UNIVERSITY OF TWENTE.

Bachelor Thesis

Examining the relationship between body image dissatisfaction and orthorexia-related symptoms

Greta Grewe

BMS Faculty – Positive Clinical Psychology and Technology (PCPT)

University of Twente

First supervisor: Alexandra Ghita

Second supervisor: Charlotte van Lotringen

July 1st, 2021

List of contents

Abstract

Orthorexia Nervosa (ON) is a new mental health concern characterized by having obsessive thoughts and behaviours to eat healthy and proper food. It is a current debate if the mental health concern can be categorized as a feeding and eating disorder (FED) or as an obsessive-compulsive disorder (OCD). Also, the mass media have a huge impact in representing this obsessive eating behaviour as healthy. A cross-sectional study was used to investigate influencing factors that might contribute to developing ON-related symptoms. These were body image dissatisfaction, following an eating diet, usage of the platform YouTube and a persons' BMI. Overall, 338 University students took part in the study whereas 236 remain left for analysis. To identify possible relationships a Pearson correlation, t-tests and a one-way ANOVA were conducted. Results showed significant relationships for the variables of body dissatisfaction and eating behaviour relating to ON-related symptoms. No significant relations were found for YouTube use and BMI. However, both variables exhibited tendencies regarding ON-related symptoms. Thus, two out of four hypotheses were accepted.
For future research, the exact categorization of ON should be investigated to point out its diagnostic relevance and increase treatment possibilities. Also, more detail about the observed tendencies of YouTube consumption and the BMI might increase the understanding of the relation of these variables to ON.

Keywords: Orthorexia Nervosa, body dissatisfaction, eating behaviour, social media consumption, BMI

Introduction

Nowadays, videos about healthy lifestyles and healthy eating behaviours are becoming more popular. One of the biggest platforms that include and promote videos about health information and healthy eating behaviour is YouTube (Lupton, 2020). Additionally, Lupton (2020) pointed out that in 2018 YouTube was used by 94% of adolescents aged between 18 and 24 in the USA. The same study indicated that 30% of individuals between the ages 18 and 34 watch food and eating videos in form of cooking videos or information about diets. Often, these videos include information about how to be thin and have an ideal lifestyle which can affect the body image of young adolescents negatively (Syed-Abdul, et al., 2013). These videos are called 'vlogs' that are defined by Molyneaux et al. (2008) as video blogs in visual form rather than textual, recorded with a camera and simple video production tools and later uploaded on video platforms. In their study, Molyneaux et al. (2008) also described that YouTube is currently the most popular platform when it comes to creating and watching online videos like vlogs. Research indicates that these videos facilitate social comparisons about what is perceived as having a "perfect lifestyle" (Turner & Lefevre, 2017). Nevertheless, research by Koven and Abry (2015) found that over 50% of these videos about eating behaviour and weight loss are not scientifically supported. According to Santarossa (2015), the mass media are highly influential when it comes to messages about eating behaviours and appearance by pressuring young adolescents to have an ideal body image in terms of thinness. Syed-Abdul et al. (2013) argued that the video creators often target and encourage healthy eating and lifestyle.

Nevertheless, the urge to eat "right" and "pure" foods may facilitate the development of the mental health concern called *Orthorexia Nervosa (ON)* (Hanganu-Bresch, 2020). Related to this, a previous study by Turner and Lefevre (2017) examined that higher social media use is related to symptoms of ON due to video and picture-based platforms showing food and eating habits from other individuals. However, this relationship was found primarily concerning higher Instagram use, whereas it is unclear if there is a relationship between YouTube consumption and ON-related symptoms (Turner & Lefevre, 2017). Furthermore, research has shown that regularly watching videos with such content may have a negative impact on an individual's body image (Sakib et al., 2020). Individuals presenting themselves or their life in a vlog to upload it on social media platforms mostly show the best version of themselves (Sandal, 2018). The study by Sandal (2018) pointed out because vloggers often do not show the less desirable aspects of their food consumption or body, possible consequences are that individuals who watch the vlog are only confronted with the positive aspects. Hence,

this contributes to the social ideal image. Additionally, research showed that there is a high correlation between watching videos on the media and higher symptoms for eating disorders, like anorexia nervosa (AN) (Santarossa, 2015).

Orthorexia Nervosa (ON)

Brytek-Matera et al. (2017) defined ON as an obsession with healthy food intake indicated by selecting high quality and pure food. The authors described the development of ON by often starting first with a health concern and the goal to reach optimal health. In the 1990s, Steven Bratman referred first to this concern as ON as a result of experiencing it himself, starting with a diet to overcome a minor health condition but later becoming over-preoccupied with a strict eating routine (Bratman, 2017). Koven and Abry (2015) described common symptoms of ON which are an *obsessive desire of eating* proper food, specific *patterns and rituals of eating* and the *avoidance of food* that is assumed as unhealthy by the individual. Furthermore, Donini et al. (2004) specified ON as a problematic behavioural pattern having its' roots in social life indicated by the attempts to "be perfect" and "to conform" to social and moral norms. The definition of ON involves two common criteria. ON is characterized by (1) an obsession to eat healthily and emotional distress if not eating healthy, and (2) a clinical impairment of the compulsive behaviour (Hanganu-Bresch, 2020). Furthermore, Brytek-Matera et al. (2015) referred to overall five specific criteria to define ON. These are (a) spending min. 3 hours a day on thinking and preparing food, (b) thinking of being superior to those with different or no diets, (c) following an eating diet, (d) having more self-esteem when adhering to the diet and (e) eating properly is the centre of lifestyle. The same study also reported an overlap between ON and "healthism". Healthism is defined by a major health awareness indicated by seeking health information, consuming supplements and being regularly active by exercising (Brytek-Matera et al., 2015).

Furthermore, research by Koven and Abry (2015) has shown that the development course of ON may decrease the overall quality of life. Individuals with orthorexia concerns may experience negative effects (e.g. guilt, frustration, etc.) when food patterns are disrupted. As a consequence of these guilty feelings, the individuals may adhere to even stricter diets (Koven & Abry, 2015). Related to this, Brytek-Matera et al. (2017) pointed out that when dieting becomes the main part of people's life, severe consequences of ON are malnutrition, reduced quality of life and distress regarding the need for control. Additional consequences of ON pointed out by the same study might be losing the enjoyment of food, being inflexible with eating behaviours, the need to control food intake and achieving self-esteem. Often, people with ON-related symptoms lose weight unintentionally (Brytek-Matera et al., 2017).

Hanganu-Bresch (2020) assigned the ON a prevalence rate in high risks groups of 57.6% with a ratio of 2:1, meaning more women are affected by this mental health concern than men. The most used instrument to assess ON is ORTO-15. Zeppegno (2018) refers to a prevalence rate in the general population of 7% and with 10% being at risk of developing ON. Furthermore, not much is known and researched about this condition until now which is why it is not included in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM–5; American Psychiatric Association [APA], 2013) yet.

A Debate between Anorexia and Obsessive-Compulsive Disorder

Because ON has few similarities to AN and indications of an obsessive-compulsive disorder (OCD) it is a current debate if ON should be categorized as an own distinct disorder, within the spectrum of feeding and eating disorders (FEDs) or as OCD. Pinhas-Hamiel and Levy-Shraga (2013) characterized eating disorders by having constant thoughts about food and body weight following disturbed eating behaviour. They also referred to different types of eating disorders covered in the DSM-5. Namely, binge eating disorders (BED), indicated by episodes of uncontrolled eating with large portions, bulimia nervosa (BN), defined by episodes of binge eating followed by behaviours that prevent gaining weight like self-induced vomiting and AN. Previous research indicated that there is a high comorbidity between AN and ON, although the difference is that humans with ON pay more attention to the quality of the food instead of the quantity (Barthels et al., 2020). In the study by Bulik et al. (2005) criteria of AN are provided, these are: refusal or failure to maintain body weight, the fear to gain weight, a disturbance in how individuals view their body, the denial of serious low body weight and often the occurrence of amenorrhea, meaning period cycles are interrupted. The study also pointed out that the DSM-5 makes a distinction between two types of AN. These are *restricting* defined by having the diagnostic criteria without any binge-eating or purging behaviour and *binge-eating/purging* meaning the individual also engages in binging or purging behaviour. Among the most prominent symptoms of AN are perfectionism, the desire for weight loss and the need for control (Cinquegrani, & Brown, 2018).

The study by Brytek-Matera (2012) revealed that psychologists, studying the topic of eating disorders, do not specify ON in the spectrum of FEDs yet. This is because ON does not start with low self-esteem but may become an eating disorder by more refined and compulsive behaviours over time. However, Segura-Garcia et al. (2015) examined that ON seems to be a comorbid condition meaning there is a tendency when an individual is diagnosed with a FED he/she might be more vulnerable to develop ON-related symptoms. Brytek-Matera (2012) evaluated differences and similarities between eating disorders and ON. Differences are that

people with an eating disorder have obsessions about the quantity of food and the motivation to lose weight whereas people with ON-related symptoms worry about the quality of food and have a feeling of perfection. Similarities are: both parties feel the need for perfectionism and control and both types of mental health concerns can result in malnutrition and weight loss (Brytek-Matera, 2012).

Furthermore, Arusoğlu et al. (2008) reported in their study that obsessive-compulsive behaviours are highly related to ON-related symptoms. Common symptoms of OCD are strong feelings and thoughts to adhere to their routines and limited time for other activities because the routines interfere with their normal life (Koven & Abry, 2015). Also, if routines are interrupted individuals with OCD feel responsible to prevent harm with certain actions like avoidance of behaviours, checking, hoarding or ordering actions (Storch et al., 2008). The mental health concern ON shows common symptoms with both, AN and OCD. Nevertheless, the study by Barthels et al. (2020) concluded that the mental health concern ON is more similar to eating disorders, like AN than expected, due to the reason that the ultimate goal of ON is not only to eat healthy and pure but also to reach a desirable, most often thin, body image.

Body Image Dissatisfaction, Eating Behaviour, YouTube Use and Body Mass Index

Zeppegno (2018) defined body image as an image of our own body that we form in our mind influenced by thoughts, behaviours, feelings and beliefs. Furthermore, body image dissatisfaction develops by continuously comparing one's own body to an 'ideal' body causing negative feelings and thoughts (Zeppegno, 2018). Likewise, the study by Barthels et al. (2020) supported the finding that there is a positive correlation between ON-related symptoms and body dissatisfaction in a sample of young females.

Zeppegno (2018) referred to two components of body image, the *body percept* and the *body concept*. The former relates to the internal perception of the body shape and the latter suggests the degree of satisfaction with the body. The body percept and the body concept form the body image (dis)satisfaction. Nevertheless, negative feelings and thoughts about one's own body can have an impact on dissatisfaction with the body image. This is often caused by overrating one's body proportions (Zeppegno, 2018). Zeppegno (2018) pointed out that one factor that facilitates higher body image dissatisfaction in young adolescents is the use of social media by increasing the possibility of social comparison. Moreover, the study assumed that people with a disrupted image of their body who are anxious about being overweight are more likely to develop symptoms of ON. This is supported by Barnes and Caltabiano (2017) who also reported people who are appearance oriented and afraid of

becoming overweight might have higher indications of ON-related symptoms. Zeppegno (2018) indicated a higher likelihood to experience ON-related symptoms as a result of frequently engaging with social media platforms (e.g. Instagram). Furthermore, Barthels et al. (2020) observed that ON is related to a drive to thinness and low self-acceptance. Thus, social comparisons with friends and celebrities through social media are contributing factors to develop body image dissatisfaction (Santarossa, 2015). Additionally, mostly young females show indications of higher body image dissatisfaction than men (Calzo et al., 2012).

Although good nutrition with eating healthy food often has a positive impact on someone's life, focusing too much on it may have a negative outcome. The study by Hanganu-Bresch (2020) claimed that diets like vegan, vegetarian or macro diets have an impact on the development of ON. By trying to avoid certain types of food that are perceived as unhealthy, individuals start to adhere to strict eating behaviours and routines assuming this as a healthy eating lifestyle. Thereby, individuals' first intention is to avoid medication and to overcome illness by starting to have healthy eating behaviours without knowing that this can also lead to another medical and psychological concern called ON. Barthels et al. (2018) pointed out that specific food selections like vegan or vegetarian diets often should help to lose weight by a low-calorie intake. Vegetarians mostly exclude just meat from their diet while vegans do not eat any food of animal origin. Furthermore, Donini et al. (2004) explored that eating behaviours like vegan or vegetarian food intake often create an illusion of perfect health and overall control of one's life. In addition to that, the prevalence of vegetarians in Germany is 4.3% and for those following a vegan diet is 0.1 – 1.0% (Barthels et al., 2018). Moreover, the study suggested that a vegetarian or vegan diet is assumed as influential for developing ON symptoms by continuously restricting certain categories of food. Additionally, 7.9% of vegans and 3.8% of vegetarians in the sample of the study already reached the cutoff point indicating a greater likelihood to experience ON compared to individuals who eat meat (Barthels et al., 2018). In addition to that, the study explained that the desire to eat healthily is not a pathological disease but the obsession to strictly conform to healthy food routines can create symptoms of a mental health concern like ON. Moreover, Nevin and Vartanian (2017) referred to the fact that dieting is becoming an increasing trend including only eating pure and healthy food. They referred to the most popular diets which are low carb or low-fat intake and vegan eating behaviour. In addition to this, Nevin and Vartanian (2017) also concluded that restrictive eating diets can be harmful to people due to the obsessive desire to adhere to them which in turn can influence ON-related symptoms.

Additionally, the correlation between YouTube use and ON is taken into account. For that, this paper will take a closer look at vlogs on YouTube that are called “What I eat in a day” or “Food Diary” because these kinds of videos are becoming more popular. Sandal (2018) mentioned that vloggers often film videos like “What I eat in a day” daily to interact with their community and to report about their food preparation. The same study also pointed out that in these video’s vloggers show how to prepare and cook their food fitting to specific diets like vegan or vegetarian. In addition to showing their food, they also show their healthy lifestyle and argue positively for their chosen diet. A vlog is defined by a person who speaks into the camera and films his or her daily life mostly with a specific topic, like a food diary (Sandal, 2018). As described by Zemlyanskaya et al. (2021) a so-called “fitspiration” movement is already viewable on Instagram including accounts that promote health and fitness information. However, the study also pointed out that this movement can become dangerous when only promoting the idea of a strict diet. Because the platform YouTube has similarities with Instagram in terms of video-based content it might be possible that the trend “fitspiration” also develops there.

Further, the indications of one´s own Body Mass Index (BMI) is related to a negative body image. The World Health Organization (WHO) calculates the BMI by dividing a person’s weight in kilograms by the height in meters. The sum gives an indicator of the nutritional status. The WHO refers to underweight if the BMI is below 18.5, normal weight between 18.5 and 24.9, pre-obesity between 25 and 29.9, obesity class 1 if the BMI is between 30 and 34.9, obesity class 2 if it is between 35 and 39.9 and obesity class 3 if it is above 40. Taking the BMI in relation to ON-related symptoms, previous studies already drew some conclusions. For example, Dell’Osso et al. (2018) exhibited that participants with a low BMI showed significantly higher indications of ON-related symptoms than subjects with a normal or high BMI. The study referred to mild underweight resulting from the desire of eating healthy. The study by Oberle et al. (2017) researched the relationship between BMI to ON. It was found that there is a positive correlation. Nevertheless, the study found a greater correlation between BMI and ON in men than in women. However, few studies found contrasting results. Regarding the study by Arusoğlu et al. (2008) who found that a higher BMI influences specific eating diets which in turn might have an impact on developing ON-related symptoms. As reported by Godefroy et al. (2021) few studies did not find a significant relation between ON-related symptoms and BMI or if then there was most often a correlation between the risk to develop ON. Instead, the study referred to individuals who already show ON-related symptoms may have a limited decrease in BMI due to the restricted eating style.

The Present Study

Objectives

This study will examine the relationship between body image dissatisfaction and ON-related symptoms. Based on previous literature it is important to get a better understanding and insight into the influence of body image dissatisfaction on the mental health concern ON. Also, the influence of following a specific diet concerning ON-related symptoms is taken into account as previous literature pointed out there might be a high correlation between them. Moreover, individuals who use the platform YouTube often are expected to show a positive relationship with ON-related symptoms. Lastly, people with a BMI less than 18 have underweight and are expected to show higher ON-related symptoms. Here, research demonstrated that they may have more concerns about their bodily appearance resulting in the desire to eating pure food.

The chosen target group are university students as Frank (2015) pointed out tendencies for eating disorders are more common during adolescence or young adulthood. Furthermore, often university students are familiar with the use of social media. Based on the research topics following research questions (RQ) as well as corresponding hypotheses (H) were addressed:

(1) "What is the relationship between body image dissatisfaction and ON-related symptoms in university students?"

$H1_A$: There is a positive relationship between body image dissatisfaction and ON-related symptoms in university students.

(2) "What is the relationship between the type of diet and ON-related symptoms among university students?"

$H2_A$: University students following a specific eating diet experience more ON-related symptoms.

(3) "To what extent does YouTube usage affect ON-related symptoms in university students?"

$H3_A$: There is a positive relationship between frequent YouTube use and ON-related symptoms in university students.

(4) "Is the students' BMI related to ON-related symptoms in university students"?

$H4_A$: University students with a low BMI display more symptoms related to ON.

Method

Design

The current study used a quantitative cross-sectional online survey to collect data about the relationship between individual variables and ON-related symptoms. A deductive approach was used to develop hypotheses and test them based on an existing theory.

Participants

In this study, 338 university students participated in the survey to identify influencing factors about the development of ON-related symptoms. All relevant data about the demographics of the sample can be found in Table 1. 91 participants did not finish the whole survey, 2 of them did not give their informed consent and 9 participants did not indicate to be university students, therefore, 236 participants remained for analysis. Overall, the response rate was about 73%. The sample was mixed, meaning female (81.8%) and male (16.5%). Concerning nationality, most of the participants were from Germany and the Netherlands. A few single participants came from different countries, like Bulgaria, Greece or Italy. Specific inclusion criteria consisted of being a university student and having English reading and comprehension skills.

Furthermore, some recruitment strategies were used to collect sufficient data. First of all, the researchers spread the survey using their social media accounts, for example, on Instagram. Next, the SONA system of the University of Twente made the survey public for possible participants. Overall, 122 students conducted the survey on the SONA system website. These strategies made up an opportunity sampling because the researcher selected everyone for the survey who is willing to take part and who fits in the target group. Before participating in the survey, the participants filled in an informed consent that gave information about the goal of the study and the confidentiality of data and the anonymity of the survey.

Table 1

Demographics of participants (n=236)

Characteristic	N	Percentage	Mean	SD	Min	Max
Gender						
Female	193	81.8				
Male	39	16.5				
Non-binary	2	.8				
No answer	2	.8				
Age	236		21.57	2.6	17	38
Education						
Bachelor	201	85.2				
Master	14	5.9				
PhD	5	2.1				
Hogeschool	15	6.4				
State examination	1	.4				
Nationality						
German	183	77.5				
Dutch	25	10.6				
Other	28	11.9				

Materials and Measures

Individual variables. To collect information about specific eating behaviours, ad-hoc closed-ended questions were created. The participants were asked to indicate their current eating diet (Appendix A). Based on the previous study by Clarys, et al. (2014), the following definitions of different diets were used: vegan (not consuming animal products), vegetarian (not consuming fish or meat), semi-vegetarian (consuming red meat or fish no more than once a week), pesco-vegetarian (consuming fish but no meat) and omnivorous (eating meat or fish almost every day). To score the answers of the participants, every category was indicated with a score, ranging from 0 to 8. If a participant indicated he or she does not have a certain diet it is scored with a *0*. The diets mentioned above were scored with *1 = vegan, 2 = vegetarian, 3 = semi-vegetarian, 4 = pesco-vegetarian and 5 = omnivorous*. Additional answers were *6 = gluten-free, 7 = low-carb and 8 = Other.* To compare participants who have no diet with participants who have a diet these are scored with 0 (no diet) and 1 (diet).

To have further insight if the consumption of YouTube has influences on ON-related symptoms the participants were asked if they use the platform. This was scored with a 1 = Yes and a 0 = No. Additionally, a closed-ended question gave further insight into how many minutes a participant was watching YouTube per day.

Orthorexia-related symptoms. The questionnaire ORTO-15 (Appendix B) was used to assess the frequency of orthorexia symptoms in students and adolescents (Missbach et al., 2015). Stochel et al. (2015) mentioned that the ORTO-15 was conducted including several diagnostic criteria as cognitive, emotional and clinical facets that are connected with eating habits. It is a self-report questionnaire developed by Donini et al. (2004). It consists of 15 items with a 4-point Likert scale with the response options and scoring *always (1), often (2), sometimes (3)* and *never (4)*. Related to that, the scoring of items 2, 5, 8 and 9 was reversed and items 1 and 13 were scored 2, 4, 3, 1. The ORTO-15 was analyzed as the higher the score obtained, the closer the participant is to normal and healthy eating behaviour (Stochel et al., 2015).

The different items cover topics around attitudes and beliefs in relationship to food selection and consumption. Also, they ask about food habits and eating behaviour relating to daily life (Missbach et al., 2015). Some example questions of the ORTO-15 are “When eating, do you pay attention to the calories of the food?”, “Do you think your mood affects your eating behaviour?” or “Do you think that consuming healthy food may improve your appearance?” (Stochel et al., 2015). Donini et al. (2004) reported a substantial validity for a threshold of 40 points. Stochel et al. (2015) assessed a reliability analysis of the questionnaire and obtained a Cronbach’s alpha of 0.78, meaning the ORTO-15 is an acceptable instrument.

Body Image. Furthermore, the body dissatisfaction subscale from the Eating Disorder Inventory-2 (EDI) (Appendix C) was used to assess the degree of a negative body image in the participants (Garner, 1983). The study by Garner et al. (1983) designed the EDI to measure different indications and characteristics of eating disorders, like AN or bulimia. In addition to that, Nevonen et al. (2006) described the EDI-2 as a self-report measure that assesses feelings, behaviours and thoughts concerning eating disorders. Overall, the EDI-2 consists of 91 items within 11 subscales (Parra-Fernández et al., 2018). The latest form of the Eating Disorder Inventory was not publicly available yet which is why the second form was used. Furthermore, both the EDI-2 and the EDI-3 have the same questions for the body dissatisfaction subscale. Thus, the reliability and validity of both versions were reported which showed acceptable reliability and validity for the body dissatisfaction subscale. The subscale of the EDI-2 showed internal reliability of .91 for normal control groups (Nevonen et

al., 2006). By comparison, Clausen et al. (2011) reported internal reliability of .93 about the subscale within a normal control group.

Garner et al. (1983) referred to the body dissatisfaction scale as an instrument that reflects the degree of dissatisfaction with a person's body parts. Moreover, they related the degree of dissatisfaction to AN-related symptoms. The body dissatisfaction subscale consists of nine questions that participants answered on a 6-point Likert scale from *always, usually, often, sometimes, rarely* to *never* (Parra-Fernández et al., 2018). Few example items of the subscale are: "I think that my stomach is too big", "I think that my thighs are too large", "I think my hips are too big" and "I think my buttocks are too large". The study by Parra-Fernández et al. (2018) also indicated a scoring system. The most extreme answer possibilities (*always or never*) were scored with a 3, the response after that (*usually or rarely*) was scored with a 2 and the answer after that (*often or sometimes*) was scored with a 1. The 3 answer possibilities that are left were scored with 0. Therefore, the higher the score the higher was the body dissatisfaction of the participant.

Body Mass Index (BMI). To calculate the BMI the participants were asked to indicate their weight and height. As mentioned above, according to the WHO, the BMI is a standard measurement to indicate a person's nutritional status by dividing the weight in kilograms by the height in meters. The BMI was scored into three categories. *1 = low BMI (< 18.5), 2 = normal BMI (18.6 – 24.9) and 3 = high BMI (25 – 40>).*

Procedure

First of all, the current study was approved by the Ethics Committee from the University of Twente. The survey was published on Qualtrics from the 26th of March 2021 until the 8th of April 2021. Thus, the duration of the data collection was almost two weeks. Students participated in this survey based on their signed informed consent. First, socio-demographic data such as age, gender, nationality and occupation were collected. Individual variables like height and weight and the participants' social media usage were also registered. To become more specific, closed questions of the survey covered topics about their eating behaviour regarding their types of diets and asked about their consumption of YouTube. Also, the ORTO-15, subscales of the EDI-2 and general questions regarding social media were asked. Lastly, after filling in all questions, the participants were informed about further information about the study goal and were provided with the contact information of the researchers.

Statistical Analysis

First, to test the data for normality a Shapiro Wilk test was conducted that indicated the data were not normally distributed regarding all variables. However, QQ plots were visually inspected and there were no significant deviations, therefore, parametric tests were employed to address the hypotheses. According to the central limit theorem, parametric tests can state higher statistically correct statements than non-parametric tests (Kwak & Kim, 2017). Additionally, Kwak and Kim (2017) referred to the rule of thumb of the central limit theorem that suggests the higher the sample size, the higher are the means normally distributed and a skewed distribution does not have a large effect.

A new variable was made for the ORTO-15 questionnaire for which the participant got a score of 1 if he or she scored lower than 40 and a 0 if the participant scored higher than 40, indicating no ON-related symptoms. A Pearson correlation analysis was conducted in this study to explore the relationship between body image dissatisfaction and ON. Regarding H_2, a new variable was added that compared participants who do not follow a specific diet, scored with a 0, and those who follow one, scored with a 1. To investigate differences between these groups, t-tests for independent samples were used to explore it. Additionally, a t-test for independent samples was conducted to explore differences between participants who use YouTube and those who do not use it. Furthermore, a one-way ANOVA explored the differences between three BMI groups (low BMI, normal BMI, high BMI). The Statistical Packages for Social Sciences (SPSS) was used to analyze the dataset. First, an analysis of the descriptive statistics of the participants' demographics was conducted. By using the DESCRIPTIVES command the mean scores, standard deviations and maximum and minimum scores of the ORTO-15, the EDI-2, the BMI and the duration of YouTube use were identified. Also, frequency analyses were conducted with the eating diet ad-hoc item, the BMI scores and time spent on YouTube (in minutes per day). The significance level was set up at a p-value of $< .05$.

Results

The mean scores, standard deviations, range and correlations of the variables can be seen in Table 2. In this study 163 (69.1%) participants scored below the cut-off point of 40 on the ORTO-15 questionnaire. Overall, the mean of the ORTO-15 questionnaire was 37.55 (SD = 3.81) with a minimum of 27 and a maximum of 47 and the degrees of freedom of 234 and a variance of 14.54.

Table 2

Means, Standard Deviations, Min, Max and Correlations

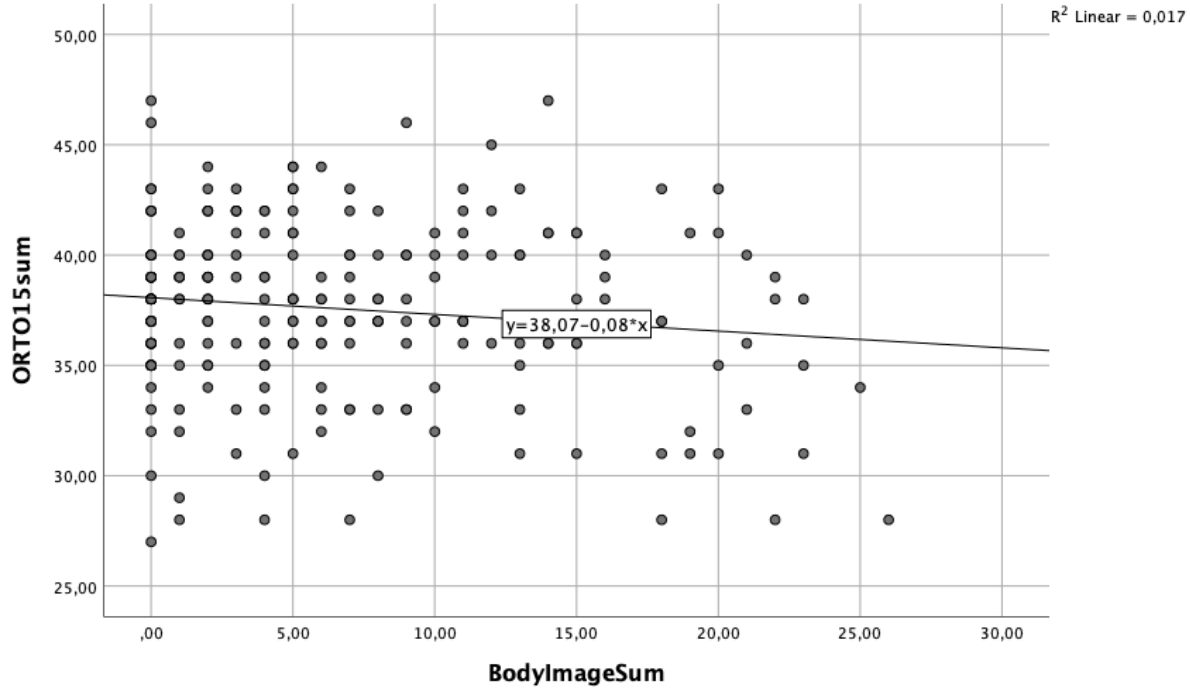
Variables	N	Mean	SD	Min	Max	ORTO-15
						r (p)
ORTO-15	236	37.55	3.81	27	47	
Body Image Dissatisfaction	236	6.86	6.57	0.00	26	*.045
						t (p)
Eating diet not or yes	236	0.55	0.5	0	1	*.016
YouTube Use	236	0.70	0.46	0	1	*.090
						F (p)
BMI	223	22	3.10	16.10	40.12	*0.95

*p<.05

Regarding H_1, the Pearson's r test showed a significant correlation between the sum score of the ORTO-15 and EDI-II Body Dissatisfaction sub-scale ($r(234) = -.131$, $p = .045$). As indicated in Figure 1, the graph showed that the higher the body dissatisfaction the lower is the score of the ON questionnaire, indicating higher ON-related symptoms ($M = 6.86$, $SD = 6.57$). Therefore, this hypothesis was accepted.

Figure 1

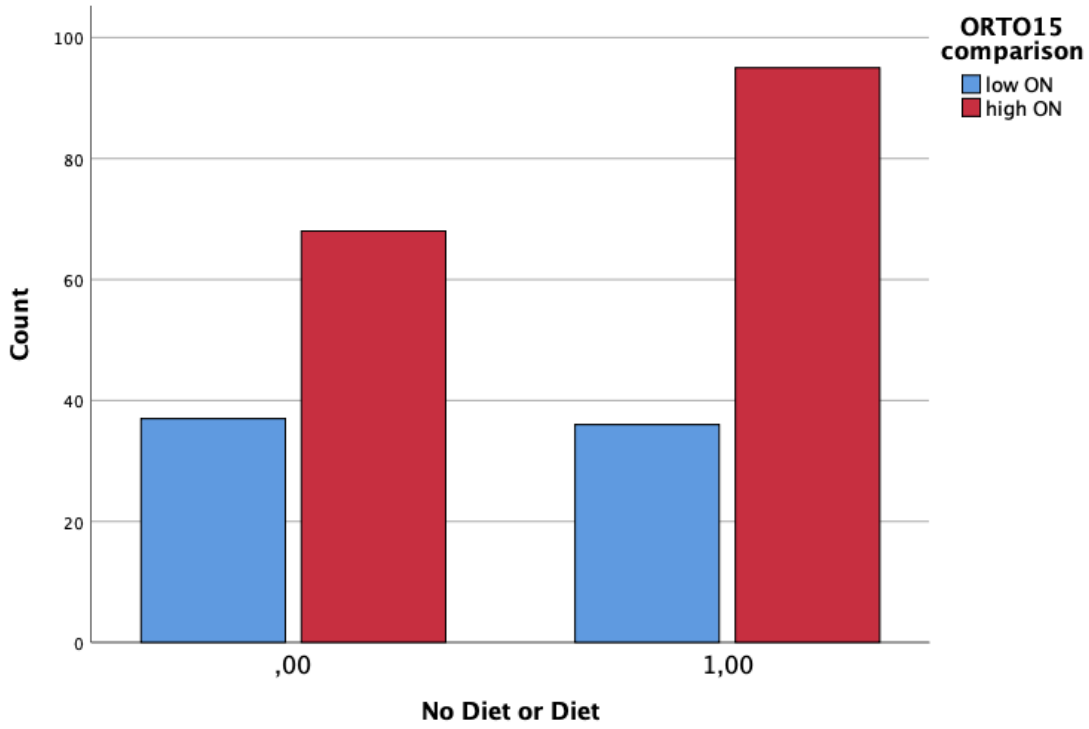
Scatterplot EDI-2 sum score, ORTO-15 sum score.



When addressing H_2, a t-test for independent samples indicated a statistically significant difference between following a specific eating diet and ON-related symptoms ($t(234) = 2.435$, $p = .016$). The results showed a higher occurrence of ON-related symptoms among students who do follow a certain diet ($M = 37.02$, $SD = 4.1$) compared to students who did not follow a specific diet ($M = 38.21$, $SD = 3.34$). These findings are emphasized in Figure 2. Thus, H_2 was accepted. Descriptive statistics showed that 55.5% of the participants indicated having a specific diet while 45.5% did not have one. Most of the participants who had a certain diet specified to be vegetarian (19.5%), after that 11.4% mentioned being semi-vegetarian and 8.1% were vegan. All frequencies of the questionnaire for a specific eating dieting are shown in Appendix D.

Figure 2

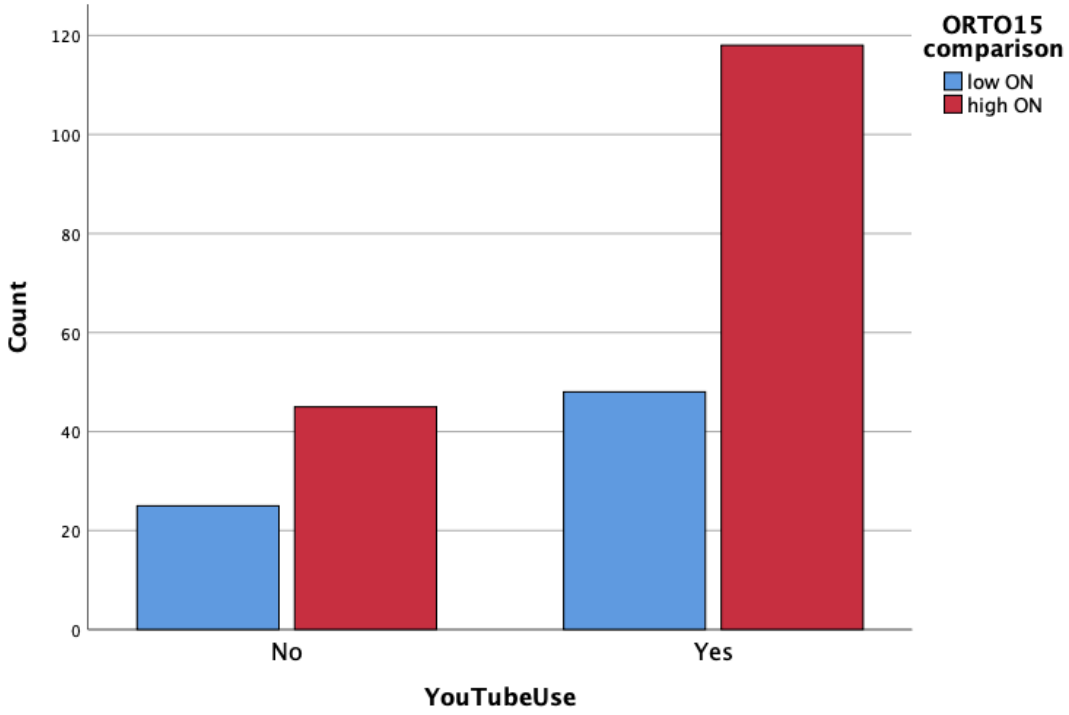
Following a diet or no diet and ON



Referring to H_3, the t-test showed that there was no significant difference between YouTube users and non-users concerning ON-related symptoms ($t(234) = -1.71$, $p = .090$). Concluding, this hypothesis was rejected. Nevertheless, results showed a slightly higher indication of ON-related symptoms among YouTube users ($M = 37.27$, $SD = 3.85$) compared to non-users ($M = 38.2$, $SD = 3.68$). Relating to that, overall more participants who showed ON-related symptoms (71.1%) indicated to use YouTube compared to those who do not consume it (28.9%). These results are highlighted in Figure 3. Furthermore, frequency analyses showed that 166 (70.3%) of the 236 participants indicated that they use the social media platform YouTube, whereas 70 participants (29.7%) stated to not use it. The mean duration of the YouTube use was 42.56 ($SD = 50.1$) minutes.

Figure 3

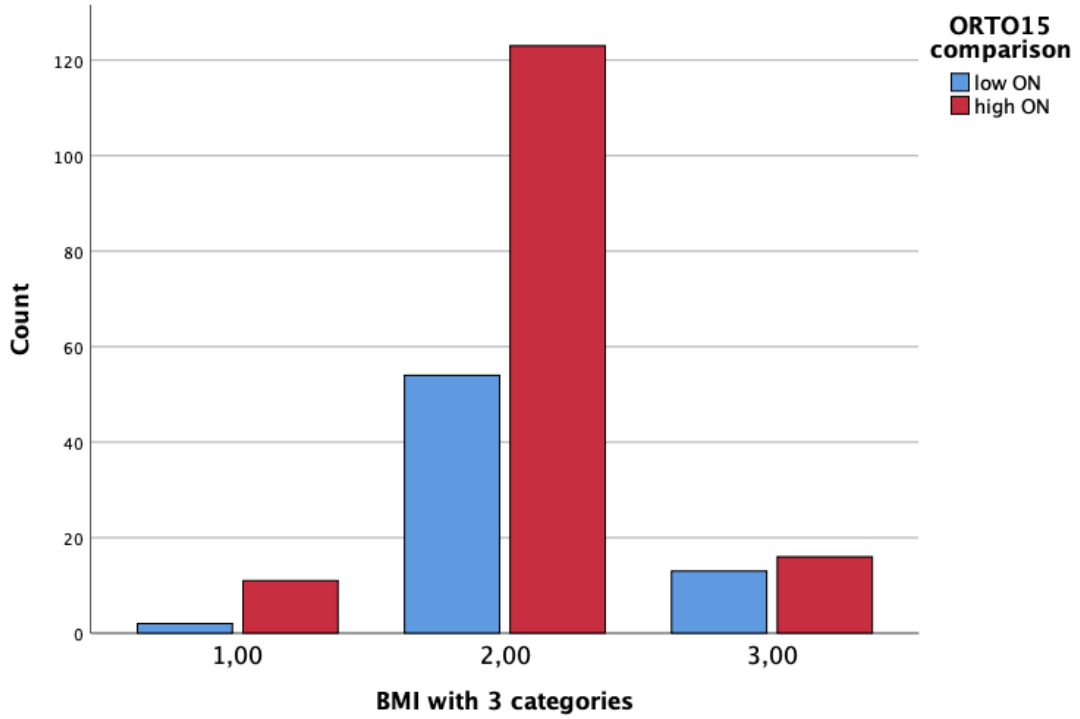
YouTube users and non-users compared to ON



Addressing H_4, 17 cases were excluded because of missing data about weight indications. The BMI variable showed that out of 219 participants, 177 (80.8%) had a normal BMI while 13 (5.9%) seemed to have underweight and 29 (13.2%) were classified as overweight. Results of the one-way ANOVA showed no significant difference between all three BMI categories concerning ON-related symptoms ($F(2, 216) = 2.38$, $p = .095$). Meaning H_4 was rejected. Nevertheless, the outcomes showed a slightly higher exhibition of ON-related symptoms among participants who show a low BMI ($M = 36$, $SD = 2.58$) than those who had a normal BMI ($M = 37.67$, $SD = 3.86$) and those with a high BMI ($M = 38.69$, $SD = 3.29$). Relating to this, more students following a specific diet showed ON-related symptoms (5.02%) than those who do not follow one (0.91%). However, this pattern was also found in participants who had a normal and high BMI (Figure 4).

Figure 4

Low, normal and high BMI related to ON



Discussion

This study aimed to examine the relationship between body dissatisfaction and ON-related symptoms. Recent literature already found that there is quite high pressure from the mass media in young adults resulting to have the desire for a thin and ideal body often forming body dissatisfaction (Zeppegno, 2018). Furthermore, the purpose of the study was to gain a better understanding of factors that might influence the occurrence of the new mental health concern. An association between following a diet and ON-related symptoms was examined from previous studies and based on the famous case of Steven Bratman who had himself issues with ON resulting from a vegan diet (Hanganu-Bresch, 2020). Furthermore, connections were drawn between YouTube consumption and developing an eating disorder (Santarossa, 2015), therefore, it was examined if there is a relation between YouTube use and ON-related symptoms. Lastly, recent literature was quite contrasting referring to the relationship between ON-related symptoms and a low BMI (Dell'Osso et al, (2018). Overall, the findings revealed a high prevalence of ON-related symptoms in the sample of university students (69.1%). Furthermore, results showed that two out of four formulated hypotheses were accepted.

Overall, the results of the current study confirmed previous theoretical background and research. Considering the findings of recent literature about the relationship between body dissatisfaction and ON-related symptoms (Barthels et al., 2020), this study also supported that there is a significant positive relationship. Results showed a steady increase in ON-related symptoms as the body dissatisfaction becomes higher. The findings were in line with previous studies, for example, both Zeppegno (2018) and Barthels et al. (2020), pointed out that body dissatisfaction influences the development of ON-related symptoms by having the desire to be thin together with low self-acceptance.

This pattern of results is consistent with the previous literature that concluded there is a possible impact of diets on ON-related symptoms. For instance, the studies by Hanganu-Bresch (2020), Barthels et al. (2018) and Donini et al. (2004) investigated significant relations between a vegan or vegetarian diet and symptoms of the mental health concern ON. Diets that showed the highest tendencies to develop ON-related symptoms were vegan, vegetarian and low-carb. Also, Nevin and Vartanian (2017) supported these findings in their study by reporting that these diets can be harmful when developing an obsessive desire to adhere to the restrictive eating style. Moreover, following a specific diet can contribute to ON-related symptoms when constantly thinking about meal preparation, meal planning and consumption (Donini et al., 2004).

As previously mentioned in this study, several studies pointed out that there is a high impact of vlogs that are uploaded on YouTube on eating behaviours by supporting a thin and ideal lifestyle (Syed-Abdul, et al., 2013; Santarossa, 2015). Recent research indicated the use of social media encourages to strive for a perfect lifestyle including an ideal body image by promoting weight loss and eating healthy food (Turner & Lefevre, 2017). Nevertheless, the use of YouTube did not show a connection to that in the current study. However, some tendencies were observed that support the assumption that higher YouTube use influences the occurrence of ON-related symptoms. Previous research by Turner and Lefevre (2017) and by Hanganu-Bresch (2020) found correlations between the social media platform Instagram and ON-related symptoms. Due to this, a link was made between the similarity of YouTube and Instagram through the image- and video-based content. Moreover, several studies associated social media platforms with mental health concerns (Santarossa, 2015), thus it was hypothesized that YouTube could be also highly influential. A reason that might explain the non-significant results was elaborated by Pereira et al. (2016). Their study pointed out that YouTube as well as other social media platforms can also help when facing a FED through positive and emotional support of others. Nevertheless, as stated by Syed-Abdul et al. (2013),

video creators often target to encourage a healthy eating lifestyle, thus possibly pressuring a thin body image facilitating AN. Further evidence which might explain the current findings regarding higher tendencies of ON-related symptoms among YouTube users is that participants use this platform to retrieve information about healthy eating behaviour (Cheshire et al., 2020). The same study supported a link between this information-seeking behaviour about healthy eating diets on YouTube and developing problematic eating patterns. This was in line with the findings that the current study found a subtle difference between YouTube users and non-users. Despite not reaching statistical significance, a tendency was observed in non-users versus users regarding ON-related symptoms. When observing the results, it is recognizable that users showed higher tendencies to develop ON-related symptoms than non-users.

Lastly, it was hypothesized that students with a low BMI show higher scores on the ORTO-15 scale. Few studies had contrasting findings relating to BMI as an influencing factor of ON-related symptoms. For example, the Turkish study of Fidan et al. (2010) stated the higher the BMI score the lower the ORTO-15 score, therefore, the higher ON-related symptoms. In contrast to that, few studies found significant differences between participants with a low BMI and ON-related symptoms, for example, the French study by Dell'Osso et al. (2018) concluded that a low BMI influences ON-related symptoms. These differences in findings could be explained by a much higher sample size that the study by Dell'Osso (2018) had with 2065 participants in contrast to Fidan et al. (2010) with 895 participants or due to the differences in culture. In general, previous studies did not find a significant relationship between BMI and ON-related symptoms (Godefroy et al., 2021), and this study is in line with current findings. Nevertheless, as pointed out by Godefroy et al. (2021) people who display ON-related symptoms may have a slight decrease in BMI which is also supported in the current findings.

Strengths and Limitations

One major strength of the current study was the use of the EDI-2 and its' body dissatisfaction questionnaire. This questionnaire showed great reliability and validity (Garner et al., 1983). Also, the 6-point Likert scale was simple to understand and use. The second strength of this study was that, in contrast to previous research, it considered several influencing variables with the mental health concern ON and took a wider focus on these variables. Thirdly, the results were mostly consistent with recent research findings which strengthen the hypotheses. Furthermore, several studies linked ON to relevant variables that could influence the development of its symptoms. An important strength of the current study

was that it investigated the relationship between YouTube use and ON-related symptoms which was not found in recent research. As stated in the introduction section, recent studies found influences from social media on eating behaviour and eating disorders (Turner & Lefevre, 2017). Related to that, this study took a new perspective and related YouTube usage to the new mental health concern where tendencies were observed.

Referring to the ORTO-15, the literature was mixed concerning this instrument as some research emphasized its clinical relevance by capturing questions concerning the cognitive, emotional and clinical field (Babeau et al., 2019). Another strong point of the ORTO-15 questionnaire is that it includes important items that test the occurrence of ON-related symptoms. Also, the scale seems to show good validity and reliability. According to this, the study by Rogoza and Donini (2021) analysed the questionnaire and concluded that most items measure ON-related thoughts or behaviours well while only some items did not show good measurement. However, the same study suggested adapting some items. Thus, this is at the same time a limitation that is further highlighted in the next section.

Concerning the prevalence rate of ORTO-15, literature criticised that the questionnaire tends to overestimate the prevalence of ON-related symptoms (Missbach et al., 2015). Also, other studies highlighted the cut-off point of 40 as being problematic because most participants tend to fall directly beyond this and by reducing it the prevalence rate might be more accurate (Mitrofanova et al., 2021). In addition to that, the study by Zickgraf (2020) pointed out that some items of the ORTO-15 seem to measure general eating intentions instead of eating obsessions. The authors mentioned the difficulty in terms of interpretation of the questionnaire and reported that some groups of psychologists argued to develop new measures to detect ON-related symptoms or to improve the existing ones. As described by Chard et al. (2019) prevalence rates of ON vary extensively from 1% to as high as 88.7%. In contrast to the results of the current study, Chard et al. (2019) concluded with "The Düsseldorf Orthorexia Scale" (DOS) a much lower prevalence rate. They reported a rate of 8% that is considered as having ON and 12.4% being at risk of developing ON in a sample of 384 students.

Another limitation was the outcome of the comparison between the three BMI categories and ON-related symptoms that showed only slight variations. These marginal differences between the three BMI categories could be explained by the idea that participants could have changed their weight indications to make them more socially acceptable. Since most data were in the normal BMI category and some data about weight indications were missing it might be that some participants had personal issues to indicate their actual weight.

The last limitation was the cross-sectional design that is limited in its' explanatory power because it captures data only at one point in time. Therefore, it was difficult to draw conclusions because data could be biased in terms of the sample. The current study had a good sample size with 236 participants but not with a huge variation of nationalities that influences the representativeness negatively. In addition to that, the sample size mostly represented German and Dutch university students which is why the conclusions could be prone to bias. Also, the demographics showed an imbalance in age, gender and education level that might also influence the results.

Study Implications and Directions for Future Research

Despite these limitations, the current study posits further insight into ON-related mechanisms. Overall, the current study concluded body dissatisfaction and following a specific eating diet both correlate with developing ON-related symptoms. Furthermore, the results showed no significant relationship between YouTube use and ON-related symptoms. However, some tendencies were observed that there are indications of higher ON-related symptoms when consuming YouTube. As mentioned above, Syed-Abdul et al. (2013) investigated in their study a relation between watching healthy lifestyle videos and having the desire to be thin resulting in affecting the body image of young people. This led to the assumption that there might be a relation between YouTube use and forming a body dissatisfaction that could have an impact on developing ON-related symptoms. Therefore, this relationship should be addressed in future research. Also, recent research already indicated there might be a relation when having ON-related symptoms resulting in a decrease of the BMI due to the restricted eating style (Godefroy et al., 2021). Despite the non-significant results in this study, the relation between BMI and ON-related symptoms should be further investigated. For that, it might be of interest to conduct a longitudinal study to observe this correlation over time.

Considering the limitations and implications, in terms of future research, much work needs to be done before a full understanding of the mental health concern ON is established. There is a continuing debate whether the mental health concern can be categorized under ED or OCD. Both disorders show overlap with symptoms of ON. For example, the need for perfectionism and control and the desire to lose weight are symptoms of both AN and ON (Brytek-Matera, 2012). Additionally, the desire to adhere to routines that eventually limit activities is an indication of both OCD and ON (Koven & Abry, 2015). For further research, it would be interesting to examine the categorization of ON to improve options for diagnostic and treatment.

The mental health concern ON is a new and complex topic slightly getting more awareness of the population. Therefore, multiple known or unknown factors can influence its' development that were not considered in this study. As Cheshire et al. (2020) pointed out there are several influences that can occur on the individual (micro) level, the external (meso) level and the societal (macro) level that could have an impact on the occurrence and development of ON. The study explained influencing factors on an individual level could be behaviours when growing up, the personality of an individual or possible health concerns. Additionally, external factors would be family or friends and an example of a societal influence are the mass media. Thus, for future research, it would be interesting to investigate further possible factors that might have an impact on developing ON-related symptoms.

Lastly, a recommendation for future research would be to consider different measurements for identifying ON-related symptoms. Possible scales would be the DOS, the Eating Habits Questionnaire (EHQ) or the Teruel Orthorexia Scale (TOS) that all seemed to demonstrate good face validity, internal consistency and replicability (Zickgraf, 2020). As mentioned above, Chard et al. (2019) concluded in their research a more realistic prevalence rate of ON-related symptoms by using the DOS. Related to this, it is recommended to conduct this current study again with the DOS scale. Furthermore, as suggested by Rogoza and Donini (2021) some items of the ORTO-15 should be improved. Also, the study recommended adapting the cutoff point of 40 to not overestimate the prevalence of ON-related symptoms in future.

Conclusion

In summary, the research findings contributed to a growing understanding of the new mental health concern Orthorexia Nervosa (ON) and influencing factors. Considering the growing awareness of ON as a serious mental health concern it is of great importance to pay more attention and research on this topic. The current study displayed a prevalence rate of ON-related symptoms about 69.1% of university students and showed significant correlations with body dissatisfaction and following an eating diet. Although the variables YouTube consumption and BMI did not show a significant relation concerning ON-related symptoms, the variable YouTube use indicated a positive trend regarding being more likely to develop symptoms of ON when using YouTube. Furthermore, the question arises which other possible influencing factors might contribute to this mental health state and thus, how this information can be used to, first, classify and define ON in the diagnostic manuals and, second, detect and treat it as a mental health concern.

References

Arusoğlu, G., Kabakçi, E., Köksal, G., & Merdol, T. K. (2008). Orthorexia Nervosa and Adaptation of ORTO-11 into Turkish. *Turkish Journal of Psychiatry*, *19*(3).

Babeau, C., Le Chevanton, T., Julien-Sweerts, S., Brochenin, A., Donini, L. M., & Fouques, D. (2019). Structural validation of the ORTO-12-FR questionnaire among a French sample as a first attempt to assess orthorexia nervosa in France. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity,* 1-8. https://doi.org/10.1007/s40519-019-00835-0

Barnes, M. A., & Caltabiano, M. L. (2017). The interrelationship between orthorexia nervosa, perfectionism, body image and attachment style. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *22*(1), 177-184. https://doi.org/10.1007/s40519-016-0280-x

Barthels, F., Kisser, J., & Pietrowsky, R. (2020). Orthorexic eating behavior and body dissatisfaction in a sample of young females. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 1-5. https://doi.org/10.1007/s40519-020-00986-5

Barthels, F., Meyer, F., & Pietrowsky, R. (2018). Orthorexic and restrained eating behaviour in vegans, vegetarians, and individuals on a diet. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *23*(2), 159-166. https://doi.org/10.1007/s40519-018-0479-0

Bratman, S. (2017). Orthorexia vs. theories of healthy eating. *Eating and Weight Disorders – Studies on Anorexia, Bulimia and Obesity volume 22*, 381-385. https://doi.org/10.1007/s40519-017-0417-6

Brytek-Matera, A. (2012). Orthorexia nervosa–an eating disorder, obsessive-compulsive disorder or disturbed eating habit. *Archives of Psychiatry and psychotherapy, 1*(1), 55-60.

Brytek-Matera, A., Donini, L. M., Krupa, M., Poggiogalle, E., & Hay, P. (2015). Orthorexia nervosa and self-attitudinal aspects of body image in female and male university students. *Journal of Eating Disorders, 3*(1), 1-8. http://doi.org/10.1186/s40337-015-0038-2

Brytek-Matera, A., Fonte, M. L., Poggiogalle, E., Donini, L. M., & Cena, H. (2017). Orthorexia nervosa: relationship with obsessive-compulsive symptoms, disordered eating patterns and body uneasiness among Italian university students. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 22*(4), 609-617. https://doi.org/10.1007/s40519-017-0427-4

Bulik, C. M., Reba, L., Siega-Riz, A. M., & Reichborn-Kjennerud, T. (2005). Anorexia nervosa: definition, epidemiology, and cycle of risk. *International Journal of Eating Disorders, 37*(S1), S2-S9. https://doi.org/10.1002/eat.20107

Calzo, J. P., Sonneville, K. R., Haines, J., Blood, E. A., Field, A. E., & Austin, S. B. (2012). The development of associations among body mass index, body dissatisfaction, weight and shape concern in adolescent boys and girls. *Journal of Adolescent Health*, *51*(5), 517-523. https://doi.org/10.1016/j.jadohealth.2012.02.021

Chard, C. A., Hilzendegen, C., Barthels, F., & Stroebele-Benschop, N. (2019). Psychometric evaluation of the English version of the Düsseldorf Orthorexie Scale (DOS) and the prevalence of orthorexia nervosa among a US student sample. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 24*(2), 275-281. https://doi.org/10.1007/s40519-018-0570-6

Cheshire, A., Berry, M., & Fixsen, A. (2020). What are the key features of orthorexia nervosa and influences on its development? A qualitative investigation. *Appetite*, *155*, 104798. https://doi.org/10.1016/j.appet.2020.104798

Cinquegrani, C., & Brown, D. H. (2018). 'Wellness' lifts us above the Food Chaos': a narrative exploration of the experiences and conceptualisations of Orthorexia Nervosa through online social media forums. *Qualitative Research in Sport, Exercise and Health*, *10*(5), 585-603. https://doi.org/10.1080/2159676X.2018.1464501

Clarys, P., Deliens, T., Huybrechts, I., Deriemaeker, P., Vanaelst, B., De Keyzer, W., & Mullie, P. (2014). Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet. *Nutrients, 6*(3), 1318-1332. https://doi.org/10.3390/nu6031318

Clausen, L., Rosenvinge, J. H., Friborg, O., & Rokkedal, K. (2011). Validating the Eating Disorder Inventory-3 (EDI-3): A comparison between 561 female eating disorders patients and 878 females from the general population. *Journal of Psychopathology and Behavioral Assessment, 33*(1), 101-110. https://doi.org/10.1007/s10862-010-9207-4

Dell'Osso, L., Carpita, B., Muti, D., Cremone, I. M., Massimetti, G., Diadema, E., & Carmassi, C. (2018). Prevalence and characteristics of orthorexia nervosa in a sample of university students in Italy. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 23*(1), 55-65. https://doi.org/10.1007/s40519-017-0460-3

Donini, L. M., Marsili, D., Graziani, M. P., Imbriale, M., & Cannella, C. (2004). Orthorexia nervosa: a preliminary study with a proposal for diagnosis and an attempt to measure

the dimension of the phenomenon. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *9*(2), 151-157.

Dunn, T. M., Gibbs, J., Whitney, N., & Starosta, A. (2017). Prevalence of orthorexia nervosa is less than 1%: data from a US sample. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 22*(1), 185-192. https://doi.org/10.1007/s40519-016-0258-8

Fidan, T., Ertekin, V., Işikay, S., & Kırpınar, I. (2010). Prevalence of orthorexia among medical students in Erzurum, Turkey. *Comprehensive Psychiatry, 51*(1), 49-54. https://doi.org/10.1016/j.comppsych.2009.03.001

Frank, G. K. (2015). What causes eating disorders, and what do they cause? *Biological Psychiatry, 77*(7), 602-603. https://doi.org/10.1016/j.biopsych.2015.01.012

Garner, D. M., Olmsted, M. P., & Polivy, J. (1983). The Eating Disorder Inventory: A measure of cognitive-behavioral dimensions of anorexia nervosa and bulimia. *Anorexia nervosa: Recent Developments in Research*, 173-184. https://doi.org/10.1002/1098-108X(198321)2:2<15::AID-EAT2260020203>3.0.CO;2-6

Godefroy, V., Trinchera, L., & Dorard, G. (2021). Optimizing the empirical assessment of orthorexia nervosa through EHQ and clarifying its relationship with BMI. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 26*(2), 649-659. https://doi.org/10.1007/s40519-020-00909-4

Hanganu-Bresch, C. (2020). Orthorexia: eating right in the context of healthism. *Medical Humanities, 46*(3), 311-322. http://dx.doi.org/10.1136/medhum-2019-011681

Koven, N. S., & Abry, A. W. (2015). The clinical basis of orthorexia nervosa: emerging perspectives. *Neuropsychiatric Disease and Treatment*, *11*, 385. https://doi.org/10.2147/NDT.S61665

Kwak, S. G., & Kim, J. H. (2017). Central limit theorem: the cornerstone of modern statistics. *Korean Journal of Anesthesiology, 70*(2), 144. https://doi.org/10.4097/kjae.2017.70.2.144.

Lupton, D. (2020). Carnivalesque food videos: excess, gender and affect on YouTube. *In Digital Food Cultures* (pp. 35-49). Routledge.

Missbach, B., Hinterbuchinger, B., Dreiseitl, V., Zellhofer, S., Kurz, C., & König, J. (2015). When eating right, is measured wrong! A validation and critical examination of the ORTO-15 questionnaire in German. *PloS One*, *10*(8), e0135772. https://doi.org/10.1371/journal.pone.0135772

Mitrofanova, E., Pummell, E., Martinelli, L., & Petróczi, A. (2021). Does ORTO-15 produce valid data for 'Orthorexia Nervosa'? A mixed-method examination of participants' interpretations of the fifteen test items. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *26*, 897-909. https://doi.org/10.1007/s40519-020-00919-2

Molyneaux, H., O'Donnell, S., Gibson, K., & Singer, J. (2008). Exploring the gender divide on YouTube: An analysis of the creation and reception of vlogs. *American Communication Journal, 10*(2), 1-14.

Nevin, S. M., & Vartanian, L. R. (2017). The stigma of clean dieting and orthorexia nervosa. *Journal of Eating Disorders, 5*(1), 1-10. https://doi.org/10.1186/s40337-017-0168-9

Nevonen, L., Clinton, D., & Norring, C. (2006). Validating the EDI-2 in three Swedish female samples: eating disorders patients, psychiatric outpatients and normal controls. *Nordic Journal of Psychiatry, 60*(1), 44-50. https://doi.org/10.1080/08039480500504537

Oberle, C. D., Samaghabadi, R. O., & Hughes, E. M. (2017). Orthorexia nervosa: Assessment and correlates with gender, BMI, and personality. *Appetite*, *108*, 303-310. https://doi.org/10.1016/j.appet.2016.10.021

Parra-Fernández, M. L., Rodríguez-Cano, T., Onieva-Zafra, M. D., Perez-Haro, M. J., Casero-Alonso, V., Fernández-Martinez, E., & Notario-Pacheco, B. (2018). Prevalence of orthorexia nervosa in university students and its relationship with psychopathological aspects of eating behaviour disorders. *BMC Psychiatry, 18*(1), 1-8. https://doi.org/10.1186/s12888-018-1943-0

Pereira, L. M., Quinn, N., & Morales, E. (2016). Breaking news: "I have an eating disorder." Video testimonials on YouTube. *Computers in Human Behavior, 63*, 938-942. https://doi.org/10.1016/j.chb.2016.06.027

Pinhas-Hamiel, O., & Levy-Shraga, Y. (2013). Eating disorders in adolescents with type 2 and type 1 diabetes. *Current Diabetes Reports, 13*(2), 289-297. https://doi.org/10.1007/s11892-012-0355-7

Rogoza, R., & Donini, L. M. (2021). Introducing ORTO-R: A revision of ORTO-15: Based on the re-assessment of original data. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 26*, 887-895. https://doi.org/10.1007/s40519-020-00924-5

Sakib, M. N., Zolfagharian, M., & Yazdanparast, A. (2020). Does parasocial interaction with weight loss vloggers affect compliance? The role of vlogger characteristics, consumer readiness, and health consciousness. *Journal of Retailing and Consumer Services*, *52*. https://doi.org/10.1016/j.jretconser.2019.01.002

Sandal, C. (2018). You are what you eat online: The Phenomenon of mediated eating practices and their underlying moral regimes in Swedish "What I eat in a day" vlogs. http://lup.lub.lu.se/student-papers/record/8943596

Santarossa, S. (2015). #SocialMedia: Exploring the Associations of Social Networking Sites and Body Image, Self-Esteem, Disordered Eating and/or Eating Disorders and the Impact of a Media Literacy Intervention". *Electronic Theses and Dissertations.* 5508. https://scholar.uwindsor.ca/etd/5508

Segura-Garcia, C., Ramacciotti, C., Rania, M., Aloi, M., Caroleo, M., Bruni, A., ... & De Fazio, P. (2015). The prevalence of orthorexia nervosa among eating disorder patients after treatment. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity, 20*(2), 161-166. https://doi.org/10.1007/s40519-014-0171-y

Stochel, M., Janas-Kozik, M., Zejda, J. E., Hyrnik, J., Jelonek, I., & Siwiec, A. (2015). Validation of ORTO-15 Questionnaire in the group of urban youth aged 15–21. *Psychiatr Pol, 49*(1), 119-134. https://doi.org/10.12740/PP/25962

Storch, E. A., Abramowitz, J., & Goodman, W. K. (2008). Where does obsessive–compulsive disorder belong in DSM-V? *Depression and Anxiety, 25*(4), 336-347. https://doi.org/10.1002/da.20488

Syed-Abdul, S., Fernandez-Luque, L., Jian, W. S., Li, Y. C., Crain, S., Hsu, M. H., & Liou, D. M. (2013). Misleading health-related information promoted through video-based social media: anorexia on YouTube. *Journal of Medical Internet Research*, *15*(2), e30. https://doi.org/10.2196/jmir.2237

Turner, P. G., & Lefevre, C. E. (2017). Instagram use is linked to increased symptoms of orthorexia nervosa. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *22*(2), 277-284. https://doi.org/10.1007/s40519-017-0364-2

World Health Organisation. Global database on body mass index. Available at: http://www.who.int/bmi/index.jsp?introPage=intro_3.html.

Zemlyanskaya, Y., Valente, M., & Syurina, E. V. (2021). Orthorexia nervosa and Instagram: exploring the Russian-speaking conversation around# орторексия. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 1-10. https://doi.org/10.1007/s40519-021-01230-4

Zeppegno, P. (2018). The psychopathology of body image in orthorexia nervosa. *Psychopathology*, *24*, 133-140.

Zickgraf, H. F. (2020). Re. "Sex differences in orthorexic eating behaviors: A systematic review and meta-analytical integration". *Nutrition, 70*. https://doi.org/10.1016/j.nut.2019.110571

Appendices

Appendix A

Closed-ended questionnaire about diet

Please indicate if you are following a certain diet.

- I do not have a certain diet
- Vegan (not consuming any animal products)
- Vegetarian (not consuming any meat or fish)
- Semi-vegetarian (consuming red meat, poultry or fish no more than once a week)
- Pesco-vegetarian (consuming no meat but fish)
- Omnivorous (eating meat or fish almost every day)
- Gluten-free
- Low-carb
- Other, namely:

Appendix B

Figure 5

The ORTO-15 questionnaire in German and English.

Item	German Translation	English original
1	*Achten Sie beim Essen auf den Kaloriengehalt der Lebensmittel?*	*When eating, do you pay attention to the calories of the food?*
2	*Fühlen Sie sich beim Lebensmitteleinkauf überfordert?*	*When you go in a food shop do you feel confused?*
3	Haben Sie sich in den letzten 3 Monaten beim Gedanken an LM Sorgen gemacht?	In the last 3 months, did the thought of food worry you?
4	Bestimmt die Sorge um Ihren Gesundheitszustand Ihre Essensauswahl?	Are your eating choices conditioned by your worry about your health status?
5	Ist Ihnen der Geschmack wichtiger als der gesundheitliche Aspekt von Lebensmitteln?	Is the taste of food more important than the quality when you evaluate food?
6	Sind Sie bereit mehr Geld für gesünderes Essen auszugeben?	Are you willing to spend more money to have healthier food?
7	Sorgt Sie der Gedanke an Ihre Ernährung mehr als 3 Stunden täglich?	Does the thought about food worry you for more than three hours a day?
8	*Erlauben Sie sich gegen Ihre Essprinzipien zu verstoßen?*	*Do you allow yourself any eating transgressions?*
9	*Glauben Sie, dass Ihre Stimmung Ihr Essverhalten beeinflusst?*	*Do you think your mood affects your eating behavior?*
10	Glauben Sie, dass die Überzeugung ausschließlich gesunde Lebensmittel zu essen, das Selbstwertgefühl steigert?	Do you think that the conviction to eat only healthy food increases self-esteem?
11	Glauben Sie, dass gesund zu essen Ihren Lebensstil verändert? (Häufigkeit von Restaurantbesuchen, Freizeitaktivitäten, usw.)	Do you think that eating healthy food changes your lifestyle (frequency of eating out, friends, . . .)?
12	Glauben Sie, dass gesundes Essen Ihr Aussehen verbessern könnte?	Do you think that consuming healthy food may improve your appearance?
13	*Fühlen Sie sich schuldig, wenn Sie gegen Ihre Essprinzipien verstoßen?*	*Do you feel guilty when transgressing?*
14	*Glauben Sie, dass es auch ungesunde Lebensmittel im Handel gibt?*	*Do you think that on the market there is also unhealthy food?*
15	Sind Sie während Ihrer Mahlzeiten alleine?	At present, are you alone when having meals?

Appendix C

Body dissatisfaction subscale

1. I think that my stomach is too big.
2. I think that my thighs are too large.
3. I think that my stomach is just the right size.
4. I feel satisfied with the shape of my body.
5. I like the shape of my buttocks.
6. I think my hips are too big.
7. I think that my thighs are just the right size.
8. I think my buttocks are too large.
9. I think that my hips are just the right size

Appendix D

Figure 6

Frequencies of participants following a certain diet.