.
Histogram Orthorexia Nervosa Distribution



Appendix 2

ESM Questionnaire Outline

Did you use any form of social media (e.g. Instagram, YouTube, Facebook, etc.) in the last two hours?

Yes

No

When you used social media, have you looked through/at fitness/food-related posts (e.g posts by influencers)?

Yes

No

How do you feel about yourself at the current moment? Have a look at the statements below and indicate to what extent you agree with them from 1 (strongly disagree) to 7 (strongly agree).

1. "I am a failure"
2. "I am ashamed of myself"
3. "I like myself"
4. "I am a good person"

The following questions tap into your satisfaction with your own body/appearance. Indicate on a scale from 1 (not at all) to 5 (very) how much you identify with these statements

1. "I am dissatisfied with some aspects of my appearance"
 Not at all A little bit Neutral moderately very
2. "I feel others are more physically attractive than me"
 Not at all A little bit Neutral Moderately Very
3. "I have avoided looking at my appearance in the mirror"

Not at all A little bit Neutral Moderately Very

4. "I feel there are certain aspects of my appearance I would like to change"

Not at all A little bit Neutral Moderately Very

The following statements relate to your eating behaviours. Please indicate how much you agree with those statements.

1. "I feel great when I eat healthy"

Not true at all Slightly True Mainly True Very true

2. "I feel in control when I eat healthily"

Not true at all Slightly true Mainly true Very true

3. "I am making efforts to eat more healthily at the moment"

Not at all true Slightly True Mainly true Very true

4. "Eating the way I do gives me a sense of satisfaction"

Not at all true Slightly true Mainly true Very true