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Exploring the relationship between orthorexia nervosa, mindful eating and guilt and shame

BACKGROUND
Orthorexia nervosa (ON) is an under-researched maladaptive eating behaviour which focuses on the quality and purity of food. Mindful eating refers to being aware of what we eat by making conscious food choices. Guilt and shame are negative self-evaluative emotions which have been associated with maladaptive eating behaviours. This study explores the relationships between ON, mindful eating, and feelings of guilt and shame.

PARTICIPANTS AND PROCEDURE
Two hundred and fifty-two participants were recruited from various online platforms, such as Facebook, Twitter, and Instagram. They were asked to complete self-report questionnaires on ON, mindful eating, and guilt and shame.

RESULTS
The findings suggested that ON was significantly negatively associated with the mindful eating subscales focused eating, hunger and satiety, and eating with awareness and significantly positively associated with guilt and shame. In addition, guilt was significantly negatively associated with focused eating, whilst both guilt and shame were significantly negatively associated with hunger and satiety and eating with awareness. Further investigation suggested that guilt and shame mediated the association between mindful eating and ON.

CONCLUSIONS
It was concluded that guilt and shame could explain the association between mindful eating and ON. Limitations and future directions are discussed.

KEY WORDS
orthorexia nervosa; guilt and shame; mindful eating

BACKGROUND

The emphasis on body image has repeatedly been found to influence and increase the prevalence of maladaptive eating behaviours (Chen et al., 2020). One maladaptive eating behaviour which has gained increased attention in the past decade, yet is still under-researched, is orthorexia nervosa (ON; McComb & Mills, 2019). First described by Bratman (1997), ON refers to a pathological obsession with healthy eating. It entails a preoccupation with the quality of food as opposed to the quantity and does not have a primary aim of weight loss, unlike disorders such as anorexia nervosa (Dunn & Bratman, 2016). As of yet, ON has not appeared in any official diagnostic criteria, such as the Diagnostic and Statistical Manual of Mental Disorders or the International Classification of Diseases (Costa et al., 2017; Gaebel et al., 2017). There have been discussions regarding the nosology of ON, and whilst some reviews have suggested that ON is a symptom of other eating disorders, others have suggested that orthorectic eating behaviours appear to indeed be an eating disorder with an over-emphasis on healthy or clean eating (Barthels & Pietrowsky, 2012; Dąbal, 2020). ON has also been suggested to have a 1 to 2% prevalence rate within the general population (Barthels & Pietrowsky, 2012), although this may be higher amongst certain groups, such as athletes (Segura-García et al., 2012; Surała et al., 2020). People with ON are concerned with "clean" and "pure" foods, with an explicit avoidance of unhealthy foods (Vuillier et al., 2020). Interest in healthy foods has become more fashionable within popular culture (Bratman, 2017), especially with food photos and opinions becoming increasingly shared on social media platforms such as Instagram (Vuillier et al., 2020). Turner and Lefevre (2017) found that Instagram use was linked to high symptoms of ON, with the healthy eating community and some celebrities contributing to symptom increase. Some argue that although weight loss may not be the main aim of ON, the notion of being "healthy" can often become muddled with views on body image and body fat (Bratman, 2017). There is an important distinction between ON and regular healthy eating (or healthy orthorexia), as the latter simply refers to a normal healthy diet (Bratman, 2017; Depa et al., 2019). Barthels et al. (2019) suggested that ON is distinct from regular healthy eating as they have differing symptoms and implications, such that ON could have negative consequences for mental and/or physical well-being.

Mindful eating, which refers to being attentive and aware of what we eat (Winkens et al., 2018), is a type of mindfulness which is specific to eating (Mantzios, 2021). Some literature suggests that it involves making conscious food choices, responding to hunger and satiety cues, and recognising the physical senses of food, rather than relying on psychological hunger and external cues (Warren et al., 2017). Research suggests that being mindful when eating can have positive effects on eating behaviours and relationships with food (Hong et al., 2014). For example, mindful eating can minimise impulsive reactions to food such as emotional or binge eating, whereby eating is driven by an automatic urge (Winkens et al., 2018). Other research has found mindful eating to be negatively associated with grazing and fat and sugar consumption (Mantzios et al., 2018a, b). Similar findings have also been established within experimental settings (Allirot et al., 2018; Hong et al., 2014); for example, Hussain et al. (2021) found that a brief mindful eating induction subsequently led participants to eat a reduced number of energy-dense foods. Whilst mindful eating can help with weight loss, it is not a primary aim; it involves gaining self-acceptance whilst appreciating food with full awareness (Hong et al., 2014; Nelson, 2017). Thus, mindful eating can act as a protective factor in various maladaptive eating behaviours and disordered eating.

Maladaptive and disordered eating behaviours are often associated with negative emotions, such as depressive symptoms, shame and guilt (Bottera et al., 2020; Sharpe et al., 2018; Zhang et al., 2021). Body image dissatisfaction, a form of self-criticism, has been shown to be a predictor of maladaptive eating behaviours through the associated negative emotions (Chen et al., 2020; Sharpe et al., 2018), and is associated with guilt and shame. Guilt and shame are types of self-evaluative negative emotions which can contribute to disordered eating behaviours (Bottera et al., 2020). The feelings of guilt and shame can arise as a product of non-compliance with the maladaptive eating behaviour, or as a symptom of body dissatisfaction, thus causing a maladaptive eating behaviour to develop (Oberle et al., 2021). Various studies have found feelings of guilt and shame to be associated with weight and other eating behaviours including self-induced vomiting and body checking (Bottera et al., 2020; Solomon-Krakus & Sabiston, 2017). Intuitive eating contrarily has been shown to relate positively to the dismantling of any self-evaluative negative emotions (Craven & Fekete, 2019). Considering the similarities between intuitive and mindful eating (e.g., Özkan & Bilici, 2021), and the associations drawn between intuitive eating and shame (Webb et al., 2013), it is natural to assume that there would be benefits for people who are aiming to adhere to strict guidelines of healthy eating, whether it is disordered or not. Craven and Fekete (2019) found that increased binge eating symptoms were also associated with guilt and shame relating to weight. These findings of negative judgment on oneself were found regardless of the weight or size of the person. Solomon-Krakus and Sabiston (2017) found that women reported more body checking and

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negative self-conscious emotions than men; however, shame and guilt were related to body checking in both genders. Conradt et al. (2007) suggest that these feelings of weight-related guilt and shame may arise from failed attempts to lose weight due to the thin ideals that are portrayed in the media and are seemingly easy to achieve. No study to date has looked at the relationship between feelings of guilt and shame and ON, as well as mindful eating. Research has found (a) guilt and shame to be associated with intuitive eating, as well as disordered eating, such as bulimia nervosa, binge eating, and anorexia nervosa (Blythin et al., 2020; Bottera et al., 2020; Craven & Fekete, 2019; Solomon-Krakus & Sabiston, 2017), and (b) similarities between eating behaviours and disorders (Gramaglia et al., 2017; Koven & Abry, 2015; Zagaria et al., 2022). It could be assumed that guilt and shame may play a similar role within ON and mindful eating. This study aims to explore the association between orthorexic tendencies and feelings of guilt and shame, potentially triggered by not conforming to a strict healthy diet (Oberle et al., 2021). Similarly to guilt and shame arising from failed attempts to lose weight (Conradt et al., 2007), individuals with orthorexic symptoms may punish themselves through negative feelings of guilt and shame from not consuming the most pure and healthy foods (Vuillier et al., 2020). The potential associations of mindful eating with ON being explained by the negative relation to self-evaluative negative emotions is something that has not been evaluated in the literature, and could offer insights as to how mindful eating may foster a more adaptive version of healthy eating.

This study primarily aims to explore the relationships between ON, mindful eating, and guilt and shame, as no study has investigated this yet. The second aim is to explore whether guilt and shame can mediate the relationship between mindful eating and ON. The first hypothesis is that low levels of mindful eating will be associated with higher levels of ON, guilt, and shame. The second hypothesis is guilt and shame will mediate the association between mindful eating and ON.

PARTICIPANTS AND PROCEDURE

PARTICIPANTS

A sample of 252 participants was recruited via opportunity sampling, through social media platforms, such as Facebook, Instagram, and Twitter, as well as the university Research Participation Scheme (RPS). Participants who were recruited via the RPS were given two course credits as a benefit for participating. There were 203 females, 46 males, one transgender male and two participants who self-described as non-

binary. Participants' ethnicities consisted of White (n = 182), Asian/Asian British (n = 42), Black/African/Black British (n = 7), Mixed Ethnicities (n = 10) and Arab/Other (n = 4). The participants had an average body mass index (BMI) of M = 24.44 (SD = 5.31) and age of M = 28.00 (SD = 10.50). Within the sample, 180 of the participants had no dietary style, 30 were vegetarian, 15 were vegan, 7 were gluten-free, and 19 had another dietary style.

All potential participants were informed via the information sheet and consent form that they were not eligible to participate if they had been diagnosed with an eating disorder (either existing or a history).

MEASURES

Demographic questionnaire. This included questions regarding age, gender, ethnicity, dietary style, height and weight, in order to assess background information.

Düsseldorf Orthorexia Scale (DOS). The DOS (Chard et al., 2019) is a 10-item scale that measures orthorexic behaviour through statements about healthy and clean eating. Items include statements such as "I have certain nutrition rules that I adhere to" and "I feel upset after eating unhealthy foods". Participants rated each one on a 4-point response scale ranging from 1 (*this does not apply to me*) to 4 (*this applies to me*). Higher overall scores indicate higher orthorexia behaviours and tendencies. This study found the internal reliability Cronbach's α value to be .87.

Weight- and Body-Related Shame and Guilt Scale (WEB-SG). The WEB-SG (Conradt et al., 2007) is a 12-item scale which is split into two subscales, including 6 items on guilt and 6 items on shame. Sample items from the guilt subscale include "When I have eaten more than I want, I experience feelings of guilt", and items from the shame subscale include "The appearance of my body is embarrassing for me in front of others". The participants rated each statement on a 5-point scale from 0 (*never*) to 4 (*always*). Higher scores totalled from both subscales indicated more frequent experiences of weight and body-related shame and guilt. This study found the internal reliability Cronbach's α value to be .73.

The Mindful Eating Behaviour Scale (MEBS). The MEBS (Winkens et al., 2018) is a 17-item scale which covers four domains relating to attentive eating: focused eating, hunger and satiety cues, eating with awareness, and eating without distraction. The participants rated each item on a 5-point response scale from 1 (*never*) to 5 (*very often*). The items included statements such as "I trust my body to tell me when to eat" (hunger and satiety cues subscale) and "I stay aware of my food while eating" (focused eating subscale). For this scale, it is recommended to use the four domains separately due to low inter-factor cor-

relations. This study found that the internal reliability Cronbach's α value for the focused eating domain (5-item subscale) was .86, the hunger and satiety cues domain (5-item subscale) was .87, the eating with awareness domain (3 item subscale) was .91 and the eating without distraction domain (4 item subscale) was .75.

PROCEDURE

The study was advertised online as research exploring eating behaviours and habits, and was deliberately kept vague to prevent participants from predicting the true aim of the study. Potential participants responded to the online advertisement on various social media platforms (see under *Participants*). They were then directed via a link to Qualtrics, and were able to access the participant information sheet and consent form. The information sheet and consent form informed participants not to participate in the study if they had been diagnosed with an eating disorder. Once participants provided informed consent, they were directed to the demographic form, which included questions such as gender, age, ethnicity, dietary style and weight and height to calculate BMI. They then progressed on to complete the DOS, WEB-SG and MEBS, and this took the participants approximately 20 minutes to complete. Once completed, participants were offered the opportunity to provide a unique ID number, allowing them to withdraw their data at a later stage if required, and retain the anonymity of their participation. Finally, participants were directed to the debrief form where they were given further information about the study as well as information on support services available to them. They were also given the researcher's contact details should they have any issues or want further information.

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Birmingham City University (March 21/PSY_MSc_Mar21_008).

RESULTS

BMI, MINDFUL EATING, GUILT, SHAME, AND ORTHOREXIA NERVOSA

Inter-correlations between BMI, focused eating, hunger and satiety cues, eating with awareness, and eating without distraction, guilt, shame, and ON are presented in Table 1, alongside means and standard deviations. The findings suggest a small, significant negative relationship between focused eating and guilt ($r = -.16$, $p = .011$), as well as ON ($r = -.16$, $p = .011$). There was a moderate, significant negative relationship between hunger and satiety cues and guilt ($r = -.40$, $p < .001$) and shame ($r = -.38$, $p < .001$), and a small, significant negative relationship with ON ($r = -.16$, $p = .011$). There was a small, significant negative relationship between eating with awareness and guilt ($r = -.13$, $p = .041$), shame ($r = -.19$, $p = .002$), and ON ($r = -.16$, $p = .014$). There was a moderate, significant positive relationship between BMI and guilt ($r = .32$, $p < .001$), a small, significant positive relationship with shame ($r = .22$, $p = .001$), and a moderate, significant negative relationship with hunger and satiety cues ($r = -.21$, $p = .001$). There was also a small, significant positive relationship between ON and guilt ($r = .25$, $p < .001$) and a moderate, significant positive relationship with shame ($r = .46$, $p < .001$).

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Table 1

Mean, standard deviation, and bivariate correlations between BMI, focused eating, hunger and satiety cues, eating with awareness, and eating without distraction, guilt, shame, and orthorexia nervosa

	1	2	3	4	5	6	7	M	SD
1. BMI								24.44	5.31
2. Focused eating[a]	−.07							20.06	3.69
3. Hunger and satiety cues[a]	−.21**	.43**						17.17	4.41
4. Eating with awareness[a]	−.02	.26**	.13*					10.91	3.15
5. Eating without distraction[a]	−.04	.19**	.01	.33**				11.71	3.41
6. Guilt[b]	.32**	−.16*	−.40**	−.13*	.10			14.52	7.08
7. Shame[b]	.22**	−.06	−.38**	−.19**	.05	.72**		16.66	6.80
8. DOS	−.08	−.16*	−.13*	−.16*	−.01	.25**	.46**	19.79	6.34

Note. [a]Subscales of the Mindful Eating Behaviour Scale; [b]subscales of the Weight and Body Related Shame and Guilt Scale; DOS – Düsseldorf Orthorexia Scale; *correlation is significant at the .05 level; **correlation is significant at the .01 level.

DIRECT AND INDIRECT EFFECTS OF GUILT AND SHAME

The direct and indirect effects of focused eating on ON via guilt were explored using mediation analyses. The findings suggested that focused eating had a significant direct effect on ON ($\beta = -.21$, $SE = .11$, 95% CI [$-.42$, $-.00$]), and a significant indirect effect via guilt ($\beta = -.06$, $SE = .03$, 95% CI [$-.13$, $-.01$]).

Furthermore, the direct and indirect effects of hunger and satiety cues and eating with awareness on ON via guilt and shame were explored. The findings that suggest hunger and satiety had a non-significant direct effect on ON ($\beta = -.05$, $SE = .10$, 95% CI [$-.24$, .13]), and a significant indirect effect via guilt ($\beta = -.14$, $SE = .04$, 95% CI [$-.22$, $-.06$]). Similarly, hunger and satiety had a non-significant direct effect on ON ($\beta = .07$, $SE = .09$, 95% CI [$-.10$, .24]), and a significant indirect effect via shame ($\beta = -.26$, $SE = .05$, 95% CI [$-.36$, $-.16$]). In addition, eating with awareness had a significant direct effect on ON ($\beta = -.25$, $SE = .12$, 95% CI [$-.49$, $-.01$]), and a non-significant indirect effect via guilt ($\beta = -.06$, $SE = .04$, 95% CI [$-.13$, .00]). Moreover, eating with awareness had a non-significant direct effect on ON ($\beta = -.14$, $SE = .12$, 95% CI [$-.37$, .09]), and a significant indirect effect via shame ($\beta = -.17$, $SE = .07$, 95% CI [$-.31$, $-.05$]). Thus, guilt and shame appear to mediate the relation between mindful eating and ON (see Tables 2 and 3).

Table 2

Mediation on the effect of focused eating, hunger and satiety, and eating with awareness on orthorexia nervosa via guilt

	β (effect)	t	p	95% CI
Focused eating				
Total (c)	$-.28$	-2.57	.011	$-.49$, $-.06$
Direct (c^1)	$-.21$	-1.99	.048	$-.42$, $-.00$
Indirect (ab^1)	$-.06$			$-.13$, $-.01$
Hunger and satiety				
Total (c)	$-.19$	-2.10	.036	$-.37$, $-.01$
Direct (c^1)	$-.05$	-0.56	.575	$-.24$, .14
Indirect (ab^1)	$-.14$			$-.22$, $-.06$
Eating with awareness				
Total (c)	$-.31$	-2.49	.014	$-.56$, $-.06$
Direct (c^1)	$-.25$	-2.03	.043	$-.49$, $-.01$
Indirect (ab^1)	$-.06$			$-.13$, .00

Note. Total (c) = direct (c^1) + indirect guilt (ab^1).

Table 3

Mediation on the effect of hunger and satiety, and eating with awareness on orthorexia nervosa via shame

	β	t	p	95% CI
Hunger and satiety				
Total (c)	$-.19$	-2.10	.036	$-.37$, $-.01$
Direct (c^1)	.07	0.78	.434	$-.10$, .24
Indirect (ab^1)	$-.26$			$-.37$, $-.16$
Eating with awareness				
Total (c)	$-.31$	-2.49	.014	$-.56$, $-.06$
Direct (c^1)	$-.14$	-1.22	.226	$-.37$, .09
Indirect (ab^1)	$-.17$			$-.31$, $-.05$

Note. Total (c) = direct (c^1) + indirect shame (ab^1).

DISCUSSION

To our knowledge, this was the first study which aimed to find associations between ON, mindful eating and guilt and shame. The findings of the current study suggested that mindful eating, specifically, focused eating, hunger and satiety, and eating with awareness, was significantly negatively associated with ON, and guilt and shame (except focused eating and shame). If according to Mantzios et al. (2020) there are subscales that measure mindful eating behaviour and mindful decision making, mindful eating decision making (i.e., hunger and satiety) and its relation to ON are explained through the association with guilt, and mindful eating behaviour (i.e., eating with awareness, eating attentively) is explained through shame. The potential implications for clinical practice and the contribution to alleviating self-evaluative symptoms may be an element that could make a difference, but further research needs to look into similar mindfulness-based constructs.

The negative associations between ON and focused eating, hunger and satiety cues and eating with awareness imply that those with higher rates of ON focused less on their food whilst eating, paid less attention to hunger and satiety cues and were less aware of food when eating. This is consistent with research suggesting that being mindful when eating can reduce maladaptive or disordered eating behaviours (Winkens et al., 2018). For example, Brewer et al. (2018) found that mindfulness training was effective in reducing maladaptive eating behaviours such as restrained eating, which has been compared to ON due to similarities regarding the restriction of

certain foods (Depa et al., 2019). Therefore, this may contribute to research which encourages the use of mindful eating in preventing maladaptive eating behaviours (Kristeller et al., 2006), and could accordingly be applied to the potential future treatments of ON.

Orthorexia nervosa was also significantly positively associated with guilt and shame, which may suggest that if someone displays more orthorexic tendencies, they may experience more feelings of guilt and/or shame, perhaps from not conforming to the strict diet associated with ON (Oberle et al., 2021). Striving to eat the purest and healthy foods comes with pressure, which may lead someone to feel guilty or shameful when they do not comply with this diet (Vuillier et al., 2020). This finding is consistent with research which has found guilt and shame to be related to other maladaptive eating behaviours. For example, Solomon-Krakus and Sabiston (2017) found that body-checking and self-conscious emotions were associated with feelings of guilt and shame relating to body image and weight. This highlights the potential effects of societal and media pressures on body image perceptions, resulting in impacts on well-being due to negative feelings of guilt and shame, leading to maladaptive eating behaviours (Conradt et al., 2007; MacNeill et al., 2017). As ON is becoming more prevalent, and more people are becoming concerned with the health and purity of food, self-evaluative emotions such as guilt and shame may begin to increase due to the pressures of such a dietary style (Oberle et al., 2021). Comparably, guilt and shame relating to weight may also be a predecessor of orthorexic tendencies as the negative self-evaluations may cause the person to begin engaging in maladaptive eating behaviour (Craven & Fekete, 2019), although there is uncertainty whether feelings of guilt and shame predate or postdate orthorexic tendencies.

Significant negative relationships were also found between guilt and focused eating, hunger and satiety cues and eating with awareness, and between shame and hunger and satiety cues, and eating with awareness. Negative emotions such as guilt and shame could possibly arise as a product of responding to psychological or external cues, such as smell or the sight of appealing food, rather than paying attention to our hunger signals (Kristeller et al., 2006). Mindfulness within mindful eating has been found to be effective at reducing emotional eating, which refers to eating in response to negative emotions (Lattimore, 2020). The mindfulness element can encourage one to pay more attention to any distressing emotions and accept them rather than reverting to food (Egan et al., 2021; Mantzios & Giannou, 2014; Mantzios et al., 2020). This may be a potential reason for the negative relationship between the mindful eating domains, and guilt and shame, as having less mindful eating ability may lead to higher negative emotions.

There was no significant relationship between eating without distraction, and either ON or guilt and shame. Winkens et al. (2018) found no significant correlation between the eating without distraction subscale and retrained eating. Restrained eating has been previously compared to ON as having some overlap regarding the similarities in limiting the food that is eaten (Barthels et al., 2019). Therefore, the lack of association between restrained eating and eating without distraction might translate similarly for ON and eating without distraction. This might be because eating with distraction, such as watching TV, tends to be associated with overeating and weight gain (Winkens et al., 2018), whereas ON does not tend to involve overeating or weight gain and thus eating without any distractions may have no impact on it.

The current study found a positive relationship between BMI and feelings of guilt and shame, indicating that the higher one's BMI, the more one displays feelings of guilt and shame. This may be because those who are overweight or classed as having obesity are often discriminated against in society and can thus suffer from feelings of guilt and shame inflated through overeating or failed weight loss attempts (Conradt et al., 2007). Albohn-Kühne and Rief (2011) found that binge eating disorder in obese people was strongly related to feelings of guilt and shame, suggesting that those who are overweight, or have a higher BMI, may be subject to these types of emotions. Additionally, higher BMI and obesity have been related to negative emotions as well as maladaptive eating behaviours (Westermann et al., 2015). Therefore, this may explain the positive association that was found between BMI and guilt and shame, as it is likely that those with a higher BMI were overweight.

The second part of the analysis found that guilt and shame mediated the relationship between ON and mindful eating. Perhaps the findings correspond to ON being highly restrictive to the quality of food that one can eat (Dunn & Bratman, 2016), and consequently experiencing negative self-evaluations such as guilt and shame if there is some form of incongruency between behaviours and adherence to the diet (Kalika et al., 2022; Oberle et al., 2021). More specifically, further exploration into the mediational effects suggested that focused eating had a direct effect on ON, and an indirect effect via guilt, whereas hunger and satiety had a non-significant direct effect on ON, but a significant indirect effect via guilt and shame. Furthermore, eating with awareness had a significant direct effect on ON, a non-significant indirect effect via guilt, and a significant indirect effect via shame, thus suggesting that guilt and shame may mediate associations between mindful eating and ON.

Given the established role that mindful eating and guilt and shame have been suggested to play towards ON within the current study, identifying

interventions for the prevention or treatment of ON may be of benefit. Mindfulness-based interventions have been widely used in eating behaviour and disordered eating research (e.g., Godsey, 2013; Kristeller & Wolever, 2010; Marek et al., 2013; Turgon et al., 2019). For example, in a recent study, mindfulness induction resulted in significantly lower negative affect and lower trends for explicit body dissatisfaction amongst those with disordered eating, such as anorexia nervosa or bulimia nervosa (Keng & Ang, 2019). Moreover, exploring the effectiveness of mindful eating, mindfulness and self-compassion as interrelated constructs may also be promising (Mantzios & Giannou, 2019; Mantzios & Wilson, 2015). Mantzios et al. (2018a) suggested that mindfulness- and compassion-based constructs together can improve psychological and physiological health. This may be due to the mindfulness element which is found within both self-compassion and mindful eating, meaning both concepts involve a similar element of conscious awareness but with a different approach to suffering (Neff, 2003; Neff et al., 2007).

LIMITATIONS AND FUTURE DIRECTIONS

There were some limitations to the current study which should be noted. Firstly, this study had a low percentage of men (18%) compared to women, which limits the representativeness of the sample for both males and females. Eating disorders tend to be higher in women, perhaps due to the female thin ideal which often causes body dissatisfaction (Anixiadis et al., 2019; Chen et al., 2020; MacNeill et al., 2017). Therefore, future research could try to recruit similar numbers of men and women or even involve studies that assess men alone.

Additionally, most of the participants had no specific dietary style, which may have also influenced the findings of the current study. Vegans, vegetarians, and individuals following a gluten-free diet tend to have stricter diets than someone who has no dietary style, and this has been related to eating disorder symptomology (Heiss et al., 2017). In this study, vegans, vegetarians, and gluten-free individuals had higher means of ON than those with no specific dietary style, which might be an outcome of the restrictions that these diets entail, including cutting out meat products (Heiss et al., 2017; Kalika et al., 2022).

Furthermore, the sample was also mainly White, meaning that generalizing the findings to a wider range of cultures and ethnicities should be done with caution. Future research could try to recruit a wider range of genders, ages, dietary styles, and ethnicities to be able to better generalise the findings and identify specific population needs.

Finally, the present study did not include any measurements on negative affect and its potential effect towards ON and guilt and shame. For example, previous research has found negative affect to strengthen the relationship between body dissatisfaction and disordered eating (Cruz-Sáez et al., 2020; Rosewell et al., 2018), and showed body dissatisfaction to have a direct and indirect effect via negative affect on disordered eating (Cruz-Sáez et al., 2020). Whilst it could be suggested that disordered eating behaviours are used as a method to cope with negative mood states, especially when related to one's body dissatisfaction, it could also be postulated that negative affect leads to maladaptive eating, resulting in body dissatisfaction (Wildes et al., 2012). Therefore, future research should explore the direct and indirect role of negative affect on ON and guilt and shame.

CONCLUSIONS

Overall, this study has provided useful insight into the relationships between ON, mindful eating and guilt and shame. Firstly, a significant relationship was found between ON and mindful eating, as well as guilt and shame, highlighting the connection between a strictly controlled diet with lower levels of mindful eating and high guilt and shame. This has contributed to our knowledge of ON, revealing how it relates to guilt and shame and mindful eating. We also revealed the mediating role of guilt and shame, in explaining the negative relationship between ON and mindful eating. The findings provide practical insight into how the variables associate with each other and contribute to the psychological understanding of the topics explored.

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