

# Developmental pathway of orthorexia nervosa: Factors contributing to progression from healthy eating to excessive preoccupation with healthy eating. Experiences of Dutch health professionals

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## ABSTRACT

Orthorexia nervosa (ON) has in recent years attracted attention, but the scarcity of empirical research on the matter generates uncertainty about its progression. This study aims to gain insight into the developmental pathway of ON and factors contributing to it, to establish its etiology. In order to gain insights into health professionals' experience with patients that they identified as suffering from ON, this study adopted mixed methods, with a sequential exploratory design: first, semi-structured interviews ( $n = 10$ ) were conducted; following, a questionnaire ( $n = 101$ ) was administered online. Nutritionists, psychologists, psychotherapists, and support workers with experience in treating eating disorders in the Netherlands were the study's target group. Results shed light on environmental factors influencing the development of ON (e.g. pseudoscientific nutritional experts on social media), baseline risks (e.g. high level of education), initiating events (e.g. experiencing a break up), symptoms (e.g. feelings of depression and anxiety), diagnosis and type of treatment administered (e.g. cognitive-behavioral therapy). The current study is unique in its use of health professionals' experiential knowledge to assess how ON develops and who typically develops it. Furthermore, it contributes to the sparse literature on potential ways to treat ON. More top-down investigations into health professionals' experiences are encouraged as the literature on ON thickens.

## 1. Introduction

Healthy eating is an important protective factor for a considerable amount of diseases, mainly non-communicable ones (World Health Organization, 2020). Therefore, over the past decades, governments of many states have joined their efforts to encourage healthy eating (Barnhill et al., 2014). One of the consequences of this is that, in recent years, healthy eating has increasingly developed as a social trend (McCartney, 2016). According to Google Trends, the number of searches for the terms 'how to eat healthy' has nearly tripled in the last sixteen years (Google, 2018). Although this phenomenon in itself can have positive implications for tackling such problems as obesity (Shugart, 2016), it can also lead to problems when these ideas are taken too far. One of the possible consequences of the rise in popularity of the healthy eating trend among various populations is the risk of developing a problematic preoccupation with the perceived quality of food (McCartney, 2016).

In recent years, increasing amount of attention has been given to this

preoccupation, most notably by Bratman, 1997 who coined the term orthorexia nervosa (ON). The main characteristics of this phenomenon are: spending an excessive amount of time thinking about, looking for and preparing food; feeling superior to those with different eating habits; rigidly following a particular health food diet; engaging in compensatory restrictions to make up for dietary indiscretions; associating self-esteem with adherence to the diet; and turning eating 'properly' into the central focus of life (Bratman, 1997; Brytek-Matera et al., 2015; Gleaves et al., 2013). An important distinction that separates ON from established eating disorders, such as anorexia nervosa (AN) and bulimia nervosa (BN) is the fact that preoccupation is not linked to the food quantity or weight loss, but rather to the perceived quality of foods consumed (Andreas et al., 2018).

Currently, ON is in a grey area, as there is no consensus about its diagnostic attribution, clear definition, or diagnostic criteria, which results in a lack of inclusion of ON in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (Allison & Lundgren, 2017). However, regardless of the official status of ON, it appears to be a relatively

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widespread phenomenon in Western countries (Agopyan et al., 2018; Clifford & Blyth, 2018; Grammatikopoulou et al., 2018; Lopes et al., 2018; Reynolds, 2018) and has also been recognized by health professionals (Syurina et al., 2018; Vandereycken, 2011), although its prevalence is often assessed using inaccurate diagnostic tools (Valente et al., 2019).

The research into ON up to now has been quite fragmented and has concentrated mainly on the diagnostic criteria, tools, and general prevalence of the eating pattern (Barthels et al., 2015; Brytek-Matera, 2012; Dunn & Bratman, 2016; Moroze et al., 2015). Although the scope of the studies published about ON has been quite limited (Missbach, Dunn & Konig 2017), it paved the way for our bio-psycho-social understanding of ON, in that it showed that ON has biological, psychological, and social roots. For example, ON has been shown to be associated with, among others, executive dysfunction (i.e. *bio*) (Koven & Senbonmatsu, 2013); emotion dysregulation, perfectionism, appearance orientation, overweight preoccupation, and dismissing attachment style (i.e. *psycho*) (Barnes & Caltabiano, 2017; Vuillier et al., 2020); and Instagram use, thinness and muscular internalization, media pressure, and Western culture (i.e. *social*) (Syurina et al., 2018; Tóth-Király et al., 2019; Turner & Lefevre, 2017).

In addition, it has been discussed that ON-related behavior develops over time. More specifically, there seem to be two broad stages that lead to the development of ON-related behavior: the first being a relatively harmless choice to pursue a healthy diet, and the second being an unhealthy obsession evolving from this aim (Bratman, 2017). Only the second stage is indicative of pathology, although when irrational or strange dietary ideas are present in the first stage, this is sometimes erroneously labelled as disordered eating (Bratman, 2017). The scarcity of broad-scale empirical research leads to uncertainty about the progression of ON.

Understanding how ON progresses over time could be helpful in advancing our knowledge on diagnostic criteria and tools, as well as on the classification of ON. Furthermore, it is important to investigate the

development of ON in order to explore its etiology. The aim of this study was therefore to gain insight into the developmental pathway of ON-related behavior (e.g. baseline risks, initiating events, manifestation of symptoms, diagnosis, and treatment) and factors contributing to it (e.g. bio-psycho-social and environmental determinants), by recording and analyzing information regarding patients identified by health professionals as potentially fitting the ON criteria. The research question of this study is: *How does ON typically develop, and what factors contribute to the development, according to health professionals?*

## 2. Methods

The present study was conducted using a sequential exploratory mixed-methods design. The data collection consisted of semi-structured interviews and an online questionnaire. Data collection and analysis were facilitated by a conceptual framework resulting from the combination of the network theory of mental disorders by Borsboom (2017), the growing into deficit model by Syurina et al. (2015), and the dynamic biopsychosocial model of health by Lehman et al. (2017).

### 2.1. Conceptual framework

The conceptual framework (Fig. 1) visualizes how a psychological illness develops in a person, starting from the presence of inactive symptoms (predisposition) that over time develop into active symptoms, triggered by initiating events and effects of the environment, until enough symptoms are present to constitute a disease. Additionally, it demonstrates the progression of a disorder from tolerable to intolerable, and informs on what forms of treatment may be appropriate in each phase.

The model is based on the network theory of mental disorders by Borsboom (2017), the growing into deficit model by Syurina et al. (2015), and the dynamic biopsychosocial model of health by Lehman et al. (2017).

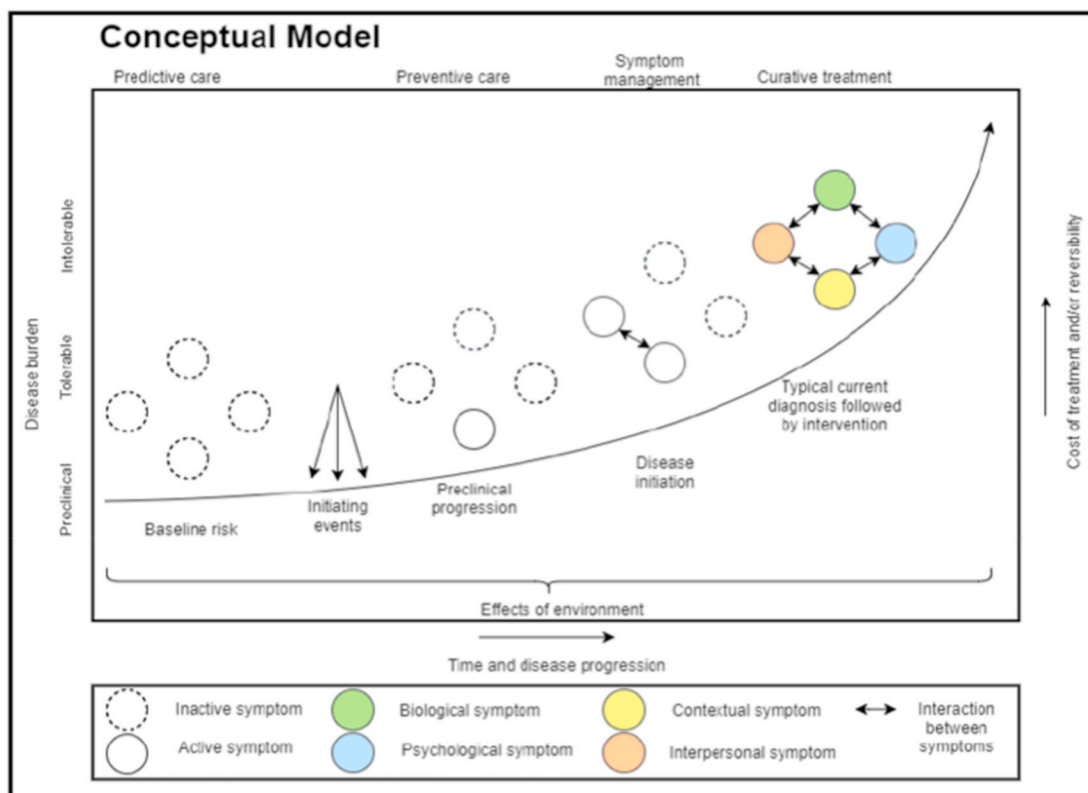


Fig. 1. Conceptual framework (adapted from: Syurina et al. (2015), Lehman et al. (2017), and Borsboom (2017)).

The network theory of psychopathology (Borsboom, 2017) displays the etiology of mental disorders as a process of spreading activation in a symptom network. This theory states that a triggering event (e.g. cancer in family) may activate a symptom (e.g. desire to improve own health), which influences the likelihood that a related symptom (e.g. increased interest in healthy foods) will develop as well. Mental disorders are then the result of groups of coupled symptoms, that become self-sustaining clusters as the symptoms continuously reinforce each other. Matching ON with this theory is deemed appropriate, as matching EDs with the network theory seems reasonable as well (Borsboom, 2017).

The network theory overlaps with the adapted Snyderman's curve (Syurina, 2013) representing growing into deficit and developing common complex diseases, though this curve additionally demonstrates the progression from tolerable to intolerable, and thus informs on what form of treatment is appropriate for each phase.

Lastly, the dynamic biopsychosocial model of health (Lehman et al., 2017) is useful in classifying symptoms of ON and understanding the interconnectedness of the symptoms. The model envisions a person's health, or lack thereof, as a combination of the reciprocal influences of biological, psychological, interpersonal and contextual dynamics that develop and change over time. Biological influences are all processes within the body that may affect a person's health, such as the immune system. Psychological influences are all brain-regulated processes that affect a person's health, namely cognitive, emotional, motivational, attitudinal, and behavioral processes. Interpersonal influences encompass all effects of social contacts on an individual. These may be direct contact with another, such as parental contact, or the effect of the actions of others, such as peer pressure. Contextual factors include all influences that affect the biological, psychological and interpersonal processes, such as shared culture, norms, policies and values (Lehman et al., 2017).

The integrated model guided the construction of the interview guide and the questionnaire. Furthermore, it was kept in mind during data analysis. Overall, it provided a general structure to our investigation into the developmental pathway of ON and contributing bio-psycho-social factors.

## 2.2. Interviews

Interviews were held with health professionals practicing in the Netherlands who had experience with treating a patient with ON symptoms. To assess whether they had experience with treating such a patient, they were given an explanation of what ON entailed and asked whether they recognized any of their former patients in this. They were recruited via email, phone and/or social media. The interviews were semi-structured and guided by a visual supplement and a written interview guide. The interviews focused on four sub-topics: general description of the (former) patient(s) with ON symptomatology, discussion of the patient's history, description of the patient at the time of diagnosis, and a review of the selected course of treatment and its results. During the discussion of each stage, attention was given to biological, psychological, interpersonal, and contextual factors that played a role in patients' life and could potentially contribute to development of ON eating patterns. The visual interview guide supplement consisted of three stick figures that represented the development of ON symptoms over time, reflecting the conceptual model in a simplified manner. The first stick figure represented the patient before the symptoms were present (baseline risk); the second, the patient in whom several symptoms had started developing (preclinical progression and disease initiation); and, the third, the patient once they were deemed to suffer from orthorexia (typical current diagnosis followed by intervention). Apart from the symptoms developing in the different phases, the interviews focused on effects of the environment, initiating events and form of treatment used. The interviews were conducted and coded in Dutch. Quotes have been translated to English for publication purposes.

### 2.2.1. Data analysis

Interviews were manually transcribed and coded using Atlas.ti 8. Thematic analysis (Braun et al., 2016, pp. 191–205) and axial coding were employed to help identify themes in the timeline of ON. The conceptual model was used to guide the coding process and sort the themes into the different aspects of the model, namely effects of the environment, baseline risk and symptoms. During the coding, two other themes, namely diagnosis and treatment were deduced and will be reported on in this article.

## 2.3. Survey

The survey participants were health professionals practicing in the Netherlands, with experience in treating eating disorders. Participants were recruited through email, social media and through newsletters of various organizations for health professionals. With regard to the absence of ON as an official diagnosis, it was difficult to recruit professionals who encountered patients suffering from ON. Therefore, we also included professionals who had experience with treating people with disordered eating habits in general, as we considered their opinion to still be of value to understand ON's developmental pathway. Because of the anonymous nature of the questionnaire, it was impossible to assess whether all interviewees also completed the questionnaire. The survey was conducted in Dutch. The variables have been translated into English in the results section for publication purposes.

### 2.3.1. Questionnaire design

The online survey was created using the Qualtrics programme. The survey was developed on the basis of the framework, and using main themes raised by the first five interviews. Thus, included a section on effects of the environment (e.g. 'To what extent have relationship problems contributed to this persons development of ON symptoms?'), baseline risk (e.g. 'How would you describe this person's self-confidence?'), symptoms (e.g. 'How would you describe this persons need for control?') and treatment methods (e.g. 'What form of treatment would you apply or have you applied on this person?' and 'How effective would you say this treatment was?'). Diagnosis was not further inquired into as not all participants had treated a person with ON. The respondents could indicate on a five- or three-point Likert scale whether they thought aspects of the development of ON that were proposed by the interviewees were indeed present. In addition, demographics of the participants were collected. As some health professionals might not have treated someone with ON symptoms, information was given about diagnostic criteria (Dunn & Bratman, 2016) to help them form their opinion.

### 2.3.2. Data analysis

The survey data was analyzed using StataC 15. Demographics of the participants were reviewed using descriptive statistics. Furthermore, to assess whether there were differences between characteristics or symptoms of orthorexia before and after the onset of orthorexia, a paired sampled *t*-test was performed ( $\alpha < 0.05$ ). Inconsistencies that arose from the interviewees were resolved using the results of the questionnaire. Additionally, the responses to the Likert scales that measured to which extent survey respondents agreed with the initiating events, baseline risks and symptoms that were extracted from interviews aided in determining whether there was enough support for these aspects to be part of the developmental pathway of ON.

## 2.4. Ethical considerations

Owing to the characteristics of the study population and the type of data collected, the study was exempted from a compulsory medical ethical approval procedure in accordance with Dutch law: Wet Medisch-Wetenschappelijk Onderzoek met Mensen. To ensure a high ethical standard of the study, the researchers followed the prescriptions of the Dutch Scientific Code of conduct through all stages of data collection

and analysis. Written informed consent was obtained from all participants.

### 3. Results

Qualitative and quantitative results were interpreted and analyzed according to the conceptual framework (Fig. 1). To guide the reader, the sub-headings of the results section correspond to (some of) the phases reported along the curve: (1) effect of the environment, (2) baseline risks, (3) initiating events, (4) symptoms, and (5) typical current diagnosis followed by intervention. In every section, qualitative and quantitative results are presented together. This demonstrates how they complement and strengthen each other.

#### 3.1. Demographics

##### 3.1.1. Qualitative sample

Ten health professionals (27–60 y/o) were interviewed: eight women and two men. Among them were nutritionists, a nutritionist/therapist, a psychologist, a nutritional psychologist, a pediatrician, a professor specialized in eating disorders and a support worker with personal experience of working at an eating-disorder treatment facility. Most health professionals could think of a few patients that had shown symptoms of ON, whereas some, mostly nutritionists, could think of many.

##### 3.1.2. Quantitative sample

One hundred and one participants took part in the survey during the two months it was online. The majority of the sample were women (96.5%) and the most highly represented profession was nutritionist (55%), followed by psychologist (17%), support worker with personal experience (5%), psychotherapist (2%), and 'other' (21%). Professions that were indicated through the 'other' option included nurse, personal trainer, combination of nutritionist and psychotherapist, clinical psychologist, psychosocial counsellor, and a nutritional psychologist. With regard to their clinical activity, 25% of respondents had been clinically active for less than five years, 25% between five and 10 years, 28% between 10 and 20 years, and 20% for more than 20 years. Finally, 64% of the sample declared having had a previous experience with treating (symptoms of) ON.

#### 3.2. Developmental pathway of orthorexia nervosa

##### 3.2.1. Effect of the environment

Environmental factors include macro-level influences that affect the individual's health. Examples of environmental factors that might influence health are policies, cultural norms and trends, or social habits and practices. A prominent environmental factor influencing ON was the presence of excessively healthy or unhealthy eating habits in the direct environment (mentioned in five interviews):

*"I think the origin lies with her family, as they were all extraordinarily focused on being healthy."* – Nutritionist/therapist

*Interviewer:* You mentioned that her mother suffers from obesity, do you think that had an influence on the daughter? *"Yes, unconsciously. Because the girl had a healthy BMI before, but I think [her mother's obesity] did play a role [in her developing an eating disorder]."* – Nutritionist/psychologist

Social and mainstream media, together with pseudoscientific nutritional 'experts', were mentioned as other environmental factors affecting ON:

*"Because the media tells you that sugar is bad, the media tells you that carbs are bad – that diet is booming, which is just scary. Movie stars will even tell you that gluten is bad for you ... [Online nutritional 'experts']"*

*say it as though they have the qualifications to say it, my work only consists of explaining people about food, because people have lost the plot when it comes to food."* – Nutritionist

The environmental factors influencing ON mentioned during the interviews were confirmed by the survey results. In fact, survey participants agreed in considering social and mainstream media, and pseudoscientific nutritional experts, as influencing ON. Nevertheless, the inconclusiveness of the interview results regarding both healthy and unhealthy eating habits in the direct environment is not explained by the results of the survey, as only the influence of healthy eating habits was examined.

##### 3.2.2. Baseline risks

To explore baseline risks for individuals to possibly develop ON, interviewees were asked to identify what characterized the patients they encountered. For a complete overview of all baseline risks that were gathered from the interviews and survey, please refer to Table 1. In all cases, the patient was a young (16–35 y/o) woman who was educated to an intermediate or high level. Having an active lifestyle and an ambitious personality type were both prominent characteristics (both mentioned in six interviews). Some health professionals elaborated upon the ambitious personality type, mentioning perfectionism and giving high importance to school or work (mentioned in three and two interviews, respectively). In the case of body weight, health professionals contradicted each other. Four mentioned that their patient had always had a healthy weight, whereas three mentioned that their patients were overweight. Contrasting opinions about self-confidence were observed too: three women were said to have a high degree of self-confidence, whereas four were said to have a low level of self-confidence:

*"She also felt like she couldn't do a lot of things right, and that she was never good enough. But if she was fit, really strong, then she would feel good."* – Support worker with personal experience

Respondents also disagreed about the patient's social life. Three interviewees encountered a patient with an active social life, whereas the other three mentioned their patients did not have many friends:

*"She limited herself with respect to her social life, because she just didn't think she was fun, she really thought she was too fat as well."* – Nutritionist/psychologist

The results obtained from the questionnaire confirmed the findings of the interviews. Furthermore, they clarified some of the inconclusive results obtained from the qualitative phase: with regard to self-confidence, survey respondents favored the low self-confidence option (74%), and with regard to body weight, low or normal weight was most often selected as a characteristic of patients (92%). Similar to the interviews, results of the survey are inconclusive when it comes to good contact with friends and colleagues/fellow students.

##### 3.2.3. Initiating events

Initiating events were relatively difficult to identify for interviewees. Having recently experienced a break-up or divorce, experiencing family problems and not having a good relationship with one's family were mentioned as triggers for the development of ON. Other triggering events included difficulties arising from other mental illnesses, namely depression and autism (mentioned in one and two interviews, respectively):

*"She has also been diagnosed with an autistic disorder ... and because of that she has always been a picky eater."* – Nutritional psychologist

Other possible initiating events included the physical and psychological changes that accompany puberty, looking up increasing information about food and taking up an interest in a flexitarian, vegetarian or vegan diet. Finally, two specific triggers related to bodily issues were

**Table 1**  
Baseline risks and symptoms of ON according to Dutch health professionals.

Constant – Response of health professionals (in %)				Total N
Gender	F: 83	M:7	Neutral: 10	101
	<i>High</i>	<i>Middle</i>	<i>Low</i>	
Intelligence	70	27	2	99
Age	0	28	72	101

Baseline risks - Response of health professionals (in %)				Symptoms - Response of health professionals (in %)				Total N	
<i>Biological</i>	<i>High</i>	<i>Neutral</i>	<i>Low</i>		<i>High</i>	<i>Neutral</i>	<i>Low</i>		
* Weight	8	45	47	62	Weight	2	32	66	100
Physical Activity	71	21	8	62	Physical Activity	84	14	3	37
Tiredness	60	23	8	57	Tiredness	62	23	7	92
* Intake of food	8	34	55	60	Intake of food	3	19	77	99
* Feelings of dizziness	19	29	15	39	Feelings of dizziness	25	29	13	67
<i>Psychological</i>	<i>High</i>	<i>Neutral</i>	<i>Low</i>		<i>High</i>	<i>Neutral</i>	<i>Low</i>		
* Self-confidence	3	21	74	61	Self-confidence	5	23	71	96
Urge for control	82	11	3	60	Urge for control	92	4	4	100
* Feelings of depression	29	45	15	55	Feelings of depression	47	36	4	87
Feelings of anxiety	70	25	3	36	Feelings of anxiety	74	15	7	86
Emotional stability	8	45	44	60	Emotional stability	9	36	52	97
Ability to express emotions	5	39	47	56	Ability to express emotions	7	39	46	92
* Sensitivity to stress	76	16	3	59	Sensitivity to stress	81	12	3	97
* Worrying	81	6	2	55	Worrying	100	0	0	35
Ability to concentrate	13	58	15	53	Ability to concentrate	19	45	21	85
	Agree	Neutral	Disagree			Agree	Neutral	Disagree	
<i>Social</i>									
* Good contact with friends	40	32	19	57	Good contact with friends	44	33	16	93
Good contact with colleagues/ fellow students	40	29	21	56	Good contact with colleagues/ fellow students	40	31	16	87
Feelings of loneliness	54	28	5	50	Feelings of loneliness	55	18	9	82

Note: some rows do not add up to a 100% as some respondents selected the 'I don't know' option.

identified. First, one health professional described a patient who had suffered from extreme stomach aches for which a nutritionist recommended her to eat more healthily. The patient took the advice to eat more healthily, but this triggered the development of symptoms of ON. Second, a patient had an abdominoplasty surgery scheduled, which triggered her to eat more healthily to ensure the operation would be as effective as possible:

*“From the moment that the surgery was planned, she thought ‘now I am going to change my diet, because then the surgery will have the most rewarding effect’ and that is when the downward spiral started.”* – Support worker with personal experience

The triggers mentioned during the interviews were confirmed by the survey results. Despite identifying possible initiating events, it is important to note that most health professionals expressed the view that they could not be certain of what had triggered or been a contributing factor to the development of ON symptoms.

**3.2.4. Symptoms**

Because the interviewees deemed it difficult to determine which symptoms presented themselves before or after the onset of ON, baseline risks and symptoms were investigated concurrently. The statistical analysis that followed allowed for the differentiation between baseline risks and symptoms (Table 1): if the paired samples t-test did not show a significant difference between a characteristic before and after the development of ON, this was considered a baseline risk. If there was a significant difference, this was considered a possible symptom and is marked with an asterisk in Table 1.

When reporting the symptoms of their patients, interviewees had the opportunity to expand on their description. A more detailed account of the symptoms is reported below. The symptoms described overlapped considerably, and can be divided into biological, psychological and social symptoms. Many of the biological symptoms reported by health professionals can be considered “physical manifestations”, rather than actual clinically assessed biological symptoms. To maintain consistency

with the study framework, however, such physical manifestations will be referred to as “biological symptoms” in the following sections.

**3.2.4.1. Biological symptoms.** Low food intake was a characteristic that all the interviewees observed in their patients. The patients differed slightly in what food they considered healthy: the patients’ diets were most commonly low in fat and low in sugar (both mentioned in four interviews), low in carbohydrates and vegetarian or vegan (both mentioned in three interviews) and in one case, the patient’s diet was low in gluten. Another prominent symptom was (severe) weight loss (mentioned in nine interviews), which half the women realized, but did not consider a problem. As a result of this weight loss, some patients experienced dizziness (mentioned in two interviews), became more preoccupied with food (mentioned in five interviews) and half of them stopped menstruating. As a consequence of the low food intake, many women experienced nutritional deficiencies and felt tired (mentioned in six and five interviews, respectively). The seven women who had previously an active lifestyle before developing symptoms continued with working out, although for most it became more of an obsession:

*“She went running six times a week, because if she was really stressed, then running was her way of coping. And on top of that she also went to the gym.”* – Support worker with personal experience

**3.2.4.2. Psychological symptoms.** Psychologically, the patients differed in how well they felt. In four cases, the patients still felt relatively well:

*“Mentally they can be doing really well, because [healthy eating] is a kind of power for them.”* – Nutritionist

However, more than half of the women did not feel well mentally, experiencing feelings of depression and anxiety, predominantly regarding food (mentioned in five and seven interviews respectively):

*“At one point I suggested having low-fat quark instead of non-fat quark for lunch. In that moment she just froze, I could just see it in her body posture and her eyes. It was just pure panic.”* – Nutritionist/therapist

One health professional mentioned that anxiety may also be connected to catastrophic thinking:

*“I’m thinking of catastrophic expectations, for example, if they don’t adhere to this eating pattern then they are convinced they will get cancer or something like that.”* – Professor specialized in eating disorders

**3.2.4.3. Social symptoms.** Most health professionals recognized that the patients’ behavior had an impact on their social life. As spare time was mostly spent on exercising, preparing or shopping for food (mentioned in seven and three interviews, respectively), half of the women spent less time socializing with friends. According to some health professionals, the patients would be less likely to attend social events, because these often include eating:

*“She stopped having dinner with other people, because if she did, she couldn’t control what she would have for dinner.”* – Nutritionist/psychologist

If healthy eating was a theme in their social environment, however, social activities did not necessarily decline.

Triangulation of the interview results with the survey results demonstrates overlap. The inconclusiveness regarding the mental state of patient was not further investigated, as feeling mentally well was not an option in the survey. However, the inconclusiveness regarding whether social activities were diminished or not was resolved, since according to survey respondents contact with others did not decline (70%) (Table 1).

### 3.2.5. Diagnosis followed by intervention

With regard to diagnosis, most health professionals were hesitant to diagnose their patient or refrained from diagnosing altogether. Only four health professionals gave diagnoses, namely (restrictive) AN (in 2 cases), an eating disorder without further specification or OCD:

*“I personally think it was more of an obsessive-compulsive disorder, in that she really tried to be in control through maintaining those restrictions, control over food and with that hopefully also control over the rest of her life.”* – Nutritionist

The health professionals provided extensive information on the treatment. Therefore, within this section, the following subsections address: (1) reasons to seek treatment, (2) factors influencing treatment, (3) types and effectiveness of treatments administered.

**3.2.5.1. Reasons to seek treatment.** Most commonly, the patients would seek help because of people in their direct environment being worried (mentioned in nine interviews):

*“She did realize that [she had a problem] and she did say that it was not so much a problem for her, but if we thought it important that she then would not mind gaining a little more weight.”* – Pediatrician

Other incentives to seek help (each mentioned in one interview), were bodily discomfort, wanting to recover for the sake of family/children, wanting to solve issues caused by disordered eating in a relationship with a partner, being worried about gaining weight after having lost it and lastly mental discomfort.

**3.2.5.2. Factors influencing treatment.** Parents were mentioned during three interviews as having a large influence on the effectiveness of the treatment. If parents were supportive and coaching towards their child during the course of the treatment, this was said to have a positive effect on the child (mentioned in two interviews). Conversely, if parents doubted their children, or showed little support, this had a negative

effect on the outcome of the treatment:

*“[Her mother] made the awkward move of saying that she did not believe [the treatment] would succeed in that way. This basically gave her daughter a free pass to fail and not get better.”* – Pediatrician

Furthermore, avoiding the use of some terms such as ‘eating disorder’ and ‘gaining weight’ positively influenced treatment for some patients.

**3.2.5.3. Types and effectiveness of treatments administered.** Relatively common types of treatment mentioned by health professionals included cognitive-behavioral therapy (CBT), exposure therapy and group therapy (mentioned in three, two and two interviews, respectively). Forms of treatment that were administered in only one case included seeing a GP to test blood levels, family therapy, home guidance, pediatric help, social therapy, psychiatric treatment and admission to an eating disorder clinic.

The most prominent aspect of treatment was restoring the weight of a patient (mentioned in eight interviews). Apart from health benefits, a reduction in the preoccupation with food was a motive for many health professionals to emphasize weight restoration (mentioned in three interviews). In three cases this was accomplished by educating patients on the psychological importance of proper nutrition:

*“Look, when you eat very little and you start eating a little more, even if it’s just more nutrient-rich, then mentally you will relatively quickly feel a lot better.”* – Nutritionist/therapist

Furthermore, building motivation was a relatively common aspect of treatment (mentioned in five interviews):

*“The moment that [people with symptoms of orthorexia] have to start changing things and tackling things, they need to know why they’re really doing it. Because only when you have a very clear motivation for yourself, then it’s worth it to keep going.”* – Nutritionist/psychologist

As not all treatments had been concluded or as some patients had been referred to a different health professional, the effectiveness of treatment was often uncertain. Two patients were still in treatment, one of whom showed signs of improvement due to having been admitted to an eating disorder clinic. Three patients were referred, of which two had been in treatment with a nutritionist to increase their food intake. The other patient had had a combination of CBT, group therapy, nutritional advice and motivation building. What can be said with certainty is that weight restoration was effective in three cases. CBT, exposure therapy, and family therapy were all effective in separate cases. Group therapy (combined with admission to an eating disorder clinic), was effective in at least one case.

Attitudes towards the different treatment types was hard to establish since opinions differed greatly among patients and several types of treatment were mentioned, meaning the number of women treated in a similar way was small. However, it was mentioned that treatment is often difficult, due to the pervasive nature of ON.

*“Her sense of identity was related to eating healthily, because that is something that she is good at, and thus she found it difficult to let that go [during admission].”* – Psychologist

Similar to what was observed among the interviewees, many different options for treatment were given in the survey. Education on the psychological importance of food was deemed most appropriate by many survey respondents, followed by group therapy and altering food intake (see Fig. 2).

## 4. Discussion

This mixed-methods study was aimed at gaining insight into the developmental pathway of ON and contributing factors, by recording

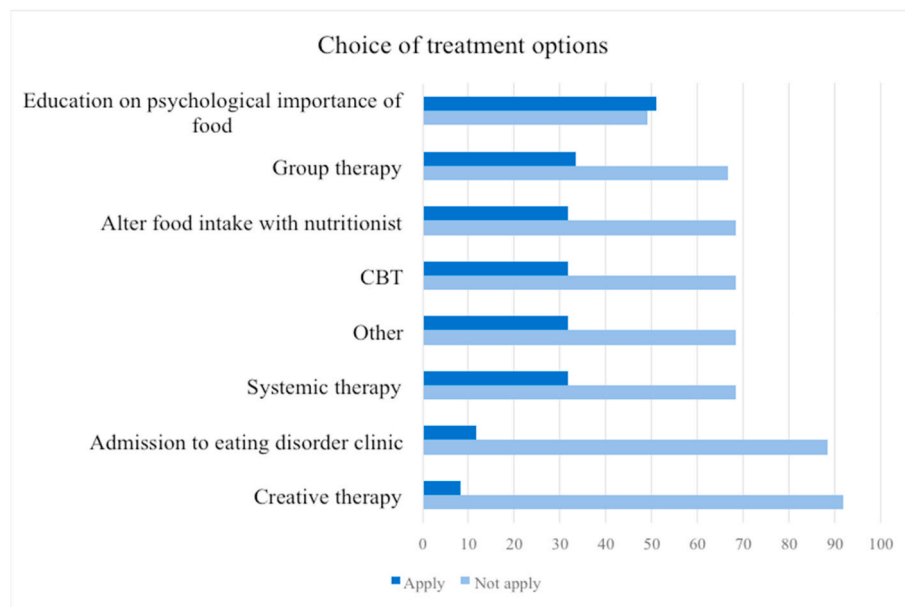


Fig. 2. Overview of treatment options for ON identified by questionnaire respondents.

and analyzing information regarding patients identified by health professionals as potentially suffering from ON. The results were collected through interviews and validated by a questionnaire.

Results shed light on environmental factors influencing the development of ON (e.g. pseudoscientific nutritional experts on social media), baseline risks (e.g. high level of education), initiating events (e.g. experiencing a break up), symptoms (e.g. feelings of depression and anxiety), diagnosis and type of treatment administered (e.g. cognitive-behavioral therapy).

Although previous studies have used the experience of health professionals to study the clinical recognition of ON (Ryman, Cesuroglu, Bood, & Syurina, 2019; Reynolds & McMahon, 2019; Vandereycken et al., 2011) and the cultural phenomena believed to be associated with ON (Syurina et al., 2018), the current study is unique in its use of health professionals' experience to assess how ON develops and who typically develops it. Furthermore, it contributes to the sparse literature on potential ways to treat ON.

Bratman identified two stages of ON, the first being a relatively innocent stage where one chooses to eat a healthy diet – corresponding to the 'preclinical progression' in the model we propose; the second stage involving an unhealthy pursuit of the previously adopted ideals of healthy eating – corresponding to the 'disease initiation' stage of the model we propose here (Bratman, 2017). However, the proposed model adds more depth to what comes before and after these stages. We believe this developmental conceptualization of ON may inform future development of phase-dependent diagnostic tools for ON. Furthermore, this model makes it possible to locate this study in scholarly discussions about the development of a mental disorder and provide structure to something that is highly complex in nature, that is the interaction of factors responsible for the onset and progression of a psychopathology.

The findings of the present study are mainly in agreement with and complement those of the literature review undertaken by McComb and Mills (2019). This review reports inconclusive findings regarding the association between age, sex, educational level and ON (McComb & Mills, 2019). In this regard, professionals in our study agreed in considering young age, female and high level of education as baseline risks for ON. Among the risk factors for ON found by McComb and Mills, perfectionism and use of social media were confirmed by the present study.

In the present study, health professionals reported weight loss as a symptom rather than a motivation to engage in ON-like behavior. This

finding underscores the inconclusive evidence regarding ON and weight loss that characterizes the current literature about ON (Depa et al., 2019; McComb & Mills, 2019; Valente et al., 2020), and underlines the great need for future research on this aspect. Two other inconsistencies were found in this study. First, health professionals described patients who typically develop ON as both having an active social life and not having an active social life. The second is that patients were said to both come from an environment where health was a priority and from an environment where health was not a priority. As both can logically instill a desire to develop a healthy lifestyle, this inconsistency is logical but provides an interesting direction for further research.

As a further recommendation for future research we suggest that additional factors that have been correlated with ON through literature reviews (see for example: McComb & Mills, 2019) are also explored with health professionals. The current research took a bottom-up approach where topics put forward by health professionals were further examined. As the literature on ON thickens, this allows for more top-down investigation.

Lastly, we identify some strengths and limitations. The most important strengths are: (i) the use of mixed methods, which allowed us to both benefit from validity and generalizability of quantitative techniques, and from the depth of qualitative techniques, thus overcoming the limits that would have occurred if only one of the two techniques had been used; (ii) the involvement of professionals' experiential knowledge and expertise in exploring the developmental pathway of ON, knowledge that is considered important (Hoffmann et al., 2007) and that has not been used in past research on the subject; (iii) the use of a theoretical framework in guiding data collection and analysis, which assisted in contextualizing formal theories in the study, ultimately helping situating it within broader scholarly discussions (Adom et al., 2018). The main limitations are: (i) the fact that the questionnaire was disseminated after having conducted five out of ten interviews, which prevented the questionnaire from addressing all the controversial issues that emerged during the interviews; (ii) the relatively limited size of both qualitative and quantitative samples; (iii) our focus on one specific cultural niche, which on the one hand hinders generalizability, but on the other can be used as a starting point for other similar studies elsewhere, and (iv) the fact that not all health professionals who participated in the questionnaire had encountered a patient with ON. With regard to this last limitation, we acknowledge that it is possible that some professionals commented on their experience with patients

suffering from other eating disorders than ON. One of the measures taken to ensure the validity of results, however, was to present the professionals with a general description of ON (i.e. diagnostic criteria from Dunn and Bratman (2016)), so that everyone could recall any patients who have suffered from this (or a similar) symptomatology, or at least enabled everyone to answer the questions with the same phenomenon in mind. It is worth saying, in conclusion, that we believe that professionals in contact with patients suffering from eating disorders on a daily basis have such experiential knowledge in the field that they can provide valuable information about ON, even without having met an actual patient with ON. Therefore, we believe that, although some professionals who participated in the questionnaire had no direct experience with ON, they contributed significantly to obtaining meaningful results in this study.

#### 4.1. Clinical relevance

This section contains some reflections on how the results of this study can be useful for clinical practice. This is intended to stimulate reflections on how scientific results can be translated into practice and how this can facilitate prevention and treatment of ON. The result of this study that is perhaps most useful for clinical purposes is its contribution to the early recognition of ON symptomatology. Early recognition of the symptoms makes it possible to act more promptly with treatment, thus increasing the chances that the patient will recover.

A critical reflection, which could inform the development of therapeutic interventions, concerns the role of identity. It is now well established that identity plays a fundamental role in maintenance of and recovery from eating disorders (Stockford et al., 2019). It is possible that identity plays also a role in ON, and that identity evolves along the developmental pathway of ON, together with its progression. To support this hypothesis is the egosyntonic nature of ON symptoms (Koven & Abry, 2015). Considering identity in the treatment of ON (e.g. Identity Intervention Program (Stein et al., 2013)) could therefore be beneficial.

Also beneficial for clinical and therapeutic practice is understanding whether the two phases of ON, i.e. 'healthy orthorexia' and 'orthorexia nervosa', might be two stages characterizing the progression of one single phenomenon (Bratman, 2017), or two distinct phenomena (Barrada & Roncero, 2018). If the former conceptualization is true, then recovery should focus on reversing ON to its initial stage; if the latter is true, then recovery should focus on turning 'orthorexia nervosa' into 'healthy orthorexia'. Since our results seem to be mainly in line with Bratman's conceptualization of the development of ON, we would encourage therapeutic practice to establish a backward path that guides the patient to find the initial healthy approach to healthy eating.

#### 4.2. Conclusion

To conclude, our results show that ON has a developmental pathway and so does not appear suddenly. Its development can be interpreted as a continuous interaction of biological, psychological, and social dynamics over time. This way of displaying the development of ON helped health professionals identify symptoms, triggers, and possible treatments, information that can contribute to further research on ON and inform clinical practice.

#### Author contributions

First author, ERD, set up the research protocol, executed both interviews and survey, analyzed data and wrote the final manuscript.

Second author, MV, contributed in organizing and structuring results and collaborated in writing the final manuscript.

Third author, EVS, contributed to the conceptualization of the study, and supervised the development of the research protocol and data collection.

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#### Ethical statement

Owing to the characteristics of the study population and the type of data collected, the study was exempted from a compulsory medical ethical approval procedure in accordance with Dutch law: Wet Medisch-Wetenschappelijk Onderzoek met Mensen. To ensure a high ethical standard of the study, the researchers followed the prescriptions of the Dutch Scientific Code of conduct through all stages of data collection and analysis. Written informed consent was obtained from all participants.

#### Declaration of competing interest

None.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2020.105008>.

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