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General

Engagement With Clean-Eating Hashtags, Orthorexia Nervosa, and the Sense of Self on Instagram a Mixed Methods Study

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This mixed methods study, which was conducted in partial fulfilment of a Professional Doctorate in Counselling Psychology, aims to explore the relationship between those who self-identify as having orthorexia nervosa (ON) and their engagement with clean-eating hashtags, as well as any impact on their sense of self. The quantitative component (n = 104) aims to explore the relationship between Instagram's clean-eating hashtags and ON symptoms. The qualitative component (n = 8) aims to understand how individuals experienced their sense of self whilst using Instagram. A correlation between higher engagement with Instagram clean-eating hashtags and ON symptoms was found. Respondents described the negative impact of Instagram on their sense of self (self-worth and self-esteem) and engaging in behaviours and cognitive processes to help regulate their sense of self-worth through Instagram. A sense of meaning and purpose was attributed to their ON and Instagram usage and a recognition of repeating negative cycles which have a detrimental impact on their sense of self. Most participants found their ON distressing but feared and resisted change, preferring to disengage from certain Instagram behaviours. The findings of the study suggest the widening of the application of CBT-E and MBT within the field of ON as suitable clinical approaches.

Highlights

- At the time of writing, no research has addressed quantitatively how those who self-identify as having ON engage with or are engaged by Instagram's clean-eating hashtags nor how individuals who self-identify with ON experience their sense of self whilst using Instagram.
- The development of the questionnaire I-HES to understand engagement with Instagram hashtags.
- The primary quantitative finding was that individuals who engage with clean-eating hashtags on Instagram demonstrate higher levels of orthorexic behaviours.
- An important qualitative finding was the cycle of negative self-belief, self-esteem, and self-worth, and linking this to CBT-E and MBT.
- Mentalization based Treatment for Eating Disorders and Transdiagnostic CBT-E seem to be applicable to treating ON.

1. Introduction

Orthorexia nervosa (ON) is characterised as an obsessional preoccupation with healthy eating, resulting in a restrictive diet, ritualised patterns of eating and rigid avoidance of 'unhealthy' foods (Moroze et al., 2015). Consuming healthy food is a highly desirable health behaviour, but when an individual begins to excessively obsess over their eating, give up their everyday lifestyle and experiences impairments, such as social and occupational, it becomes pathological (Brytek-Matera, 2012). Individuals with ON, may experience nutrition deficiency, weight loss and other physical and medical complications (Barthels et al., 2015b; Dunn & Bratman, 2016), exaggerated emotional distress about food choices perceived as unhealthy (Dunn & Bratman, 2016), and a sense of superiority over others (Donini et al., 2004). Individuals with ON experience neurocognitive deficits similar to those seen in patients with anorexia nervosa (AN) and obsessive-compulsive disorder (OCD), including impairments in executive functioning and working memory (Koven & Abry, 2015). Despite the implications of ON, it has received minimal empirical research (Koven & Abry, 2015), although this trend is changing due to increasing prevalence rates (Brytek-Matera et al., 2020; McComb & Mills, 2019; Yilmaz & Dundar, 2022).

Perhaps due to the minimal empirical research, ON is not currently recognised by the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) and International Classification of Diseases, 11th Revision (ICD-11) as either an independent disorder or as a subsection of an existing disorder (Düdükçü et al., 2022). Although there has been some recognition that ON and OCD share similar symptoms, such as frequent intrusive thoughts (Pontillo et al., 2022), recent research concludes it shares symptoms more closely related to eating disorders (EDs) rather than OCD (Bartel et al., 2020; Zagaria et al., 2022). To better understand ON and its relationship to pre-existing disorders, Zagaria et al. (2022), conducted a systematic review and meta-analysis of 36 studies and concluded that ON and ED

symptoms are more closely related. Currently recognised EDs share several component symptoms such as weight/shape concerns, dietary restriction and binge eating/compensatory behaviours (Segura-Garcia et al., 2015). However, the main difference between ON and these eating disorders is that less emphasis is placed on weight/shape concerns and more emphasis on an almost obsessive need to eat a 'clean' and 'healthy' diet, to the detriment of their social life, physical and mental health (Bratman, 1997; Bratman & Knight, 2000).

'Sense of self', a concept encompassing self-esteem, self-worth, and self-perception, is closely associated with and believed to be an underlying factor in understanding AN and BN (Bardone-Cone et al., 2020). As the research on ON is demonstrating that it is more closely aligned to EDs, it can be reasonably posited that sense of self has an impact on the development and maintenance of ON. However, given the limited research on the sense of self, as relates to ON, this article explores possible transferable studies for parallels between ON, AN, and BN.

A further impact of the limited empirical research and understanding of ON, is a gap in the psychological understanding of development and maintenance factors. This research, whilst conducted through the frameworks of healthism and social comparison, as well as that of eating disorders, uses the psychological theories of cognitive behavioural theory and psychoanalytic schools of thought, such as self-psychology (Kohut, 1971), object-relations theory (Fairbairn, 1954; Klein, 1932; Winnicott, 1960), and more contemporary psychodynamic theory regarding attachment (Tasca & Balfour, 2014).

This study can help provide a better understanding of the characteristics of ON, and how to help those that display symptoms. Recommendations of how to work with individuals presenting with ON using Transdiagnostic CBT-E (Z. Cooper & Fairburn, 2011; Fairburn et al., 2003; Fairburn, 2008), and MBT will be discussed in below in clinical implications.

1.1. Sense of Self and ON

The subject of sense of self is highly complex and unresolved, although academic research and theoretical development continues to better define a sense of self in the context of ill health and mental distress (Williams et al., 2016). Broadly a sense of self includes self-esteem, self-perception, ego deficits (Bers et al., 2004), and self-worth (Fairburn et al., 1999), all of which are found to some degree in individuals with disordered eating. Research has investigated the relationship between self-esteem and ON, but limited research has included the individual's personal sense of self. Each concept will be further explained below and transferrable studies to EDs highlighted.

Bratman & Knight (2000) posit ON allows an individual to create an identity around their food. The restraint, the self-praise for success and the self-condemnation for lapses all accumulate to form the individual's opinion of themselves and how they view their worth to others. Greville-Harris et al. (2020) discussed the negative and positive impact on self-esteem when individuals with ON compare themselves to others on Instagram. This comparison is bi-directional; downward toward those they negatively judge and thus feel superior to, or upward toward those they feel inferior to. McComb & Mills (2019), in their comprehensive systematic review of 54 studies, identified and discussed 22 possible risk factors of ON, and reported that studies have found no relationship between self-esteem and ON. However, subsequent research has found an association between low self-esteem and ON (Bóna et al., 2021; Brytek-Matera et al., 2022; Greville-Harris et al., 2020), and Yilmaz & Dundar (2022) found a high self-esteem in those with ON due to their strict adherence to their diet.

Similarly, generalised feelings of shame have been linked to negative self-beliefs in research conducted on AN and BN (Goss & Gilbert, 2002), leading to higher levels of worthlessness, inferiority and sense of failure, impacting how individuals think about eating, shape and weight (M. J. Cooper et al., 1998). It is noted in the ON proposed diagnostic criteria that feelings of anxiety and shame are experienced when a dietary deviation occurs (Bratman & Knight, 2000; Moroze et al., 2015), which resonates with feelings experienced in those with AN and BN. Goss & Gilbert (2002) posited that those with eating disorders who experience shame might be vulnerable to adverse social outcomes, such as rejection, causing them to attempt to alter their body appearance. Shame has been linked to negative self-belief in research conducted on AN and BN, which may lead to higher levels of worthlessness, inferiority and sense of failure, impacting their beliefs on eating, shape and weight. Gann's (2019) research discussed the amount of shame a woman experiences about her body is a predictor of ON behaviours, which was applied more broadly by Nechita et al. (2021), who linked body shame with eating disorders. Individuals with EDs (Lenzo et al., 2020) and ON (Costanzo et al., 2022) demonstrate involuntary defence mechanisms to protect their self-esteem and ego.

It is relevant to consider non-pathological or healthy narcissism, which is linked to ED and described as feelings of exaggerated self-importance, craving for admiration and empathy deficits which are often connected to a sense of low self-esteem (Bardone-Cone et al., 2020).

Williams et al.'s (2016) study found that individuals with AN felt their self had been taken over by and enmeshed with AN, saying "the eating disorder seemed to give them a self-image, a persona, and it was an identity over which they had control" (p. 221). Reindl (2002) described an element of self-perception for those with BN, arguing that individuals may not be able to imagine who they would be without their eating disorder and thus fiercely protect the symptoms that have become part of this self-concept.

Similarly, ON allows an individual to create an identity around their food (Bratman & Knight, 2000), providing an understanding and an image of themselves. In *Health Food Junkies,* Bratman & Knight (2000) describe the "fall from grace" (p. 9) when an individual with orthorexic tendencies eats a type of food believed to be forbidden. The restraint, the self-praise for success and the self-condemnation for lapses all accumulate to form the individual's opinion of themselves and how they view their worth to others. In-

dividuals with EDs typically display resistance to changing their sense of identity (DeBois & Chatfield, 2021), which requires courage (Bowlby et al., 2015; McNamara & Parsons, 2016) as it involves re-evaluating their beliefs, values, and changing eating patterns (Abbate-Daga et al., 2013).

1.2. ON and Social Media

A recent systematic review of ON risk factors identified social media (McComb & Mills, 2019), and linked Instagram to a possible increase in ON symptoms, propelled in part by the echo chamber effect and social comparison (Turner & Lefevre, 2017). Instagram is a significantly powerful force in social media, with 1.4 billion users worldwide (Dixson, 2024), and a growing body of research has found that those with ON tendencies are particularly active (Greville-Harris et al., 2020; Hanganu-Bresch, 2019; Lanitis, 2020; Santarossa et al., 2019; Valente et al., 2020, 2022; Zemlyanskaya et al., 2022). This review focuses on Instagram and addresses the rise of healthism, the echo chamber effect and social comparison theory.

Healthism, first coined by Crawford (1995) reflects a social construction of health (Håman et al., 2015), where an individual is responsible for their own health and thus omits factors such as socioeconomic status, genetic, environmental and work-related factors (Hanganu-Bresch, 2020). Therefore, if an individual becomes unwell, it is due to their neglect. Spence et al. (2016) believes healthism is being accelerated by social media, particularly Instagram. This is supported by the research, which is detailed below.

Chung et al. (2017) demonstrated that users often turn to Instagram for support networks, particularly health and nutritional advice, and engage with hashtags, such as #cleaneating (Riesmeyer et al., 2019) with over 47.3 million posts as of 12 June 2025. Users can engage with content without inputting hashtags through the constantly evolving curation algorithm (Fouquaert & Mechant, 2021) by following, liking, saving, commenting and searching for content on Instagram, thereby receiving related hashtags on their feed page (Instagram, 2022).

Turner & Lefevre (2017), using the ORTO-15 (Donini et al., 2004), found the more an individual used Instagram, the stronger their orthorexic symptoms, a result confirmed by Lanitis (2020). Developed by Donini et al. (2004), the ORTO-15 is a self-report diagnostic tool to measure orthorexic behaviours and thoughts using a 15-item, Likert 4- dimension scale (always, often, sometimes, never). Some examples of questions are 'Are you willing to spend more money to have healthier food?', 'Do you think your mood affects your eating behavior?', 'Do you think that the conviction to eat only healthy food increases self-esteem?'. This measure will be further discussed in 2.1, Quantitative Design, as this was one of the three quantitative tools utilised in this study. Cinquegrani & Brown's (2018) study of online bloggers who posted about ON social media, discussed the individual's description of their experiential process and how they became caught up in the pursuit of a healthy lifestyle on social media forums. Santarossa et al. (2019) who investigated conversations, images, and biographical descriptions of posters on Instagram who used #orthorexia, found a small and supportive community focused on ED recovery. Gann (2019) found that the time spent on the quantity of posting activity did not impact symptoms of ON, but time spent on social media did increase body shame, which was positively correlated to an increase in ON tendencies. Greville-Harris et al. (2020) continued the investigation of already published bloggers' experiences of ON on social media, finding that individuals initially searched the Internet for a healthy diet and lifestyle information before becoming influenced by social comparison and unhealthy eating patterns. In a mixed methods study, Valente et al. (2020) explored the personal experience of those who shared about ON, identifying three phases; onset, progression and seeking help. Valente et al. (2020) explained that there were two potential onset routes responsible for triggering ON; contextual factors like being exposed to Western sociocultural standards of thinness and health which are linked to happiness and success, as well as biopsychosocial factors such as a combination of perfectionism, anxiety and a major life event. Progression of ON symptoms was discussed in terms of the impact upon their psychological, social and most importantly physical wellbeing. Finally, the respondents discussed the third phase, seeking help. This was where the respondents realised that there was a problem, whether physical, psychological, social or a combination of all three, and took action to recover. Interestingly, social media was identified as not only a catalyst in onset and progression, but also as a tool to recover. This confirms the results of previous studies.

The echo chamber effect (Salathé & Khandelwal, 2011) states that individuals perceive their values and worldviews to be more common than they are due to interacting with similarly minded people. By selectively viewing similarly minded Instagram posts and blogs, Turner & Lefevre (2017) believe this effect explains why ON and Instagram are positively correlated. They investigated the relationship between social media and ON, finding that higher Instagram use was associated with greater ON symptoms. This, they hypothesise, may be due to users selectively exposing themselves to the content they wish to be exposed to, leading them to believe the behaviour is more prevalent or normal than it is. This perception of reality may lead to social pressure to conform to these behaviours.

Instagram has become a space where health food bloggers who market themselves as 'experts' or 'wellness gurus' promote healthy diets and lifestyle advice. Many do so without qualifications, making their advice available to those at risk of developing ON as it has been argued that exposure to clean eating messages may increase the likelihood of an individual becoming obsessed with food (Allen et al., 2018). However, the cause and/or effect is unclear as to whether orthorexic tendencies in individuals are heightened by their exposure to the blogs. The authors could not determine whether the participants viewing the clean-eating posts already had high levels of orthorexic behaviours and were seeking out the platforms to justify their behaviours. This finding was corroborated by Valente et al. (2022) and Zemlyanskaya et al. (2022), who both used mixed methods to research the #orthorexia community on

Instagram, the latter from a specific Russian-speaking population, aimed to understand who shares #orthorexia content, what type of content they share, and why. Both found that participants felt Instagram was partially responsible for the development of ON but also reported that the participants felt the platform helped raise awareness and recognition of ON.

Health food blog writers may have eating disorders or a history thereof and often emphasise appearance, thin appearance ideals, and disordered messages about food/nutrition (Boepple & Thompson, 2014). In an analysis of health food bloggers, Lynch (2010) found there tended to be an obsession with food planning and immense guilt if the food consumed was not healthy. Through Lynch's descriptions, these behavioural patterns support the view that the bloggers felt that their happiness/healthiness was tied to their healthy diet and that they received accolades from their fellow bloggers to detox if unhealthy food was consumed. This supports the ideal of healthism put forward with social influence on Instagram, influencing and promoting disordered eating patterns by normalising the idea that detoxing, restricting and eliminating foods is healthy and normal, supporting the Social Comparison Theory (Festinger, 1954).

Social Comparison Theory (Festinger, 1954) argues that individuals compare themselves to those in their social settings to self-evaluate their abilities and opinions. This was later expanded to include the setting and achieving of goals and the bi-directional nature of comparing upwards towards those they admire and feel inferior to, or downwards towards those they feel superior to (Yang, 2016). Social comparison has been reported by several studies to be present in those with ON who use Instagram (Greville-Harris et al., 2020; Turner & Lefevre, 2017). Additionally, social comparison is higher in those who seek external validation (Crocker & Park, 2004; Stapleton et al., 2017), and when combined with sociocultural pressures to appear a certain way, has been correlated with disordered eating patterns (Corning et al., 2006; Stormer & Thompson, 1996).

By combining the Social Comparison Theory, the echo chamber effect and mixing it with the societal view of the body and the moral obligations that surround one's body, it may be posited that Instagram has a significant impact on an individual's view of themselves, their eating and thus potentially influencing orthorexic behaviours. However, to be better able to help explain the psychological development and maintenance factors of ON, theories of cognitive behavioural theory, object relations theory and mentalisation have been drawn upon.

1.3. Psychotherapeutic theories

Currently, there is limited literature discussing the link between ON and existing theories of eating disorders. Therefore, this section references current psychological theories proposed for recognised eating disorders and draws parallels, using the criteria of ON.

1.3.1. Cognitive theories

According to the Transdiagnostic Cognitive-Behavioural Theory for EDs (CBT-E; Z. Cooper & Fairburn, 2011; Fairburn, 2008; Fairburn et al., 2003), a dysfunctional system for evaluating self-worth underpins the development and maintenance of EDs. The authors argue that an individual's self-worth is made up of their ability to control and be perfect in their eating habits, weight, and shape, avoiding core shame beliefs, and thereby maintaining the ED. Additionally, the negative-belief cycle individuals experience may act as a development and maintenance factor (Fairburn, 2008), resulting in negative self-appraisals and reinforcement of low self-worth and self-esteem (Sapuppo et al., 2018). Koven & Abry (2015) posited that Cognitive Behavioural Therapy (CBT) provided by an experienced therapist, combined with medication and psychoeducation, could be a successful intervention for ON. Relatedly, Yung & Tabri (2022) argue that Transdiagnostic CBT-E could be a successful intervention for those with ON, believing that perfectionism maintains the over importance placed on appearance in AN and BN, and should be expanded to include health in those with ON.

1.3.2 Psychoanalytic theories

Psychoanalytic schools of thought, including traditional Freudian theory (Freud, 1917), object-relations theory (Fairbairn, 1954; Klein, 1932; Winnicott, 1960) and self-psychology (Kohut, 1971), have examined disordered eating through the lens of unconscious motivation, intrapsychic conflict and interpersonal difficulties with an emphasis on the impact of earlier experiences on self and affect regulation. Contemporary psychodynamic theory emphasises the importance of interpersonal factors and the attachment system in formulating maladaptive eating patterns, with a focus on reflective functioning and mentalization deficits (Tasca, 2016). Tasca and Balfour (2014) for example, provide a contemporary model that conceptualises disordered eating as a consequence of biological predispositions to body weight and vulnerability to social pressures to be thin. Individual vulnerabilities are theorised to be rooted in unmet attachment needs which produce negative affect. Symptoms are then viewed as subsequent maladaptive defences. There exists considerable research evidence linking mentalization difficulties to disordered eating, with non-mentalizing modes (especially in relation to body weight and shape), as the dominant mental activity (Bateman et al., 2023). The Mentalization Based Treatment model views the symptoms of eating disorders as attempted solutions to underlying problems of social (self-)regulation. According to Bateman et al (2023) at the core of eating disorders is a social dysfunction consequent to exposure to adverse social interactions, compounded by affect dysregulation undermined by biological factors and increased levels of stress, and the disorganization of attachment relationships. Controlling one's eating habits is a method of handling emotional and social developmental milestones that the individual views as overwhelming and insuperable. Individuals suffering from eating disorders are trapped in a state of

non-mentalizing modes, limited self-awareness and understanding of their own body (Bateman et al., 2023). The dominance of the teleological non-mentalizing mode in patients with eating disorders is theorised by indications that physical action is viewed as the only way to alter or manage their mental states. The over-importance of physical appearance is, in itself teleological, motivating the individual to engage in behaviours that constitute symptoms of AN and BN. Somatic modifications like changes in body weight and shape occur in the physical domain and are observable, therefore directly affecting mental states. The illusion that the mind can be controlled through controlling the body is a core belief in AN according to the MBT model (Bateman et al., 2023) and possibly prevalent in ON too.

1.4. The Present Study

Existing research continues to identify and debate ON's construct definition as to whether it is a new eating disorder, a subsection of an existing ED, or belongs in the obsessive-compulsive spectrum (Zagaria et al., 2022). The criteria of ON also remains unresolved, with Setnick (2013), Barthels et al. (2015b), Moroze et al. (2015) and Dunn & Bratman (2016) attempting to define and propose diagnostic criteria. It has been widely accepted that two key features, namely, an obsessive preoccupation with healthy food believed to positively impact well-being and secondly the resultant clinical distress and impairment, should be included in any further proposed diagnostic criteria (Cena et al., 2019). The absence of these diagnostic criteria has impacted the development of diagnostic measures and hindered studies aimed at understanding prevalence rates and risk factors. This lack of clarity contributes to ON not being recognised by the DSM and ICD (Valente et al., 2019).

Instagram has been linked with increasing ON symptoms (Turner & Lefevre, 2017), although this was disputed by Gann (2019). A growing body of research has found that those with ON tendencies are particularly active on this social media platform (Gann, 2019; Greville-Harris et al., 2020; Lanitis, 2020; Santarossa et al., 2019; Valente et al., 2020, 2022; Zemlyanskaya et al., 2022). Valente et al. (2022) and Zemlyanskaya et al. (2022) have found that Instagram is a platform on which those with ON form a community, supporting each other in their recovery from ON. Bearing in mind the curation algorithm (Fouquaert & Mechant, 2021), users engage with hashtags, whether they initiate the hashtag or not. A user merely has to post, like, follow or search to be the recipient of numerous related hashtags, which is one of the ways Instagram organises its content.

At the time of writing, no research has addressed quantitatively how those who self-identify as having ON engage with or are engaged by Instagram's clean-eating hashtags nor how individuals who self-identify with ON experience their sense of self whilst using Instagram. This research aims to understand whether a relationship exists between ON and Instagram by posing the following two questions:

- Research Question 1: What is the relationship between Orthorexia Nervosa symptoms and using clean eating hashtags on Instagram? (quantitative)
- Research Question 2: How do individuals who identify with orthorexic behavioural patterns experience their sense of self whilst using Instagram? (qualitative)

2. Methods

2.1. Quantitative Analysis

2.1.1. Quantitative Design - Questionnaires

In parallel with the development of diagnostic criteria, diagnostic tools that identify, record and report prevalence rates are being developed for ON. One of the most widely used measures in research on ON has been the ORTO-15 (Majoch et al., 2023). In the literature, the validity and reliability remain in question due to a lack of validation, no standardisation of the methods, and the inconsistently high prevalence rates of 30% to 70%, compared to other eating disorders of an estimated 2-7.7% in the general population (Dunn & Bratman, 2016; Galmiche et al., 2019; Roncero et al., 2017; Smink et al., 2012). McComb & Mills (2019) have identified a limitation in ORTO-15, suggesting the high prevalence rates identify non-clinical healthy eating, particularly in groups such as athletes (Clifford & Blyth, 2019), doctors (Bağcı Bosi et al., 2007; Fidan et al., 2010), dieticians (Asil & Sürücüoğlu, 2015; Tremelling et al., 2017) and yoga practitioners (Herranz Valera et al., 2014). To further validate ORTO-15, Missbach et al. (2015) suggest omitting 40% of the questions. Some researchers have suggested that the diagnostic threshold be reduced from 40-points to 35-points (Almeida et al., 2018; Ramacciotti et al., 2011; Segura-Garcia et al., 2015), resulting in a mediocre validity and reliability with Cronbach's alpha = 0.67 (Ramacciotti et al., 2011) and thus lowering the prevalence rates (Almeida et al., 2018). Recently, a revised version, the ORTO-R, was developed to try and reduce the problems identified with the ORTO-15. However, it remains unvalidated and could be considered in the future (Rogoza & Donini, 2021). Despite these criticisms, the ORTO-15 continues to be used in research, as other measures, such as the Dusseldorf Orthorexia Scale (DOS; Barthels et al., 2015a), the Braxton Orthorexia Test (BOT; Bratman & Knight, 2000), and the Eating Habits Questionnaire (EHQ; Gleaves et al., 2013) all have similar recognised limitations by researchers (Majoch et al., 2023).

The frequency scale questionnaire, which for ease of reference will be referred to as the Instagram Hashtag Engagement Scale (I-HES), was designed to collect initial data on Instagram engagement with hashtags of those who self-identify as having ON (Appendix A). As no validated measures were available for the data collection required for this study, and no similar studies have been conducted, the frequency scale questionnaire was developed during the lead author's Professional Doctorate and based on the engagement with Instagram's clean-eating content, which is organised partly by hashtags. The questionnaire needed content validity, which is crucial when developing a new instrument (Taherdoost, 2016). Content validity is the degree to which the items on the questionnaire are relevant to and

represent the intended construct (Haynes et al., 1995). Following the necessary steps to ensure content validity, the research began with an exhaustive literature review, which determined what the items on the questionnaire should be. Through supervision and review by psychology professionals, the measure was judged to what extent the items represented the facets of engagement with Instagram clean-eating hashtags; a recommended necessary step in ensuring content validity (Delgado-Rico et al., 2012; Mastaglia et al., 2003). Once receiving their feedback on whether the items were relevant to and represented the engagement of clean-eating hashtags on Instagram, the questionnaire was finalised, and recruitment began. Below is a description of the scales that formed the administered questionnaires:

1. *ORTO-15*: a self-report questionnaire, was used to assess orthorexic symptoms. A 15-item, multiple-choice questionnaire using closed multiple choice answers (always, often, sometimes, never). A score between one and four is awarded for each question and totalled up, with a lower score indicating higher orthorexic symptoms. Although the authors recommend a 40-point cut-off (Donini et al., 2005), more recent research suggests a 35-point cut-off to mitigate the possibility of false-positive scores (Almeida et al., 2018; Ramacciotti et al., 2011; Segura-Garcia et al., 2015). A 35-point cut-off was used in this research.
2. *I-HES:* A seven-item, five-point frequency scale using closed multiple choice answers. A score between one and five is awarded for each question and totalled up. Each question refers to engagement described by current literature on ON and Instagram. The questionnaire is split into two parts. Part A is comprised of five questions with a choice of answering and awarded score: never (a score of 1), <once a month (a score of 2), <once a week (a score of 3), once a week (a score of 4), >once a week (a score of 5). With a maximum score of 25, the higher the score, the more engaged the participant is. This section aims to understand how often the participant engages with the clean-eating content. Based on Turner & Lefevre's (2017) conclusions regarding Instagram's selective photo sharing capability as relates to ON and Santarossa et al.'s (2019) finding that images shared with #orthorexia were 68% food, question one refers to how often the individual posts pictures or stories about food. Questions two and three ask about clean-eating hashtags to understand how those who self-identify as having ON consciously search for and engage with the clean-eating hashtag content on Instagram. Questions four and five aim to establish the engagement and frequency related to giving and receiving advice. These were based on two studies. Chung et al. (2017) reported that individuals who engage with Instagram for healthy eating participate in a community of like-minded individuals. Additionally, Valente et al. (2020) found that individuals with ON engaged with information and advice on nutrition on Instagram, which they felt propelled their symptoms. Part B is comprised of two questions with a choice of answers: 0, <5, 6-10, 11-15, 16>. '0' receives a score of 1 and each answer is sequentially scored, with '16>' receiving a score of 5. This section seeks to establish the number of accounts the individual follows, as this influences their engagement, Instagram feed and exposure to the clean-eating echo chamber effect. The highest total score for this section is 10, meaning the individual follows more accounts. Questions can be seen in Appendix A.
3. *Demographics and personal information*: Demographic information, including age, ethnicity, student status, the range of body weight (below normal, normal, above normal), and range of fitness (below normal, normal, above normal) they consider themselves to be. Additionally, the participants are asked if they have ever tried to lose weight.

2.1.2. Cronbach's Alpha

As the frequency scale was created for this study, a Cronbach's Coefficient Alpha to test internal consistency was calculated, utilising the data of 104 participants recruited for this study. This test, the most widely used measure of reliability (Trizano-Hermosilla & Alvarado, 2016), is important to conduct as a measure cannot be valid unless it is reliable (Tavakol & Dennick, 2011). Part A of the scale, comprised of questions one through five, was run through the analysis and Part B of the scale was run in a separate test. Interpreting reliability estimates followed recommendations by Pallant (2020). Cronbach's coefficient alpha was calculated using IBM SPSS Statistics (Version 28). Pallant (2020) noted that a high alpha is difficult if the scale has less than 10 items. Thus, an alpha above .5 is considered good. Part A of the scale demonstrated good reliability (α _= .74). According to Briggs & Cheek (1986), the inter-item correlation can serve as a guide for item homogeneity in a unidimensional scale (Piedmont & Hyland, 1993). 48

Optimal levels of homogeneity occur when the correlation is between the range .2 to .4. The inter-item correlation for Part A is .32, demonstrating good unidimensionality. Part B had good reliability (α _= .62), and the inter-item correlation was .45, demonstrating good unidimensionality.

2.1.3. Quantitative Analysis

2.1.3.1 Correlation. Once the Cronbach's alpha demonstrated good unidimensionality, a correlation was run to establish whether an association between participants' ORTO-15 score, and their Instagram clean-eating hashtags engagement existed. Data from the questionnaires were input into SPSS, and a check was performed to assess assumptions of normality/bias. As normality tests are sensitive to sample sizes and small samples often pass normality tests, visual checking (histogram graph and QQ plot) was combined with a Shapiro-Wilk test of normality. The ORTO-15 score implied the data was not significantly different from normal distribution, so an assumption of normality was made. However, the I-HES scores were different from normal distribution; thus, there was a lack of evidence

to accept the null hypothesis. Therefore, a Spearman r two-tailed test was conducted.

2.1.3.2 ANOVA. The participants provided data regarding their self-perceived levels of fitness and body weight relative to their perceived view of themselves against what they considered 'normal'. In both these questions, the participants could answer, 'below the normal range, 'within the normal range', 'above the normal range'. To determine whether there is a statistical difference between the three answers within each question, an ANOVA was run. Data from the questionnaires was input into SPSS, and a Levene's test was run to assess for equality of variance (Carroll & Schneider, 1985). The score for body weight was not significant, $F(2,96) = .022$, $p = .98$). The score for fitness levels was not significant, $F(2,93) = .105$, $p = .90$. Given that $p > 0.05$ in both 49 tests, the variables do not violate the homogeneity of variance assumptions required for ANOVA (Nordstokke et al., 2011) and ANOVA tests were run.

2.2. Qualitative Analysis

2.2.1. Qualitative Design – Interviews

To understand the participant's experiences and perspectives about their ON and Instagram, the interviews were conducted using a semi-structured format. This method allowed participants to enter into a dialogue and for the researcher to adapt or probe responses of interest (Smith & Osborn, 2015). Given the topic's sensitivity for the participant, the research was conducted on a one-to-one basis, lasted approximately one hour, and was aligned with Elliott et al.'s (1999) guidelines to protect the quality of the study. An interview schedule (Appendix B) consisted of four questions. These were 'what is your history of ON?', 'what has been your experience of using Instagram?', 'Can you tell me about how you are being affected by what you see and engage with on Instagram?', 'How do you make sense of your sense of self on Instagram?'. These questions allowed the participants to share their experience with ON and how they believe their sense of self is influenced whilst using Instagram. To encourage participants to expand their thoughts and elaborate, the open-ended questions included prompts to assist the participants should the question appear too abstract (Pietkiewicz & Smith, 2014).

2.2.2. Qualitative Analysis – Thematic Analysis (TA)

The six main steps of reflexive thematic analysis were adhered to (Braun & Clarke, 2019), beginning with transcribing the interviews verbatim before familiarisation with the transcripts. Initial codes were found, using Microsoft Word to highlight and differentiate. Afterwards, transcripts were uploaded to NVivo 12, codes were searched for, and themes were constructed before being reviewed and refined. A thematic map was created to help identify relationships and patterns.

2.3. Data Collection and Recruitment

A sponsored recruitment advertisement was posted on Instagram using an account specifically for this research. The posts were promoted using hashtags and sponsored advertising, which targeted individuals who engaged with hashtags and content on Instagram looking at clean-eating content, such as organic food, healthy habits, healthy food, health and wellness, clean eating, clean eating online, and living healthy. Individuals interested in participating were invited to directly message on Instagram or email the researcher to receive more information on the study. Those who expressed continued interest were sent an information sheet and instructed to complete and return the consent form. Once the consent was received, the ORTO-15, the frequency scale questionnaire, and the participant demographic sheet were sent to the participant. The questionnaires were sent in PDF format, or participants were invited to complete them on a secure online survey platform, Survey Monkey. Questionnaires consisted of three parts: (1) ORTO-15; (2) Instagram Hashtag Engagement Scale (I-HES); (3) demographic information. A university ethics committee approved the study. The British Psychological Society's 'Code of Human Research Ethics' (British Psychological Society, 2014) were adhered to, and all participants were informed about their right to withdraw and were assured of their anonymity. The consent form the participants signed was created prior to the ongoing Covid safety measures and stated the interviews would take place in person. However, having received ethical approval to conduct the interviews online, this was explained to the interviewees. Participants all provided written informed consent and interviews took place via Zoom.

2.3.1. Interview Practice

Most of the questions were well received by the participants which was evidenced by their relevant answers, openness to the topic, and ease of the conversation. However, the phrase 'sense of self' in the final question was not well understood by participants and so this was explained to them.

2.4. Participants

The research had inclusion and exclusion criteria for the participants. Participants needed to be 18 years and older, which helped ensure the largest homogeneous sample pool. Not restricting an upper age limit has been used in several studies (Barnes & Caltabiano, 2017; Barthels et al., 2018; Bundros et al., 2016; Dell'Osso et al., 2018; Dunn et al., 2017; Roncero et al., 2017; Turner & Lefevre, 2017). The age mean was 25.55 years (SD = 8.44) for the quantitative participants and 23.34 years (SD = 5.12) for the qualitative (see Table one). These are both in line with the studies sighted above. This is in the bracket of Instagram's user demographics, with ages varying between 18-29 years old (Turner & Lefevre, 2017) and 18 and 24 years old (Clement, 2020). Finally, Arnett (2000) identifies the late adolescence/early adulthood stage as a critical time for social skills, self-

Table 1. Qualitative sample characteristics

Pseudonym	Age	I-HES Score (Part A)	I-HES Score (Part B)	ORTO-15 Score
Jane	29	15	10	24
Sophie	22	24	9	23
Laura	18	25	10	30
Alice	28	15	10	26
Emily	32	22	10	29
Ava	20	21	8	29
Georgia	20	22	7	27
Grace	18	19	7	27

dependence and identity formation, which is appropriate for the qualitative element of the research.

Additionally, participants needed to be female, domicile in the United Kingdom, self-identify as having ON and use Instagram. Although some studies, such as McComb & Mills (2019), found there was no notable difference between male and female reported levels of ON, other studies have reported that ON is more prevalent in females than males (Ramacciotti et al., 2011; Strahler, 2019). Instagram user demographics are also reported to be 50.9% females and 49.1% male (Clement, 2020), Thus, as a homogeneous sample group is recommended for smaller sample sizes in a TA study, (Guest et al., 2006), this study decided to focus on females.

To ensure an accurate sample size for the quantitative aspect of the research, a power calculation was conducted using the *G* Power* (Faul et al., 2007) and taking the effect size from the most recent meta-analysis (Strahler, 2019). Using a one-tailed test, with an effect size of .23, $\alpha = .05$ and $1\text{-}ß = .80$, the ideal sample size was 113. A total of 104 participants were recruited.

For the qualitative aspect of the study, the participants were selected from the quantitative sample and identified by extreme scores of the ORTO-15 (less than a score of 35) and the I-HES (a maximum score of 25 in Part A and 10 in Part B). Between six and 10 participants is considered an adequate sample for Professional Doctorate candidates utilising the TA method (Braun & Clarke, 2013). Eight participants were deemed sufficient for the qualitative interviews as the research used a mixed-method approach.

3. Results

3.1. Quantitative Results

3.1.1. Descriptive Statistics

The descriptive statistics for the demographic variables were explored. The age of the participants ranged from 18 to 60 years (M = 25.6, SD = 8.44). There was a less satisfactory distribution among ethnicity, with English/Welsh/Scottish/Northern Irish and British being overrepresented and White Other the second most represented ethnicity. The participants reported whether they had ever tried to lose weight, with 103 reporting they had and only one reporting they had not (M = 1, SD = .098). From the I-HES data, mean score for the ORTO-15 were 31.62 (SD=4.83) with the majority of the participants (N=104) scoring below the cut-off of the 35 to determine the presence of ON tendencies. Mean scores for the I-HES parts A and B were 11.05 (SD=4.30) and 6.89 (SD=2.42), respectively.

3.1.2. Test of Normality

A correlation was run to establish whether an association between participants' ORTO-15 score, and their Instagram clean-eating hashtags engagement existed. Data from the questionnaires were input into SPSS, and a check was performed to assess assumptions of normality/bias. As normality tests are sensitive to sample sizes and small samples often pass normality tests, visual checking (histogram graph and QQ plot) was combined with a Shapiro-Wilk test of normality. The ORTO-15 score implied the data was not significantly different from normal distribution, so an assumption of normality was made. However, the I-HES scores were different from normal distribution. Examining the I-HES part A, the distribution of data departed significantly from normality ($W(103) = .93$, $p<.001$). Similarly, examination of part B of the I-HES also departed significantly from normality ($W(103) =.92$, $p<.001$). A Shapiro-Wilk test was also performed on the ORTO-15 scores and marginally did not show evidence of non-normality ($W(99) = .98$, $p=.68$). Based on the outcome, a Spearman correlation test was used for proceeding correlational analyses.

3.1.3. The Relationship between ON and Hashtag Engagement

There was a negative relationship between the ORTO-15 scores and part A of the I-HES, which was statistically significant (see Table two). This means that as participants scored higher on part A of the I-HES, they scored lower on the ORTO-15 scale, demonstrating higher traits of ON. There was a strong negative relationship between the scores on the ORTO-15 and part B of the I-HES (Table two). This means that higher scores on the part B questions were related to lower scores on the ORTO-15 scale, signifying higher traits of ON. To examine whether a relationship existed between parts A and B of the I-HES, a further correlational analysis was performed. Analysis showed a positive correlation between part A and part B of the questionnaire (see Table three).

Table 2. Spearman's rho Correlations between Total ORTO-15 Scores and Total I-HES Part A and B Scores

Variable	Rho	p
Total Part A	-.297**	.003
Total Part B	-.411**	<.001

** Correlation is significant at the 0.01 level (2-tailed).

Table 3. Spearman's rho Correlation between Total Part A and Total Part B of I-HES

Variable	Rho	p
Total Part A	.356**	<.001

** Correlation is significant at the 0.01 level (2-tailed).

Table 4. Themes and codes identified in this analysis

Theme	Codes
Regulating Self-Worth Symbolically	Seeking & Achieving Perfection Idealising the Good Object Comparing to the Good Object Mirroring the Good Object Seeking to be an Idealised Object
Finding Meaning & Purpose	Advising & Motivating Others Needing Praise from Others Striving for Meaning
Repeating Negative Cycles	Reinforcing Role of Instagram on Guilt Confirmation of Negative Self-Belief Shame Emergence & Coping
Negotiation of a Different Relationship with Lifestyle	Relief of Not Being Alone Recognising Wanting Change Fear & Resistance Around Change

Taken together, these data answer the first research question and demonstrates that the more an individual is engaged with Instagram clean-eating hashtags, the lower their score on the ORTO-15. The lower an individual scores on the ORTO-15, the more they demonstrate orthorexic symptoms. Thus, the data indicates a positive correlation between higher engagement with Instagram clean-eating hashtags and ON symptoms.

3.2. Sense of self and Instagram

Four themes emerged from the analysis; 14 codes were identified (see Table four).

3.2.1. Regulating Self-Worth Symbolically

The participants describe how their sense of self-worth and self-esteem is regulated through idealised individuals on Instagram, mainly influencers. Additionally, this theme encompasses how the participants seek to fulfil their narcissistic needs through curating themselves as an idealised object.

3.2.1.1 Seeking & Achieving Perfection. The participants describe how they helped minimise feelings of low self-worth and esteem through the control they exercised. The perfectionistic tendencies, they explain, began before their use of Instagram but were often further fuelled by it.

> "I've wanted to be the best…And that was what happened with the food and the exercise. I wanted to be doing it at the best level and I wanted to be better than these people on Instagram…it just got so unattainable". **Ava**

The extreme behaviours the participants engaged in to mitigate any negative feelings they held about themselves were often challenging and caused distress. However, they were often unable to stop.

3.2.1.2 Idealising the Good Object. The participants describe using the content posted by Influencers as inspiration for what their body and lifestyle should look like. They prefer the Influencer to reflect the ease of living this lifestyle, which they found motivational and inspirational.

> "… like physique, and, the foods that they would share, it looked like the type of lifestyle I would want. But they seem to be doing it so effortlessly". **Georgia**

The participants would find individuals whose lifestyle, body, and diet they idealise and use them as motivation to continue striving for the 'ideal', which they hoped would increase their sense of self. If the idealised individuals revealed they found the lifestyle and diet challenging, some participants unfollowed them.

3.2.1.3 Comparing to the Good Object. Participants compared themselves to their idealised object on Instagram in body shape and lifestyle. How they believed they measured up to the individual then impacted their self-perception, self-esteem and self-worth.

> "...at one point I just viewed myself as worthy as a number on the scale because of what I was seeing posted, and if my number wasn't near that, I would just think I wasn't worthy of being like one of these people". **Ava**

The comparisons impacted their sense of self and in order to mitigate the feelings, behaviours, such as emulation, were used.

3.2.1.4 Mirroring the Good Object. The participants described emulating the idealised individuals on Instagram, hoping to be more like them, thereby improving their sense of self.

> "...by buying this protein powder or doing this exercise routine that she posted, or by following the same trainer as this celebrity then I'm going to be one step closer to living their life and having their body and feeling happy and pleasant because they make it sound so great". **Emily**

3.2.1.5 Seeking to be an Idealised Object. The participants described curating an image on Instagram, hoping others would believe they were achieving and thriving in their healthy and clean lifestyle.

> "I definitely think that when you post, you post things to give a perception...and I was giving the perception that I was like super health goddess". **Alice**

The ability to create and control their image helped fulfil a narcissistic need in which they took pleasure in knowing others believed them to be achieving perfection.

3.2.2. Finding Meaning & Purpose

The participants describe the processes they engaged in, attempting to increase their sense of self and finding achievement and meaning.

3.2.2.1 Striving for Meaning. The participants discuss being goal driven about their body, clean eating, and lifestyle, and finding meaning through their behaviours which positively impacted their sense of self.

> "... if I make a meal, for accountability, I take a picture of it. I do have a way of documenting and sharing what I'm eating". **Sophie**

Participants describe holding themselves accountable to be able to achieve their body and lifestyle goals, often recognising their behaviour is unhealthy.

3.2.2.2 Needing Praise from Others. The participants posted photographs and stories on Instagram to receive praise and validation from their followers, and thus increase their self-esteem and self-worth.

> "... when I post something and I see all these positive feedback and people wanting to see more stuff like that, then I get really hyped and really happy about it... because it's the only time that I'm kind of like, happier". **Laura**

The participants describe a need fulfilled through praise they receive from others. Although many admonish themselves for not being rational, they would consciously seek this recognition from others through their Instagram engagement.

3.2.2.3 Advising & Motivating. Participants describe providing tips on nutrition and clean living, aware they were not always following them themselves. They were either asked by people to give advice, or they would offer it and found people encouraged more content.

> "...I was super preachy to people. I was telling people what's good and bad, telling them why you shouldn't eat that...this is what you should be instead. I thought I was...really healthy and some sort of health genius or something". **Alice**

Although participants admitted during the interview to engaging in disordered eating behaviours, being physically unhealthy, and emotionally and psychologically distressed, they continued to portray they were thriving, providing tips to others on how to lead a healthy and clean lifestyle.

3.2.3. Repeating Negative Cycles

Participants describe engaging in negative emotional cycles in their ON behaviour and on Instagram, impacting their self-esteem and self-worth.

3.2.3.1 Confirmation of Negative Self-Belief. Participants discuss engaging in behaviours that brought them further away from their goals, which were often determined and reinforced by Instagram. This distancing seemed to confirm the negative thoughts they held about themselves.

> "...just the fact that I would do it [transgress] would then return to me and make me feel guilty...And I'd feel like I've just given up on the goal I've been doing. And that's the only reason that I can't achieve anything...I didn't have the willpower to". **Georgia**

Body and health goals, and their fluctuation, were influenced mainly by Instagram. Participants describe changing goals or engaging in behaviour that brought them further away from their ideal, caused large amounts of guilt and shame, and reinforced their negative self-belief.

3.2.3.2 Reinforcing Role of Instagram on Guilt. Participants discuss feeling guilty for transgressing from their clean eating diet and lifestyle, which was reinforced by their constant consumption of orthorexic content on Instagram.

> "...it was just getting into my head that that there was certain foods that I should be eating and then if I didn't eat those certain foods, it would just surface a lot of guilt". **Ava**

The participants' use of Instagram presents an environment of unobtainable, ever-shifting images of people living the ideal 'healthy' lifestyle and labelling food as 'good' and 'bad'. Transgressions surface guilt, which negatively impacts the sense of self.

3.2.3.3 Shame...Emergence & Coping. The participants describe coping with feelings of inadequacy, furthered triggered by Instagram, and finding methods to defend themselves against the shame.

> "...if I don't get that sort of engagement in the first fifteen to twenty minutes of it being up, it has to go down". **Sophie**

Participants describe having ideal numbers of engagement and deleting their post if they did not receive it, thereby protecting any threat to their sense of self.

3.2.4. Negotiating a Different Relationship with Lifestyle

Six participants expressed a desire to change their lifestyle, although this was met with fear and resistance.

3.2.4.1 Relief of Not Being Alone. Participants describe relief when realising others experience similar thoughts, emotions and behaviours associated with ON.

> "... just knowing that other people have identified this as a problem and that it's okay to go through this and that you're not alone is what gave me comfort because... I'd never heard like a name to it; I thought it was just something that my crazy brain was going through and that I was all on my own with it. To just to know that it was established as something and a problem just made me feel a lot better". **Ava**

Some participants describe the label of ON containing and felt a decrease in anxiety when idealised individuals admitted to relaxing their rigid 'healthy' diet and lifestyle.

3.2.4.2 Wanting to Make a Change. Participants describe desiring a change and try different methods, such as unfollowing their idealised individuals or not posting on their pages.

> "I'm trying to engage a lot less... not following food pages, not following my healthy eating tip pages..." **Sophie**

Trends such as "What I Eat in a Day" were described by five participants as having negative results on their guilt and shame, and some chose to disengage to try and improve their relationship with diet and lifestyle.

3.2.4.3 Fear & Resistance Around Change. Participants who describe wanting to change their diet and lifestyle expressed fear about what may happen to their body, health, and others' perception of them.

> "... I've always been seen as...not the perfect girl, but like, she's healthy, she's happy, she's thriving, she's just amazing. I don't want to go out in public and say, I have orthorexia". **Laura**

This fear was too much for many participants, and many resisted change, with two of the six putting steps into place to recover.

4. Discussion

The study aimed to answer the following research questions (1) What is the relationship between orthorexia nervosa symptoms and using clean eating hashtags on Instagram? (2) How do individuals who identify with orthorexic behavioural patterns experience their sense of self whilst using Instagram? As social media usage is growing and clinicians are seeing an increase in prevalence (Wynne et al., 2022), it is important to understand the impact the engagement with clean-eating hashtags has on those with ON symptoms and how they feel this impacts their sense of self. Research on this will further the understanding of the development and maintenance factors of ON and how best for clinicians to work with presenting symptoms.

In answering the first research question, the primary quantitative finding was that individuals who engage with clean-eating hashtags on Instagram demonstrate higher levels of orthorexic behaviours. This finding confirms those of the limited literature that has been published on Instagram and ON, namely that Instagram has been linked with increasing ON symptoms (Turner & Lefevre, 2017), and those with ON have been shown to be particularly active on Instagram (Gann, 2019; Greville-Harris et al., 2020; Hanganu-Bresch, 2020; Lanitis, 2020; Santarossa et al., 2019; Valente et al., 2020, 2022; Zemlyanskaya et al., 2022). Additionally, this research corroborates Allen et al.'s (2018) finding that those exposed to clean-eating messages on Instagram may have a more significant number of ON behaviours.

Regarding the second research question, four main themes were identified from the qualitative thematic analysis. The first theme, Regulating Self-Worth Symbolically, describes how the engagement with clean-eating hashtags and time spent on Instagram, furthered their pre-existing relationship with perfectionism and social comparison, leading them to try and improve their self-worth and self-esteem through what they were exposed to and engaging with on the platform. The second theme, Finding Meaning & Purpose, depicts how posting and engaging with Instagram provided the participants with a method for improving their sense of self. This was again furthered through engagement with clean-eating hashtags and the building of a community around clean-eating. The third theme, Repeating Negative Cycles, details how the participants engaged in negative cycles that were furthered due to their high engagement with Instagram and therefore hashtags. The final theme, Negotiation of a Different Relationship with Lifestyle, describes how the participants were beginning to recognise the negative impact of their clean-eating, lifestyle and use of Instagram, and thus wanting to make a change. The 'clean' lifestyle that many engaged in was often due to or furthered by what they were exposed to on Instagram. Thus, the quantitative and qualitative findings highlight how pre-existing characteristics and behaviours are furthered by the use of Instagram and engagement with clean-eating hashtags.

This study highlights that perfectionism preceded participants ON symptomology and was further fuelled by Instagram. This corroborates the existing literature, which suggests that perfectionism is a risk factor for ON (Barnes & Caltabiano, 2017; McComb & Mills, 2019). By seeking and aiming for perfection, the participants managed their feelings of low self-esteem and self-worth by setting and revising goals based on what they were exposed to on Instagram and their idealised body, diet, and lifestyle. This corroborates current literature that high levels of perfec-

tionism are associated with low self-esteem (Fearn et al., 2022; Zeigler-Hill & Terry, 2007) and Valente et al.'s (2020) research in which those who self-diagnose as having ON tend to score themselves as having highly perfectionistic tendencies compared to those who do not self-diagnose as having ON.

A history of restriction and purging (either self-induced vomiting or laxative misuse) and/or a health problem, which warranted being prescribed a restrictive, low sugar diet, was reported by most participants. A history of an ED is a significant predictor of ON (DeBois & Chatfield, 2021; Fixsen et al., 2020; McComb & Mills, 2019; McGovern et al., 2021; Valente et al., 2020). Additionally, pre-existing health problems, mainly gastro-intestinal, have been reported by Greville-Harris et al. (2020) and Valente et al. (2020). The disordered eating behaviour reported by the participants seems to have already been present, but symptoms may have been exacerbated by what the individuals initially began searching for before being furthered by Instagram's algorithms and finding themselves in an echo chamber of healthism. This finding allows for further understanding of the direction of the relationship between ON and Instagram queried by Allen et al. (2018) and corroborates more recent research which found those who self-diagnose with ON believe Instagram was partially responsible for its development (Valente et al., 2022; Zemlyanskaya et al., 2022). Additionally, there was an emphasis amongst the participants on being thin or slim and toned. Although there was a narrative of thinness being connected to better health, this seemed to be secondary to the thin body ideal appearance. This is consistent with the current research, which has found that those with higher ON scores have a higher drive for thinness (Barthels et al., 2021; Costanzo et al., 2022; Fixsen et al., 2020) and thin-ideal internalisation (DeBois & Chatfield, 2021).

The participants engaged in behaviours on Instagram which influenced their sense of self. Participants idealised individuals on Instagram whom they believed possessed positive attributes, the ideal lifestyle and diet. This often led to self-denigration of the self (Marcia, 2001) with a pronounced a shift between the self and object representations. This is consistent with Festinger's Social Comparison Theory (1954) as the participants' self-evaluation of abilities, opinions, and goals (Yang, 2016) depended on how they measured up to their social media 'social setting'.

To defend against self-denigration, and improve self-worth and self-esteem, the participants engaged in mirroring or emulation of the idealised individual. Additionally, the participants sought to be idealised individuals themselves. They carefully curated a positive image of themselves, even if they engaged in duplicitous posting, demonstrating their sense of self as enmeshed with their 'healthy' lifestyle. This defence corroborates Dunn & Bratman's (2016) hypothesis that an individual's self-worth, identity and positive body image become increasingly dependent on their ability to comply with their orthorexic behaviours....

The participant's need for external praise impacted how they engaged with Instagram. They often posted photographs that portrayed a curated image consistent with their 'healthy' diet and lifestyle with the explicit hope of receiving positive responses. The interaction received directly impacted their sense of self, and they explained experiencing shame if the expected number of positive interactions was not forthcoming. If the latter occurred, the participants described engaging defences, which have been discussed in the Cognitive Behavioral Theory of and literature regarding EDs but not ON. Participants described removing the image from their Instagram page to eliminate evidence of a lack of engagement or pointing out any possible flaws to pre-empt any criticism or to account for a potential limited response. Shame beliefs are core to the underlying belief system associated with the development and maintenance of EDs within Cognitive Behavioral Therapy, seen through perfectionism, low self-esteem, mood intolerance and interpersonal difficulties (Fairburn et al., 2003).

The participants also provided advice on their chosen 'healthy' lifestyle, presenting themselves as compliant whether they were or not. Consistent with how this impacted their sense of self, the frequency of the activity increased with the receipt of positive responses, often leading to a sense of superiority, consistent with current research on ON and feelings of superiority over those who continue to eat a regular diet (Dunn & Bratman, 2016; Greville-Harris et al., 2020).

Goal-driven behaviour regarding their body, clean-eating and lifestyle were consistent between the participants, helping them to find purpose and a method of measuring achievement. This fits within the narrative described by Cinquegrani & Brown (2018), in which the Western goal-orientated society tends to view the body as a 'project'. Fixsen et al. (2020) found that individuals who identified as having orthorexic tendencies discussed working towards achieving the ideal body as an aspect of their ON. The participants created a sense of purpose by being preoccupied with their 'ideal' body type and the constant effort of striving to achieve their goals. Additionally, this finding lends weight to Bratman & Knight's (2000) argument that the identity of an individual with ON behaviours becomes intertwined with their ability to adhere to their goals, with self-praise for success and self-condemnation for transgressions all accumulating to form the individual's opinion of themselves and how they view their worth to others.

An important finding in this study was the cycle of negative self-belief, self-esteem, and self-worth, and linking this to CBT-E and MBT. Due to the participants' fragile sense of self and negative thoughts about themselves, they often engaged in behaviors that seemed to prevent them from achieving their goals. The Cognitive Behavioral Theory posits that the negative-belief cycle may act as a mechanism for developing and maintaining disordered eating. The MBT model also supports the indication that mental states are regulated through physical action teleologically. This seems to also pertain to ON. This cycle furthered feelings of guilt and shame, reinforcing the low self-esteem typical in those with EDs (Fairburn et al., 2003). Although this development and maintenance cycle has been well documented in other eating disorders (Bateman et al., 2023;

Fairburn et al., 2003) has not been applied to and investigated in ON.

Additionally, engagement with Instagram's clean-eating echo chamber seemed to exacerbate the participant's feelings of guilt when transgressions occurred. This is consistent with the object-relations theory of AN and current literature on ON. A trend on Instagram discussed in the study is classifying food into 'good' and 'bad' categories, posting users' opinions on food and their detailed and specific food intake. An example is a trend called "What I Eat in a Day", which six of the eight participants regularly watched. Participants described feeling a sense of failure to control themselves when they transgressed from their ideal objects' diet and lifestyle, resulting in guilt. To try and mitigate this, the participants seemed to try and control their emotions through the rigid control of 'pure' and 'good' foods and exercising further control. This is a similar experience discussed in the object-relations theory of AN, where the need to control the emotional state leads to food (the external object) becoming the representation of what cannot be ingested, i.e., the individual's emotions (Clinton, 2006). It also relates to the downward social comparison discussed earlier.

There was a point in all the participants' journeys in which they recognised or realised that there are negative implications in their chosen pursuit of a 'clean' and ideal lifestyle. This was triggered by either extreme personal distress, causing the individual to seek relief, or when an idealised object confessed to their distress and disordered eating. Participants expressed relief when realising others experience similar distressing thoughts, emotions and behaviours associated with not living up to and/or coping with the high standards of their 'healthy' diet and lifestyle. Instagram was recognised as negatively influencing their ON behaviours and as a tool for learning about it, which is consistent with current literature on ON (Valente et al., 2022; Zemlyanskaya et al., 2022). The participants discussed a shift occurring on the platform in which Influencers confessed to having ON and some apologising for what they have promoted when they have been unwell. This seemingly has allowed for a conversation to begin about when healthy eating and lifestyle becomes unhealthy. This finding supports the existing literature (Santarossa et al., 2019; Valente et al., 2020, 2022; Zemlyanskaya et al., 2022). One of the participants discussed finding a supportive community for those recovering from ON on Instagram, which she found helpful in the absence of medical or psychological help. This supports Chung et al.'s (2017), McGovern et al.'s (2021), and Valente et al.'s (2020) finding that individuals with ON will turn to social media for support networks, with the latter study also finding that individuals who self-diagnose with ON found one of the significant barriers to recovery was a lack of professionals knowledgeable about ON. The current study's findings highlight the need for help and support for individuals with ON who find their disordered eating distressing.

The participants who disclosed a desire to make a change also discussed fear and resistance to changing their ON behaviours and lifestyle, a finding that mirrors feelings experienced in those with EDs. Some participants made changes to their life to try and mitigate the echo chamber they were in, such as unfollowing Influencers and Instagram pages promoting clean eating, ON behaviours and lifestyle. However, there was a narrative that making more substantial changes, such as incorporating other foods, created too much anxiety, and any serious improvement to their diet and lifestyle was resisted. Abbate-Daga et al. (2013) argues that this is one of the hallmarks of an eating disorder. In addition to the fear felt by altering dietary restrictions, participants described a fear around losing one's identity. Thus, the current study demonstrated that for individuals with ON symptomology to begin to overcome their fear and embrace recovery, they need the confidence to change their eating and lifestyle and adjust their self-identity, values, and beliefs.

Finally, a pertinent theme in the literature on MBT for AN is the relationship between the individual and their social environment. Individuals with AN may experience a hindered recovery of mentalizing due to the reactions of others towards their eating disorder. These reactions, often marked by anxiety, fear, and frustration, create a disconnect. The individual with AN but also ON, perceives their weight loss as desirable, leading to feelings of being misunderstood and potentially ashamed by others who may not mirror these feelings. Consequently, they withdraw from a social environment that would typically aid their mentalizing recovery by offering a potential for social and self-correction that would make change, remission, and recovery possible. In this study the role of Instagram had the reverse effect, where individuals would seek affirmation of their ON behaviours and consequently non-mentalizing modes while broader social withdrawal that would otherwise support mentalizing recovery, deepened epistemic mistrust and epistemic hypervigilance (Bateman et al., 2023).

4.1. Clinical Implications

Mentalization based Treatment for Eating Disorders (Bateman et al., 2023) and Transdiagnostic CBT-E (Z. Cooper & Fairburn, 2011; Fairburn, 2008; Fairburn et al., 2003) seem to be applicable to treating ON. Consistent with these models, self-regulation through physical actions, perfectionism and the over-evaluation of control overeating, shape or weight in those with ON impact the individual's mentalizing capacity, self-esteem and self-worth. These factors, according to both models, lead to strict dieting and other weight-control behaviours. This, too, should be modified to allow for the health-related obsessive behaviours those with ON display. Additionally, the use of Instagram can be added to the Interpersonal Difficulties that are seen as contributing further to the maintenance of the ED (Z. Cooper & Dalle Grave, 2017). As relief was expressed by participants at recognising others experience similar distressing behaviours, group CBT-E or MBT for Eating Disorders, delivered by an experienced therapist, may be a preferred option.

Recognising that ON characteristics exist with or without the use of Instagram, clinicians should be aware that increased time spent on Instagram may trigger the echo

chamber effect, healthism, exposure to body idealism, the related social expectation narrative while reinforcing non-mentalizing modes. By reducing the time spent in the pressure cooker environment of Instagram, clinicians may be aiding mentalization recovery by removing one of the maintenance factors of ON, enabling them to address underlying developmental and other maintenance issues better.

4.2. Limitations and future directions

This study's demographics overrepresented Caucasian participants, which is in line with other research (McComb & Mills, 2019). The majority of studies have been conducted in Europe, with limited numbers in Australia, Latin America, and North America (Niedzielski & Kaźmierczak-Wojtaś, 2021), India (Grover & Gupta, 2021), and one study conducted in China (He et al., 2021). Therefore, this is a self-limiting research field which requires further investigation to understand true demographic and prevalence rates.

At the time when the research commenced, the ORTO-15 was the most widely used tool in studies on ON (Missbach et al., 2017; Valente et al., 2019). Although this continues to be the case, the EHQ and DOS have gained in popularity despite both possibly screening for healthy clean-eating behaviours as well as unhealthy orthorexic symptoms (Atchison & Zickgraf, 2022). Had this study used the other tools, the results probably would not have been any different as the participants were self-identifying as having ON, and the interviews conducted addressed and confirmed the existence of behaviours assessed in all three of the measures, namely impact on lifestyle, feelings of guilt, and restriction of diet. Therefore, if this study were to be replicated in the future, it would be good to use the other measures which have been found to have high integrity (Niedzielski & Kaźmierczak-Wojtaś, 2021), but the results are unlikely to differ.

Given this research has identified the active and passive usage of clean-eating hashtags, it may be helpful to explore further by including questions that more obviously identify the individuals' actions that drive the algorithm, such as liking and saving posts.

Further research which aims to better understand the development and maintenance factors associated with ON would start to close an existing gap and may begin to facilitate a better understanding of treatment. This applies to the prospect of further research on mirroring and idealisation. Additionally, understanding how individuals with ON attempt to regulate when experiencing difficult emotions, such as guilt and shame, as well as regulate their sense of self, fulfilling a narcissistic need via Instagram. A deeper understanding of the implications of the behaviour in the 'real' vs 'virtual' world arising from body shame may be helpful. The cycle of negative self-belief addresses a maintenance cycle that is well documented in other eating disorders. Understanding this relevance to ON will help close the existing knowledge gap.

All interview participants discussed the social media platform TikTok, which has been on the ascendency and incorporates the visual drive discussed with Instagram. It would be prudent to re-create this study incorporating TikTok and other platforms to understand their impact on ON.

5. Conclusion

In summary, the current study found a strong correlation between those with higher symptoms of ON and engagement with clean-eating hashtags on Instagram. Additionally, the findings of this study have offered a new way of understanding the sense of self in those with ON, thereby better understanding the development and maintenance of ON. This should help clinicians with how to best help those seeking treatment, providing further evidence for the beneficial use of an integrated approached like MBT and CBT-E, specifically tailored to the individual and ON.

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Declaration of Competing Interests

The authors have no conflicts of interest to disclose.

Data Code and Availability

The datasets generated during and analysed during the current study are available from the corresponding author on reasonable request.

Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of a UK university (09/03/2021).

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent to publish

Before interviews, all individual participants were informed in written form that all the data they provide will be completely anonymous and confidential and thus cannot be traced back to them.

Appendices {#app)

Appendix A: I-HES

Part A

1. **How often do you post pictures or stories about food?**

Never < once a month < once a week Once a week > once a week

2. **How often do you use #cleaneating?**

Never < once a month < once a week Once a week > once a week

3. **How often do you use other clean eating hashtags?**

Never < once a month < once a week Once a week > once a week

4. **How often do you take advice from health food accounts?**

Never < once a month < once a week Once a week > once a week

5. **How often do you give advice on your healthy lifestyle?**

Never < once a month < once a week Once a week > once a week

Part B

1. **How many wellness brands do you follow?**

0 < 5 6-10 11-15 > 16

2. **How many health food accounts do you follow?**

0 <5 6-10 11-15 > 16

Appendix B: Interview Schedule

This appendix includes a list of initial semi-structured interview questions with prompts used to facilitate conversation.

1. What is your history of Orthorexia Nervosa?
2. What has been your experience of using Instagram?
3. Can you tell me about how you are being affected by what you see and engage with on Instagram?
   a. What are your feelings about this?
   b. What are your beliefs around this?
   c. What are your memories about how you have been affected?
   Prompt: physically, emotionally, mentally
4. How do you make sense of your sense of self on Instagram?

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