Bachelor's Thesis

The Relationship between Orthorexia Nervosa, Anorexia Nervosa, and the Use of Instagram

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Table of Contents

Abstract

This study aimed to investigate if Orthorexia Nervosa (ON), Anorexia Nervosa (AN), and the time spend on the social media application Instagram are related. ON recently appeared in scientific literature and both, its causes and categorization, are not distinct yet. This leads to difficulties in its diagnosis and treatment. However, it seems to show similarities with the Feeding and Eating Disorder AN. Frequent Instagram use was also said to increase orthorexic tendencies, therefore the correlation was investigated. Since the use of Instagram and AN also seemed to be related, these variables were inspected for correlation as well. The analysis was conducted with 236 students that participated in this study with an average age of 21.57. Overall, 89% of the participants indicated to be users of Instagram. The study followed a quantitative, cross-sectional approach, and a Pearson correlation was performed for the investigation of correlations. To measure ON levels, the ORTO-15 was used, AN was measured using the drive for thinness subscale of the EDI-2 und for the use of Instagram two questions have been formulated. Significant correlations were found between drive for thinness and Instagram, as well as drive for thinness and ON. Only ON and Instagram did not show a significant correlation in this study. Consequently, two out of three formulated hypotheses were accepted. Therefore, it can be said that drive for thinness (indicating AN) is related to both, ON and the use of Instagram. For further research, concrete characteristics of ON might be of interest to improve diagnostic and treatment possibilities. Also, more details about the effect AN and ON have on each other might increase the certainty about the relation of these variables.

   Keywords: Orthorexia Nervosa, Anorexia Nervosa, drive for thinness, Instagram, social media

Introduction

Healthy eating supports the body in staying healthy. Consuming more fruit, vegetables and freshly cooked meals has been observed to be connected with positive health effects, such as a decrease in the mortality rate caused by different chronic diseases like obesity, cancer, and cardiovascular diseases (McComb & Mills, 2019). Especially in young generations, it was observed that healthy eating is rising in importance for themselves (Turner & Lefevre, 2017). Modern social media applications, like Instagram, seem to contribute to this development (Turner & Lefevre, 2017). Being concerned with nutrition, however, does not only have health benefits as indicated by different Feeding and Eating Disorders (FED) and the recently emerged mental health condition Orthorexia Nervosa (ON) (Hanganu-Bresch, 2019). Individuals showing ON related symptoms aim to support their individual health using a specific diet that is considered to be beneficial for the physical well-being, however, the result is not beneficial for the individual's health (Brytek-Matera et al., 2017). Both, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the International Classification of Diseases (ICD-10) did not formulate diagnostic criteria for ON to be a mental disorder yet, still in scientific literature an increasing amount of attention is directed towards it (Parra-Fernández et al., 2018). The focus of this research was to investigate, based on previous research, how the condition ON relates to the use of Instagram and the FED Anorexia Nervosa (AN).

Orthorexia Nervosa

Hanganu-Bresch (2019) described that ON first appeared in literature in 1997, in an article written by Steve Bratman. In this article, Bratman described his former obsession with the consumption of exclusively healthy food and its consequences. Thus, he characterized ON by the desire to achieve an optimal level of health using a specific diet (Brytek-Matera et al., 2017). The consequence of this desire is that dieting becomes central in the mindset of people, leading to high distress when the own dietary restrictions are not followed (Brytek-Matera et al., 2017). To maintain the own health, individuals with the ON condition use healthy food as a form of self-medication. The thought that health-related problems can be solved using a proper diet is a fact of which these individuals are deeply convinced (Hanganu-Bresch, 2019). Furthermore, a feeling of superiority to others with less healthy eating habits is a common feature of ON (Brytek-Matera et al., 2015). The prevalence of ON lays between .3% and 90% (McComb & Mills, 2019). In all, ON can be seen as a condition that relates to an obsession

with healthy eating, leading to impairments in many parts of the daily life of the individual, which will be discussed further.

There is still research necessary to classify ON, however, it might be seen as a "pathological manifestation of healthism" (Hanganu-Bresch, 2019). In general, healthism can be defined as "a belief that holds the individual responsible for his or her own health, thus neglecting the multitude of forces outside an individual's scope or power that can influence one's health" (Hanganu-Bresch, 2019, p. 7). It is characterized by strong enthusiasm in gathering information about health-promoting behaviours, as well as illness promoting behaviours. Also, those individuals seem to be rather health aware and support alternative medicine, as well as food supplements (Brytek-Matera et al. 2015). Although the consequences of ON are the contrary, one part of healthism is making positive life choices, such as regular exercises and considering official recommendations when dieting (Brytek-Matera et al. 2015). Thus, clear connections between healthism and ON can be observed.

Causes of Orthorexia Nervosa

Several causes for the development of ON have been observed. First of all, especially social groups that are concerned with their physical health, such as ballet dancers, athletes, or health care professionals seem to be prone to develop ON (Segura-Garcia et al., 2015). Additionally, some personality traits are said to be related to the development of ON, such as narcissism and perfectionism (McComb & Mills, 2019). Another influential factor is the individual's socioeconomic status (SES). Thus, a higher SES which is defined by high income and more years of education has been observed to increase the prevalence of ON (Segura-Garcia et al., 2015). The use of the social media app Instagram indicated a relation to a higher risk of ON, which seems to be especially due to the fact that this platform increases the personal involvement and connection of content creators, such as celebrities, using personal images. This personal involvement enlarges the tendency of taking food related advice seriously, thus, users are more likely to cut out specific foods (Turner & Lefevre, 2017; Douma et al., 2021). In terms of the role of gender, mixed findings have been described in research, depending on the gender variance within a sample the probability of ON differed. However, studies that were rated to be of higher quality did not show any significant gender differences between males and females (McComb & Mills, 2019). Age also seems to be unrelated to the development of ON symptoms (Turner & Lefevre, 2017). Additionally, it was observed that ON might be likely to arise after clinical treatment of the FED AN (Segura-

Garcia et al., 2015). The connection between ON and various FEDs, especially AN, will be discussed further during this report.

Apart from the development after treatment of a FED, ON seems to develop within two stages. The first stage is the decision to aim for healthy eating to ensure a healthy lifestyle, and the second stage is the emergence of an obsession with this healthy food. Whereas the first developmental stage of ON is not connected to any harm to the individual, the second stage may be considered as being pathological and leading to several health consequences due to a restricted nutrition (Douma et al., 2021).

Consequences of Orthorexia Nervosa

ON has a significant impact on several parts of the individual's life. One aspect that is influenced by ON is the individual's physical health. Instead of increasing one's health by putting a large emphasis on nutrition, this obsession turns into being harmful. Although excessive weight loss does not seem to be the goal of people with ON, it is a common consequence of the mental health condition (Brytek-Matera et al. 2017). Because of the people being too concerned with their meals, malnutrition is frequently observed (Brytek-Matera et al. 2017). Malnutrition may lead to impaired muscle and cardio-respiratory functioning, as well as decreased wound healing and immunity underlining the severity of the physical consequences of ON (Saunders & Smith, 2010).

However, ON has not only physical consequences but one's psychological status can be influenced by the obsession with healthy eating as well. Individuals with ON think about eating more than other people, they spend an excessive amount of time thinking, planning, and preparing their next meal (Brytek-Matera et al. 2015). In the long term, this leads to decreased enjoyment of eating because it becomes connected with distress and anxiety regarding the perceived and actual control over food intake (Brytek-Matera et al. 2017; Douma et al., 2021).

The psychological consequences of ON often lead to social consequences as well. The fact that individuals with ON spend a lot of time being concerned about their next meal may lead to social isolation because no time is left to spend with friends or family members (Brytek-Matera et al. 2015). Moreover, social isolation is fostered by the fact that those people tend to feel uneasy when for example eating in the present of others (Brytek-Matera et al. 2015; Douma et al., 2021). However, "eating with others plays a role in reinforcing social connections" (Higgs & Ruddock, 2020, p. 278) which supports the importance of the social consequences of ON. In sum, the social life is influenced by ON because in our modern

society eating together supports social relationships and those with ON prefer to eat without company and lack time for social interaction due to their obsession.

Categorization of Orthorexia Nervosa

A point that led to some debates is whether ON can be categorized as a FED or if it is a form of obsessive-compulsive disorder (OCD). In short, OCD can be described as an overestimation of danger and perfectionism leading to functional impairment (Guzick et al., 2020). In terms of the connection between OCD and ON, both share tendencies that are obsessive-compulsive such as ritualized food preparation and thoughts that reoccur and are rather intrusive. Those tendencies have the consequence of limiting time with others as it is not compatible with other social routines (Koven & Abry, 2015). However, research by Koven and Abry (2015) indicated that there are also differences as "the content of obsessions in orthorexia is perceived as ego-syntonic, rather than ego-dystonic" (p. 387), OCD in contrast can be classified as being ego-dystonic (Koven & Abry, 2015). In other words, for individuals with ON their condition suits their self-concept and is not considered as being distressing whereas for persons with OCD it is (Hart et al., 2018).

FEDs are defined as "a variety of disorders characterized by abnormal eating behaviors associated with emotional difficulties" (Parra-Fernández et al., 2018, p. 1). The fact that ON is a condition that relates to nutrition and eating leads to the belief that it is a FED. Also, comorbidity between both has been observed in research (Segura-Garcia et al., 2015). Additionally, there are various similarities between ON and other FEDs, one of which is a feeling of guilt after eating something considered 'unhealthy' (Koven & Abry, 2015). Generally, ON can be differentiated from other FEDs by the fact that "eating disorder patients look for an ideal body image while people with ON look for a pure body" (Segura-Garcia et al., 2015, p. 162). Thus, the categorization of ON as FED may not be accurate.

In sum, it can be said that a clear categorization of ON as either a form of OCD or a FED is rather difficult because there are similarities and differences of ON with both mental health conditions. However, the distinction between OCD and a FED is difficult in itself, as OCD and the FED AN are highly comorbid themselves, sharing multiple clinically relevant characteristics (Koven & Abry, 2015). Additionally, researchers suggested that all FEDs belong to the category of OCD, leading to the assumption that a strict distinction may not be necessary (Koven & Abry, 2015). Overall, this distinction problem underlines the difficulty to assign ON to one of these categories. During the next section, the relationship between ON and the FED AN will be discussed in further detail.

Connection between Orthorexia Nervosa and Anorexia Nervosa

When investigating the relationship between ON and FEDs one connection that is frequently made in scientific literature is that between ON and AN (Brytek-Matera et al. 2015; Segura-Garcia et al., 2015; Parra-Fernández et al., 2018). The cause for this seems to be that both conditions show various similarities as named by Brytek-Matera et al. (2015). AN is a FED characterized by a drive for thinness and fear to gain weight, which leads to altered eating patterns (Koven & Abry, 2015) and its prevalence is .3% (Hoek, 2006).

First of all, both conditions show a preoccupation with food and eating, as well as dietary restrictions, making eating concerns the primary focus of thoughts (Brytek-Matera et al., 2015). Additionally, both assign a rather high value on the influence of food on themselves leading to anxiety and avoidance towards foods that are considered to be "bad". Individuals with AN as well as ON, show a high need for control which may be connected to obsessive-compulsive traits such as perfectionism and rigidity, showing an ego-syntonic and chronic nature. Malnutrition and social isolation are consequences of both, AN and ON, indicating that both mental health conditions have a high influence on the health and quality of life of those with these conditions (Brytek-Matera et al., 2015). Also, both are connected to decreased pleasure related to food (Parra-Fernández et al., 2018). Consequently, it can be said that there are multiple similarities between the characteristics of AN and ON.

Nevertheless, although ON and AN show various similarities some fundamental differences can be distinguished as well. In scientific literature the main difference is defined in the fact that "AN patients are preoccupied with the quantity of food, [while] ON patients are preoccupied with the quality of food" (Turner & Lefevre, 2016). Also, individuals with AN show an obsession with their physical appearance and their goal of being thin, and at the same time a fear to gain weight. Those with ON in contrast focus more on being physically healthy (Brytek-Matera et al., 2015). However, it has to be mentioned that this does not seem to be completely supported yet, as McComb and Mills (2019) state that more research is needed in order to be able to exclude drive for thinness to influence the development of ON and that perceived fatness was associated with a higher risk of ON.

Another difference is about how individuals with AN and ON deal with the conditions in public: while "anorexic individuals tend to hide their behaviors, […] orthorexic individuals are more likely to flaunt their habits" (Koven & Abry, 2015, p. 387). Moreover, ON is not connected to a body image disorder, meaning that they have a realistic image of their body. In contrast to that, people with AN seem to have a distorted experience of their body image (Brytek-Matera et al., 2015). Finally, another difference is the gender distribution among the

conditions. While AN shows predominant prevalence in females (Brytek-Matera et al., 2015), the gender distribution of ON is not that explicit (McComb & Mills, 2019). Overall, despite the aforementioned similarities, the main motivations between those with AN and those with ON shows to be different, which makes the relationship between the mental health conditions rather unclear.

A history of a FED, especially AN, seems to be a strong predictor for the development of ON as indicated in multiple studies (Parra-Fernández et al., 2018; McComb & Mills, 2019, Segura-Garcia et al., 2015). This is supported by the increase of the comorbidity of FEDs and ON from 28% when starting the treatment of a FED to 53% after treatment (Segura-Garcia et al., 2015). Segura-Garcia et al. (2015) state that women that used to have a FED were more likely to seek the health benefits within the food they ate, compared to other women without such a history. This was thought to be a way for those women to control the amount they eat with a socially acceptable excuse (Segura-Garcia et al., 2015). Another reason for the increase of ON symptoms after the treatment of a FED may be that the behaviour of individuals turns from destroying their own body to trying to protect it which unintentionally leads to overprotection (Segura-Garcia et al., 2015). Taking all these aspects into account it can be said that there seems to be a relationship between ON and AN, however, in the scientific literature, there is no consensus about how this relationship looks like.

Connection between Orthorexia Nervosa, Anorexia Nervosa and Instagram

Another possible influence on both, ON and AN, is Instagram. Instagram is an image-based app that one can use to share pictures as well as short videos in four possible ways: public, private, direct, or creating an Instagram story (INSTAGRAM, 2016). Over the past years Instagram increasingly gained popularity, with more than one billion users it is one of the most used social media apps worldwide (We Are Social et al., 2021a). Within the adult population, young adults between 18 and 29 build the age group that is the most active on social media (Pew Research Center, 2019). In January 2021, 29.8% of Instagram users were between 18 and 24 years old (We Are Social et al., 2021b). Young adulthood is a critical period for the development of personal eating habits and diet choices (Vaterlaus et al., 2015). The number of adolescents using Instagram thus underlines the importance of considering possible influences of the social media app.

Overall, literature indicates the use of Instagram to be related to mental health conditions (Frison & Eggermont, 2017). It seems to increase the likelihood of individuals to develop ON. A movement within the app supporting this assumption is called 'fitspiration'.

This movement aims at encouraging the followers to adopt a healthy lifestyle, by focusing on physical activity, motivation, and 'clean' eating. Instead of promoting health only, this movement also seems to promote the development of ON (Woodley, 2018). Research showed that the image-based functioning of Instagram increased the experienced connectivity and personal involvement between the creator of the content and the user watching that content (Turner & Lefevre, 2017). This makes users more likely to stick to the advice given by others on Instagram which, in terms of food, frequently seems to be related to the advice to cut off some food groups or start a specific diet. This experienced connectivity and susceptibility to rely on nutrition-related advice thus seems to increase the risk for the development of ON (Turner & Lefevre, 2017).

Not only ON seems to be fostered by the use of Instagram, but also the development of AN shows to be stimulated. Although research showed that image-based platforms reduced individuals' perceived loneliness, which is beneficial for individuals' mental health, they may also alter their body image. Due to negative social comparisons arising from the use of Instagram, anorexic symptoms seem to increase. Thus, other FEDs like AN become more prevalent among those who are interested in health and fitness-related content on social media (Turner & Lefevre, 2017). This may be connected to the fact that viewing postings of thin bodies on Instagram fosters body dysmorphia (Wiederhold, 2019), which is characterized by an altered self-perception, being highly concerned with flaws in the own appearance and an obsession with perfection (Vashi, 2016). Additionally, there is a movement fostering AN that is similar to the 'fitspiration' movement. This movement is called 'thinspiration'. When users search for this on Instagram, they view posts showing thin bodies that shall motivate them to become thin as well (Woodley, 2018). Overall, it can be seen that Instagram may have an influence on self-perception, and also on what users consider to be the norm, thus there might be an influence on the development of both, ON and AN.

This Study

Regarding the contradictory results of research regarding the link of AN and ON, this study focused on this relationship. This is important in order to get a more precise idea about the origins and influences on the mental health condition. Also, the influence of the social media platform Instagram was taken into account, as research demonstrated that it may influence the development of both conditions.

The chosen target group for this research are university students because young adulthood was shown to be an important period for building eating and exercising habits

(Vaterlaus et al., 2015). Although age does not seem to be a predictor for ON (Turner & Lefevre, 2017), adolescents have been chosen to be the target group based on the amount of their social media consumption. The research question for this study was "To what extent are Orthorexia Nervosa, Anorexia Nervosa, and the use of Instagram related?". Based on the aforementioned research on the topic the following hypotheses have been formulated:

H_1: There is a relationship between ON and AN.

H_2: There is a relationship between ON and time spent on Instagram.

H_3: There is a relationship between AN and time spent on Instagram.

Methods

This study was a combined work of four researchers. Every researcher focused on a different research question with the overall topic being ON and social media. For this report, only questionnaires that are supposed to answer the research question "To what extent are Orthorexia Nervosa, Anorexia Nervosa, and the use of Instagram related" will be discussed.

Design

A correlational, quantitative research design was employed using a cross-sectional online survey.

Participants

Opportunity sampling was used in order to recruit participants. The participants were asked to participate via the social media accounts of the researchers (WhatsApp and Instagram). Additionally, to maximise the number of responses the cloud-based Participant Management Software 'Sona-System' was used. Inclusion criteria for participation were to be an enrolled student at a university or hogeschool, and adequate English reading and comprehension skills. In total 338 individuals took part in the survey, 122 of them participated via 'Sona-System'. 91 participants had to be excluded because they did not complete the whole survey, 2 participants because they did not give their informed consent and 9 participants were excluded since they did indicate not to be university or hogeschool students. Thus, 236 participants fulfilled all requirements of participation and were therefore considered in the analysis. On average, the participants needed 32.82 minutes to fill out the questionnaire. Three outliers that needed more than 1000 minutes and indicated a z-score of > 3 were excluded for the calculation of the mean time. The survey was open to be filled out Friday, 26 March 2022 until Friday, 9 April 2022, so 15 days in total.

Materials

As participants filled in an online survey (Appendix A), a device with internet access was required. The relevant questionnaires included in the survey to answer the research question are described in the following.

Demographic Data

The survey collected demographic data related to participant's age, gender, nationality, pursued degree, BMI (weight and height), diet, and history of mental health condition.

Questions Related to Instagram Use

In order to measure whether and to what extent the participant uses Instagram the closed question "Please indicate on which social media platforms you have an account" has been formulated. As response options, several social media platforms were mentioned, from which the participant could select multiple answers, also there was the possibility to choose "other" and name a platform that is used but not named. Participants that indicated to use Instagram got a score of 1 and those that did not use Instagram got a score of 0. To compare the time the participants spend on Instagram, they answered the open question "how much time do you spend on Instagram daily (on average in minutes)?" The indicated time in minutes were used for further calculations, whereas individuals that did not use Instagram got a score of 0 minutes. For those respondents that answered using a timespan the middle value was chosen. In other words, if a participant indicated to spend 60-120 minutes on Instagram a day, a score of 90 minutes was used for the analysis.

ORTO-15

The ORTO-15 is a 15-item questionnaire that enables the researcher to calculate the intensity of participants orthorexic behaviours. It takes into account the cognitive-relational, clinical, and emotional aspects of the respondent's eating behaviours (Missbach et al., 2015). The items of the questionnaire are consistent with the orthorexia symptoms originally defined by Bratman. Examples of those are "In the last 3 months, did the thought of food worry you?" or "Do you allow yourself any eating transgressions?" (Stochel et al., 2015). A 4-point-Likert scale was used with the response options '*always*' (1), '*often*' (2), '*sometimes*' (3), and '*never*' (4), whereas the questions 2, 5, 8, and 9 were reversed in valence and the scoring grid for question 1 and 13 was 2-4-3-1. A cut-off score of 40 was used as this shows the highest reliability values, so a score below 40 indicated orthorexic tendencies (Stochel et al., 2015). In

a sample of 15- to 21-year-olds the Cohen's kappa of the ORTO-15 was satisfactory (kappa between .7 and .9). The repeatability was very good for five items (kappa of .81-1), and good for the other ten items (kappa of .61-.8) (Stochel et al., 2015). Generally, the ORTO-15 seems to be of lower methodological quality (Hanganu-Bresch, 2019). In the present study, the sum scores were calculated to investigate the level of orthorexic tendencies of participants. The measured Cronbach's alpha was .26.

Eating Disorder Inventory -2

The Eating Disorder Inventory-2 (EDI-2) assess both, the symptoms and psychological features of various eating disorders (Clausen et al., 2011). It consists of 91 questions within 12 subscales (Clausen et al., 2011). The subscale used in this research is 'drive for thinness', which distinguishes between individuals showing anorexia related symptoms and those who do not show these symptoms. This subscale consists of seven questions that participants responded to using a 6-point-Likert scale ranging from '*always*' to '*never*' (Fernandez & Pritchard, 2012). In this questionnaire the most anorexic response of each question ('*always*' or '*never*') is scored as 3 the ones next to that are scored as 2 and 1, the remaining answers are scored as 0. Thus, question 1 is scored 0-0-0-1-2-3, whereas the questions 2-7 are scored 3-2-1-0-0-0 (Garner et al., 1983). An example question of the 'drive for thinness' subscale is "I am terrified of gaining weight" (Garner et al., 1983). Since the EDI-2 and EDI-3 have the same questions for the 'drive for thinness' subscale the reliability and validity of both versions will be described. Within the EDI-2 the 'drive for thinness' subscale shows an internal reliability of .89 within a nonpatient population (Nevonen et al., 2006). Within the EDI-3 the subscale has an internal reliability score of .91 and an adequate validity in a nonpatient population (Clausen et al., 2011). To examine the drive for thinness score, the sum scores of the items were calculated. In this study, an alpha of .92 was measured.

Procedure

The study was approved by the ethics committee of the BMS faculty at the University of Twente (Requestnr. 210185). The participants filled out the survey online, starting with the informed consent in which they were informed about the aim, risks, privacy regulations, and possibility to withdraw from the study (Appendix B). Additionally, the respondents were provided with the contact details of the researchers. After the participants gave their consent, they were asked to fill out some demographics such as age, gender, and nationality. Then,

general information such as height, weight, and details about their social media consumption, as well as history of mental health issues were investigated. After that, the participants were asked to fill out nine different scales. For this research, only the above-described ORTO-15 and EDI-2 were of importance.

Data Analysis

For the analysis, the database Statistical Packages for the Social Sciences 26 (SPSS) was used. The data analysis started with a descriptive analysis of the participants' demographics. Additionally, the mean scores, standard deviations (SD), and maximum (max) and minimum (min) scores of the ORTO-15, EDI-2, and time spend on Instagram per day were investigated using the DESCRIPTIVES command. The data were inspected for normality on SPSS with the EXAMINE command, special attention was given to the Shapiro-Wilk test and the Q-Q plot. The Shapiro-Wilk test was significant $p < .05$, however, after visual inspection of the data using Q-Q plots, it was seen that the distribution was approximately normal. Additionally, the central limit theorem indicates that in a sample of $n > 30$ data approximates a normal distribution allowing to conduct parametric tests (Kwak & Kim, 2017). In order to calculate whether there is a correlation between the three variables ON, AN and the use of Instagram a Pearson correlation has been performed using the total test scores. The statistical significance level was set at $p < .05$.

Results

In total 26 nationalities were represented in the study. Most of the participants were German (77.5%) or Dutch (10.6%), other nationalities were for example Italian (1.3%), Finnish (.8%), and Latvian (.8%). The demographics of the participants are displayed in Table 1. Within the ORTO-15 69.1% of the participants scored below the cut-off score of 40, indicating orthorexia related tendencies. In total 89% of the participants indicated to use Instagram, whereas 11% indicated not to use it.

Table 1

Demographics of participating students (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				

The mean scores, standard deviation, range, and correlations can be seen in table 2. Regarding H_1 the Pearson's r showed a statistically significant correlation between drive for thinness and the daily length of Instagram use ($r(234) = .24, p < .001$) (Figure 1). For H_2 the Pearson's r test indicated no significant correlation between the score of the ORTO-15 and the time of Instagram use ($r(234) = .01, p > .05$). Additionally, when testing H_3 a significant Pearson correlation was observed between the sum score of the ORTO-15 and drive for thinness ($r(234) = -.36, p < .001$) (Figure 2). The correlations between drive for thinness with the ORTO-15 and Instagram use were as expected based on previous research, therefore, H_1 and H_3 can be accepted. However, the non-significant Pearson correlation between the ORTO-15 and the use of Instagram was not expected, thus H_2 needs to be rejected.

Table 2

Mean, SD, Min, Max, and Pearson Correlations

Scale	Mean	SD	Min	Max	EDI-2	Instagram
ORTO-15	37.55	3.81	27	47	-.36**	.01
Drive for thinness	5.06	5.98	0	20		.24**
Instagram*	51.83	51.88	0	300		

* Time spent on Instagram per day (in minutes)

** p<.001

Figure 1

Scatterplot EDI-2 sum score and time spent on Instagram
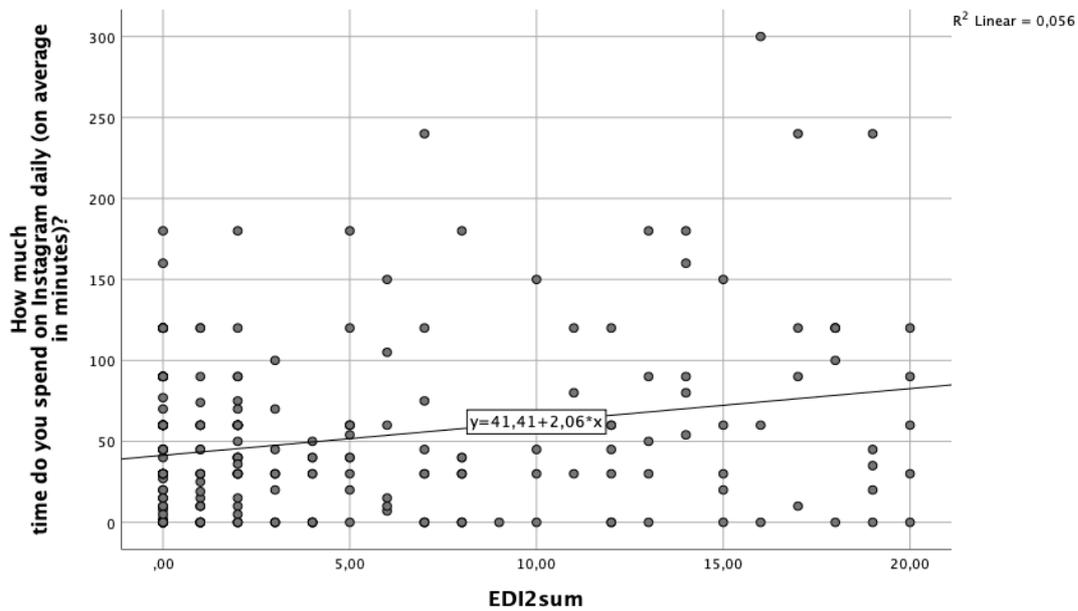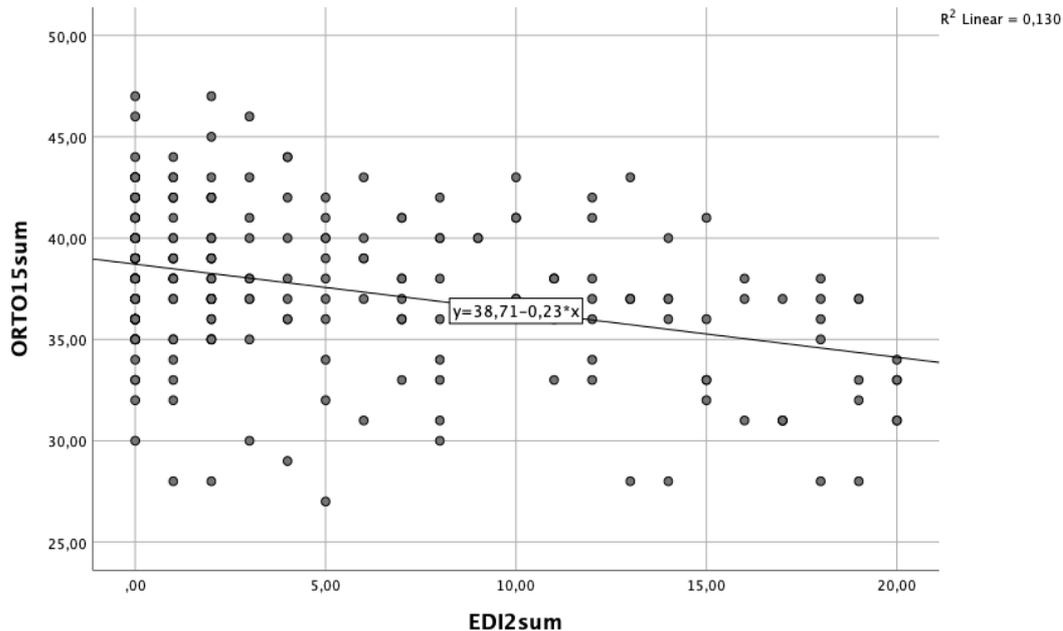

R^2 Linear = 0,056

$y=41,41+2,06*x$

Figure 2

Scatterplot EDI-2 sum score and ORTO-15 sum score

Discussion

The present study aimed to investigate whether the use of Instagram and two mental health conditions are related to each other. Previous research showed that ON may be related to different FEDs, especially several features of AN seemed to be comparable to it (Brytek-Matera et al., 2015; Parra-Fernández et al., 2018; Segura-Garcia et al., 2015). Additionally, the use of Instagram appeared to foster the development of different mental health conditions (Frison & Eggermont, 2017). Especially, Instagram movements like 'thinspiration' or 'fitspiration' were said to increase the risk of developing symptoms of AN or ON (Woodley, 2018). The relatively recent emergence of ON as well as the negative influence of Instagram use on mental health concerns underlined the need for further research in this area.

Since the mental health condition ON cannot yet be merely classified as a FED, further research in this area was needed to make this classification clearer (Koven & Abry, 2015). A number of similarities with AN have been pointed out in previous research. Especially, the preoccupation with food and different dietary restrictions were named as a common characteristic of both ON and AN (Brytek-Matera et al., 2015). It was aimed to get a deeper insight into the relation of ON and the FED AN. The analysis indicated a negative relationship between the ORTO-15 and drive for thinness. This indicated that the lower the individual's scored on the ORTO-15 scale, the higher was their drive for thinness based on

the EDI-2. Since a low score of the ORTO-15 demonstrates high orthorexia related tendencies, it can be concluded that based on these results more ON related tendencies and a higher drive for thinness are related. This finding indicates that there are not only multiple similarities between individuals with AN and those with ON (Brytek-Matera et al., 2015; Parra-Fernández et al., 2018) but that having one condition indeed increases the probability of showing tendencies of the other condition as well. So, there is an overlap between both conditions. Still, since AN and OCD seem to be highly comorbid themselves (Koven & Abry, 2015) a categorization of ON being a part of OCD rather than FED cannot be excluded.

In previous literature, an effect of the use of Instagram and ON was observed (Turner & Lefevre, 2017; Woodley, 2018). In this study, no significant results could be found between ON and the duration of the daily Instagram use, meaning that the time a person spends on Instagram a day does not interact with the level of orthorexia related tendencies. This result was unexpected as most existing literature on the causes of ON underlined that Instagram increases the chance of developing ON (Turner & Lefevre, 2017; Woodley, 2018). Due to its image-based layout it was assumed to increase the personal involvement of users with content creators (Turner & Lefevre, 2017). However, a study by Santarossa et al. (2019) concluded that Instagram does not promote or encourage the development of ON, rather it seemed to be the fact that Instagram communities support each other in the recovery of different FEDs including AN as well as ON. Overall, it seems that there are different results regarding the correlation of ON and the use of Instagram in literature. However, most available literature supports a relationship between ON and Instagram use (Turner & Lefevre, 2017; Woodley, 2018; Douma et al., 2021). Still, this was not supported in the present study.

The relationship between Instagram and AN was another focus of this study. Especially, image-based platforms like Instagram were pointed out in previous research to increase a sense of connectivity with other users of the social media app (Turner & Lefevre, 2017). The theoretical framework of this hypothesis states that due to negative comparisons anorexic symptoms seemed to increase (Turner & Lefevre, 2017). Those comparisons with other users foster the development of body dysmorphia (Wiederhold, 2019). A positive relationship was found between the duration of daily Instagram use and drive for thinness. Thus, it can be said that, in line with the theoretical framework, frequent use of the social media app Instagram is related to a higher exhibition of AN symptoms.

An unexpected result within this research was the fact that AN and Instagram use showed a significant relation whereas ON and Instagram did not show such a relationship. The fact that also ON and AN had a significant correlation within this research underlines the

question of why no correlation for H_2 was found. In other words, this indicates that AN is related to both, ON and Instagram, however, ON and Instagram do not correlate with each other. The reason for this result is not clear as in most of the previous research a relationship of Instagram with both ON and AN was observed (Turner & Lefevre, 2017; Douma et al., 2021; Woodley, 2018). Overall, it is not clear if there is a relation between ON and Instagram when comparing previous studies with the results of this study.

To answer the formulated research question, "To what extent are Orthorexia Nervosa, Anorexia Nervosa, and the use of Instagram related" it can be said that a relation of AN with both ON and the use of Instagram can be observed in the results of the present study. Only ON and Instagram show no correlation with each other, thus as opposed to the expected correlation based on previous literature, there seems to be no interaction between those variables. However, in general, the results of the present study matched the previously described existing literature.

Evaluation of the Study

Overall, it can be said that the study was in general of adequate quality. Especially, the good psychometric properties of the EDI-2 are indicators for this. Not only in other samples it showed to be of good reliability and validity (Nevonen et al., 2006), also, in the present research, a high Cronbach's alpha was identified. Additionally, the high number of participants from 26 different nationalities increases the representativeness of the described results for the target population. This is also confirmed by the demographics of the participants showing great variability in different characteristics like gender, age, and their pursued degree. Furthermore, most results were in line with the results of previous studies.

However, there were also limitations within the study. One limitation that needs to be discussed is the quality of the ORTO-15. The obsessive-compulsive patterns that are connected to ON are not targeted within the ORTO-15, thus it can be said that not all characteristics of the mental health condition are considered (Koven & Abry, 2015). Additionally, since there are no officially formulated diagnostic criteria at the present moment, testing for false positives and false negatives resulting from the questionnaire is impeded (Koven & Abry, 2015). The fact that 69.1% of the participants in this study had a score on the ORTO-15 that classified them as showing orthorexic tendencies supports the point of the probable inaccuracy of the ORTO-15. In comparison, the most common mental health conditions are anxiety disorders affecting about 30% of the adolescents (Merikangas et

al., 2010). Overall, it can be said, that the ORTO-15 needs to be reviewed to improve its quality.

In addition to that, the sampling method used in this study can be seen as another limitation. One sampling method that was used was opportunity sampling, meaning that the researchers contacted people who they thought would be willing to participate. Fogelman and Comber (2002) underlined that opportunity sampling should generally be avoided as sampling method if generalisations are meant to be made. A large extent of the participants also used the software 'SONA-Systems' to complete the survey, they were not recruited using opportunity sampling. Still, an effect of the opportunity sampling on the results cannot be excluded.

Implications for Further Research

To conduct further research the results of this study can be considered, as they provide an overview of the relationships of the variables ON, AN, and time spent on Instagram. The fact that, in contrast to the underlying literature, no relationship between time spent on Instagram and ON was found underlines the importance to test this hypothesis using different measurements. To get a more detailed impression about the impact of ON, a further research opportunity would be to use the Düsseldorf Orthorexia Scale (DOS) instead of the ORTO-15. This is advisable as the DOS has adequate psychometric properties (Cronbach's alpha of .88) (Chard et al., 2019). Also, only 8% of the participants in a study by Chard et al. (2019) exceed the cut-off score when using the DOS which is more realistic when measuring a mental health condition than 69.1% as measured in this study. Changing the measurement instrument of ON might lead to new insights into the underlying characteristics of ON.

Additionally, a longitudinal study of the relationship of ON, AN, and Instagram would give a better idea about the reciprocal influence of these variables. Especially, the development of ON and AN and their influence on each other is of interest as it is underlined in several studies that a history of AN may be a predictor for the development of ON (Parra-Fernández et al., 2018; McComb & Mills, 2019, Segura-Garcia et al., 2015). Supervising individuals over a longer period and measuring AN and ON levels regularly enables researchers to see if there is a causality instead of merely a correlation between the mental health conditions. Moreover, if additional variables are tested, researchers can investigate which other possible characteristics influence the development on ON. This is necessary because there is some disagreement about additional independent variables influencing ON. To name an example, there is no overall consensus if gender can be a cause for ON as

different studies show different results (McComb & Mills, 2019). Overall, this is of special importance because knowing the causes of a condition may facilitate the diagnosis and development of interventions (Kok et al., 2004).

       A third implication for further research can be seen in the connection between AN and Instagram. In general, with more than one billion users it can be said that Instagram is used by many people and that its importance in daily life is raising (We Are Social et al., 2021a), however, only .3% of the individuals develop AN (Hoek, 2006). Thus, it might be the case that the use of Instagram acts more as a moderator of another independent variable. In further research, the interaction effect of daily Instagram usage on other known causes such as sociocultural and family influences (Tozzi et al., 2003) could be investigated. Moreover, it could be tested which features of Instagram have a special influence on AN since then interventions that focus on adequate Instagram usage in those domains can be designed and thus may decrease the number of individuals experiencing this FED.

Conclusion

       Conclusively, it can be said that ON has an impact on the physical, psychological, and social health of those affected by it. This underlines the importance of investigating more information about this rather recently emerged condition. In addition to that, the high number of social media users underlines its importance in the life of modern society. Therefore, it is of special interest to identify potential risk factors associated with it. An increased understanding of the relationship between the social media app Instagram and the development of ON and AN ensures a better understanding of this issue for researchers. It also enables them to develop and implement interventions for those at risk for developing ON and provide good quality treatment for those that show tendencies of this condition. All these points stress the practical relevance of this study as well as the need to perform further research in this area. In all, it can be said that paying attention to one's physical health is important, however, when this behaviour becomes pathological it can be harmful to the individual. Thus, adequate research in this area is of great importance.

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Appendix

Appendix A – Questionnaires
1. General Information (Demographics and Instagram use)

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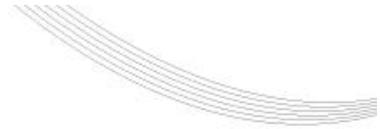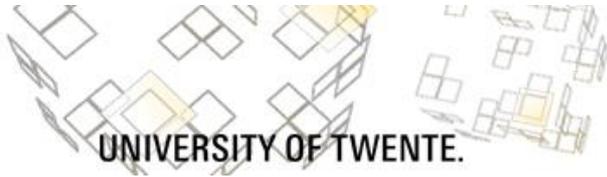
Please indicate your age in numbers.

_____

Please indicate your gender.
- o   Male
- o   Female
- o   Non-binary / third gender
- o   Prefer not to say

Please indicate your current education.
- o   Bachelor
- o   Master
- o   PhD
- o   Hogeschool
- o   Other, namely: _____

Please indicate your nationality.

_____

Please indicate the following measures:
- o   Weight (in kg): _____

- o   Height (in cm): _____

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

Please indicate on which social media platforms you have an account.
- o   Facebook

- o Twitter
- o Instagram
- o Snapchat
- o YouTube
- o None
- o Other, namely: _____

On a scale from 1 to 7, (1= least use) (7= most use), please rank the social media platforms you use the most. In case you do not use social media please select the option "none" as the top rank (1).

1. Facebook
2. Twitter
3. Instagram
4. Snapchat
5. YouTube
6. Other, namely: _____
7. None

[…]

How much time do you spend on Instagram daily (on average in minutes)?

_____

[…]

Please indicate which kind content (i.e. video, posts) you watch on social medi platforms.

- o Food Vlogs (e.g. Food Diary, What I eat in a day, Full week of eating)
- o Recipe videos
- o Recipe posts
- o Food posts (i.e. someone posts his lunch)
- o Videos about physical activity (i.e. exercising)
- o Posts about physical activity (i.e. exercising)
- o Posts about nutrition (i.e. recipes, vitamins)
- o Videos about nutrition (i.e. recipes, vitamins)
- o Dieting videos (i.e. weight loss journey, meal plan)
- o Dieting posts (i.e. meal plan to lose weight)
- o Videos about body image / appearance (i.e. body transformation)
- o Posts about body image / appearance (i.e. body transformation)
- o Videos about health in general
- o Posts about health in general
- o Content (i.e. videos / posts) of nutrition influencer
- o Content (i.e. videos / posts) of fitness influencer
- o None of the above

Have you ever sought psychological or pharmacological treatment for any mental health concerns (e.g. anxiety, depression, eating disorders)? If yes, please mention.

- o Yes: _____

- o No

Have you ever been diagnosed with a mental health condition? If yes, please mention.
- o Yes: _____
- o No

2. ORTO-15

In the next part you will be asked several questions about your eating behaviour.

When eating, do you pay attention to the calories of the food?
- o Always
- o Often
- o Sometimes
- o Never

When you go in a food shop do you feel confused?
- o Always
- o Often
- o Sometimes
- o Never

In the last 3 months, did the thought of food worry you?
- o Always
- o Often
- o Sometimes
- o Never

Are your eating choices conditioned by your worry about your health status?
- o Always
- o Often
- o Sometimes
- o Never

Is the taste of food more important than the quality when you evaluate food?
- o Always
- o Often
- o Sometimes
- o Never

Are you willing to spend more money to have healthier food?
- o Always
- o Often
- o Sometimes
- o Never

Does the thought about food worry you for more than three hours a day?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you allow yourself any eating transgressions?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you think your mood affects your eating behavior?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you think that the conviction to eat only healthy food increases self-esteem?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you think that eating healthy food changes your life-style (frequency of eating out, friends, ...)?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you think that consuming healthy food may improve your appearance?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you feel guilty when transgressing?

- o   Always
- o   Often
- o   Sometimes
- o   Never

Do you think that on the market there is also unhealthy food?

- o   Always
- o   Often
- o   Sometimes
- o   Never

At present, are you alone when having meals?

- o   Always
- o   Often
- o   Sometimes
- o   Never

3. EDI-2

UNIVERSITY OF TWENTE.

In the next part you will be asked several questions about how you perceive yourself and your body.

I eat sweets and carbohydrates without feeling nervous.
- o Always
- o Usually
- o Often
- o Sometimes
- o Rarely
- o Never

I think about dieting.
- o Always
- o Usually
- o Often
- o Sometimes
- o Rarely
- o Never

I feel extremely guilty after overeating.
- o Always
- o Usually
- o Often
- o Sometimes
- o Rarely
- o Never

I am terrified of gaining weight.
- o Always
- o Usually
- o Often
- o Sometimes
- o Rarely
- o Never

I exaggerate or magnify the importance of weight.
- o Always
- o Usually
- o Often
- o Sometimes
- o Rarely
- o Never

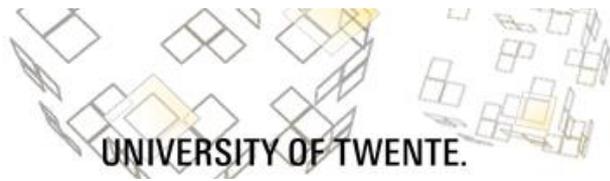I am preoccupied with the desire to be thinner.
- o Always
- o Usually
- o Often

- Sometimes
- Rarely
- Never

If I gain a pound, I worry that I will keep gaining.
- Always
- Usually
- Often
- Sometimes
- Rarely
- Never

Appendix B – Informed Consent

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Information sheet for Participation in a Questionnaire
- The University of Twente -

Description of the questionnaire and your participation
You are invited to participate in a questionnaire conducted by Marie Geise, Adriana Bülter, Svenja Gabriel and Greta Grewe, supervised by Alexandra Ghita and Teuntje Elfrink. The purpose of this questionnaire is to gain insight into your personal experiences with the use of social media in relation to your bodily and mental health. We would like to know more about the relationship between physical activity, nutrition, social media use and health in the life of university students. The questionnaire will last approximately 25 minutes. **The questionnaire will be anonymous so no information can be returned back to your person.**

Risks and discomforts
There are no known risks associated with this questionnaire.

Potential benefits
There are no known benefits to you that would result from your participation in this questionnaire. This questionnaire may help us to gain adequate knowledge to have more insight into today's lifestyle of university students.

Protection of confidentiality
Your identity will not be revealed in any publication resulting from this questionnaire. We will interpret your data and use it to analyze overall results, but your answers are completely anonymous. The data will not be used for any other purpose than for our study.

Voluntary participation
Your participation in this questionnaire is voluntary. You may choose not to participate, and you may withdraw your consent to participate at any time. You will not be penalized in any way, in case you decide not to participate or to withdraw from this questionnaire. You are allowed to withdraw the questionnaire at any time.
Consent Form for Questionnaire about healthy lifestyle

Taking part in the questionnaire
I have read and understood the study information, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.
I consent voluntarily to be a participant in this questionnaire and understand that I can refuse to answer questions and I can withdraw from the questionnaire at any time, without having to give a reason.
I understand that taking part in the study involves interpreting my data anonymous.

Risks associated with participating in the study

I understand that taking part in the study involves no risks.

Use of the information in the study
I understand that information I provide will be used for the study and to gain adequate knowledge by interpreting my results and data.
I understand that personal information collected about me that can identify me, such as [e.g. my age], will not be shared beyond the study team.
I agree that my information can be quoted in research outputs.

Contact information
If you have questions or concerns about this interview, if any problems arise or if you have questions or concerns about your rights as a participant, please contact Greta Grewe (g.grewe@student.utwente.nl), Alexandra Ghita (alexandra.ghita@utwente.nl), or Teuntje Elfrink (t.r.elfrink@utwente.nl) at the University of Twente.
I have accurately read out the information sheet and agree to participate voluntarily in this questionnaire.

- o Yes
- o No