An Examination of Temperament, Eating Behaviours, and Body Dissatisfaction as predictors of Weight Suppression in Anorexia Nervosa, Bulimia Nervosa and Binge Eating Disorder

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Abstract

Understanding factors that contribute to weight suppression across eating disorders as well as unique factors that may promote weight suppression for specific disorders is an important field of study. Weight suppression is the difference between highest past body weight and current weight, and has been associated with weight gain, continuation of binge eating and purging, and longer duration of illness in bulimia nervosa and anorexia nervosa. There is existing research to suggest that eating behaviours and body dissatisfaction may promote weight suppression differently depending on the eating disorder. The aim of the current study was to understand how temperament dimensions (novelty seeking, harm avoidance, reward dependence, and persistence), eating behaviours and body dissatisfaction predict weight suppression in a sample of 301 women with a primary diagnosis of anorexia nervosa, bulimia nervosa, or binge eating disorder. Anorexia nervosa was associated with higher levels of weight suppression followed by bulimia nervosa, and binge eating disorder was associated with the lowest weight suppression. Higher harm avoidance (characterised by inhibiting behaviours to avoid negative outcomes, experiencing worry, being fearful of uncertainty, and shyness with new people) and more frequent food restriction were found to positively predict weight suppression in the combined sample. Anorexia nervosa, bulimia nervosa, and binge eating disorder diagnoses were examined as possible moderators of the associations among eating behaviours and weight suppression, and body dissatisfaction and weight suppression. No moderation effects were found. These findings suggest that weight suppression is a transdiagnostic risk factor and contribute to understanding how temperament and eating behaviours promote weight suppression and can be applied to promoting healthy weight. Targeting harm avoidance in eating disorder treatment could promote healthy eating and recovery by alleviating the negative impact of weight suppression.

Introduction

Dimensions of temperament, eating behaviours, and body dissatisfaction may be associated with weight suppression in women with anorexia nervosa (AN), bulimia nervosa (BN) and binge eating disorder (BED) and these factors may have a different impact on weight suppression for each diagnosis. Weight suppression describes the discrepancy between current body weight and previous highest weight (Lowe, 1993; Lowe et al., 2018). This construct has clinical importance as it has been positively associated with weight gain throughout treatment, reduced treatment success, and higher binging and purging frequency (Butryn et al., 2006; Carter et al., 2008; Carter et al., 2015; Solmi et al., 2018; Wildes & Marcus, 2012). Understanding factors that contribute to weight suppression has potential to inform treatments targeting these factors (Gorrell et al., 2019; Lowe et al., 2018).

Weight Suppression in Eating Disorders

In existing research there have been different calculations for weight suppression. Absolute weight suppression represents the difference between highest ever weight and current weight (Lowe et al., 2018). Relative weight suppression represents a weight percentage decrease from highest ever weight to current weight (Piers et al., 2019; Schaumberg et al., 2016). Relative weight suppression takes into account the potential that weight reduction has a larger biological and behavioural impact on a smaller person than the same weight reduction would have on a larger person (Lowe et al., 2018). AN, BN, and BED can be distinguished by different levels of weight suppression, AN has been associated with the highest weight suppression (Piers et al., 2019; Solmi et al., 2018), and BED has been associated with the lowest weight suppression (Cook et al., 2015).

Anorexia nervosa is characterised by food restriction, dietary restraint (Huse, & Lucas, 1984), and low body weight (American Psychiatric Association, 2013; Swenne, 2016).

Dietary restraint refers to consciously attempting to limit food intake, long periods without eating, a desire to have an empty stomach and attempting to follow dietary rules (Fairburn & Cooper., 1993). A pattern of binge eating and purging including vomiting, and misuse of laxatives or diuretics in attempts to reduce weight gain can also accompany AN (Heaner, & Walsh, 2013; Huse, & Lucas, 1984). People with AN are likely to have lost a large percentage of body weight during the course of the illness (Huse, & Lucas, 1984; Jagielska, & Kacperska, 2017; Swenne, 2016), and some may have had a higher body mass index (BMI) than those of the same age before AN onset (Berkowitz et al., 2016; Swenne, 2001; Swenne, 2016). Although low body weight in this illness can reflect not gaining weight as developmentally appropriate (Swenne, & Thurfjell, 2003) and therefore weight loss has not occurred. In existing research high absolute weight suppression has been found in people with AN, with mean weight suppression values of 14.3 kilograms (Carter et al., 2015), and 17.05 kilograms reported (Wildes, & Marcus, 2012). Weight gain and maintenance are important aspects of recovery from this disorder (Jordan et al., 2020; Lock et al., 2010).

Bulimia nervosa is characterised by binge eating and behaviours that attempt to limit weight gain which may include compensatory behaviours such as fasting and excessive exercise, or purging such as vomiting and the misuse of laxatives or diuretics (Heaner, & Walsh, 2013). Binge eating has been tested in a laboratory setting; those with BN consumed a significantly greater number of calories than a control group when asked to binge eat, however during a 'normal' meal, those with BN consumed less (Walsh et al., 1992). Both over-eating and under-eating account for disturbances in eating in BN. Bulimia nervosa is associated with average or high weight (American Psychiatric Association, 2013; Butryn et al., 2011). Dieting and weight loss often occur before onset of BN (Brewerton et al., 2000; Shaw et al., 2012) and weight fluctuations are common (Chen et al., 2021; Shaw et al., 2012; Thomas et al., 2011). High absolute weight suppression has been found for people with BN

and mean weight suppression values of 7.1 kilograms (Carter et al., 2008), 9.4 kilograms (Butryn et al., 2006), 10.4 kilograms (Butryn et al., 2011), and 12 kilograms (Lowe et al., 2006) have been reported. As women with BN are typically considered at a healthy weight (Butryn et al., 2006; Fairburn, & Cooper, 2007), weight suppression may not be considered clinically relevant in treatment, and this can mean that unhealthy restriction is sustained (Fairburn, & Cooper, 2007); Hessler et al., 2018; Lowe et al., 2006).

Binge eating disorder is characterised by repeated episodes of binge eating and average or high weight (American Psychiatric Association, 2013; Keel et al., 2019). In a laboratory setting those with BED consumed a significantly greater number of calories than a control group when asked to binge eat and also during a 'normal' meal (Guss et al., 2002; Yanovski et al., 1992). Low weight suppression has been for those with BED (Keel et al., 2019). In a sample with BED mean weight suppression was 2.6 BMI units (Cook et al., 2015). In a sample with BED divided into frequent dieters and infrequent dieters relative weight suppression values were 5.78% and 3.50% respectively (Roehrig et al., 2009). Weight change has been found to be variable during treatment and recovery from this disorder, and improvement in binge eating was not significantly associated with weight loss (Pacanowski et al., 2018).

Weight Suppression predicts Weight Gain and Treatment Outcome

Weight suppression in non-clinical samples has been associated with later weight gain (Lowe et al., 2019; Stice et al., 2011), current attempts to lose weight, binge eating, weight checking, overvaluation of weight and shape, fasting (Goodman et al., 2018), purging (Burnette et al., 2017), weight-bias internalisation (Burnette, & Mazzeo, 2020), drive for thinness (Bodell et al., 2017), body dissatisfaction and dietary restraint (Burnette, & Mazzeo, 2020; Burnette et al., 2017; Burnette et al., 2018). In female university students, absolute

weight suppression was the only significant predictor of fat gain two years later (Lowe et al., 2019). In an eating disorder and overweight prevention trial, weight suppression at baseline was associated with greater weight gain over the 24 month trial and those with low baseline BMI and high absolute weight suppression gained the most weight (Call et al., 2021). High weight suppression can identify those who are at risk for developing an eating disorder, as weight suppression in non-clinical samples has been found to predict future eating disorder symptoms (Burnette et al., 2020; Burnette, & Mazzeo, 2020; Goodman et al., 2018; Keel, & Heatherton, 2010) symptoms of BN up to 20 years later (Bodell et al., 2017), and onset of AN and BN (Stice et al., 2020). Weight suppression has also been associated with weight gain and illness trajectory in women with an eating disorder diagnosis (Butryn et al., 2006; Carter et al., 2015; Carter et al., 2008; Wildes, & Marcus, 2012).

In women with BN, pre-treatment absolute weight suppression has been positively associated with weight gain throughout treatment (Carter et al., 2008; Hessler et al., 2018; Lowe et al., 2006; Lowe et al., 2007; Piers et al., 2019; Solmi et al., 2018) and weight gain at five-year follow-up (Herzog et al., 2010). Relative weight suppression (Piers et al., 2019) and the interaction of relative weight suppression and BMI has also significantly predicted weight gain during inpatient treatment. High relative weight suppression and low BMI at admission were associated with higher weight at discharge (Lowe et al., 2006; Piers et al., 2019). The association between absolute weight suppression and weight gain was not supported by Zunker and colleagues (2011) who found that weight suppression as both a continuous and dichotomised variable was not associated with weight gain. In summary the existing evidence indicates that weight suppression promotes weight gain in BN.

Weight suppression has predicted poorer outcome and course of BN. In a community sample with BN or subthreshold BN, weight suppression was found to have a significant

medium-sized effect on clinical impairment measured with the clinical impairment assessment (Hagan et al., 2017). Weight suppression has demonstrated ability to predict outcome of cognitive behavioural therapy (CBT) for BN (Butryn et al., 2006) and maintenance of BN symptoms (Butryn et al., 2006; Keel, & Heatherton, 2010). Absolute weight suppression at admission has negatively predicted treatment completion (Butryn et al., 2006), positively predicted treatment dropout (Butryn et al., 2006), and was positively associated with length of time to remission over a period of eight years (Lowe et al., 2011). Controlling for BMI, dietary restraint, and weight and shape concerns, those who continued binging and purging after eighteen sessions of CBT had significantly higher levels of pre-treatment weight suppression (Butryn et al., 2006). In a sample of women with BN or sub-threshold BN, those with high weight suppression and low BMI binged most frequently, and those with high weight suppression regardless of BMI purged most frequently (Butryn et al., 2011). However, the association between weight suppression and poorer treatment outcome in samples with BN has not been supported by all research (Carter et al., 2008; Dawkins et al., 2013; Zunker et al., 2011). The finding that weight suppression predicted treatment dropout and continuation of binge eating and purging was not replicated by Carter and colleagues (2008) or Dawkins and colleagues (2013). Furthermore, Zunker and colleagues (2011) found that absolute weight suppression was not associated with abstinence or reduction in binge eating or purging, or treatment completion. To conclude weight suppression in those with BN leads to weight gain (Carter et al., 2008; Hessler et al., 2018; Lowe et al., 2006; Lowe et al., 2007; Piers et al., 2019; Solmi et al., 2018) and weight suppression at admission has been associated with poorer outcomes in treatment (Butryn et al., 2006; Keel, & Heatherton, 2010), and longer duration of BN (Lowe et al., 2011).

Weight suppression at admission for AN treatment has been associated with weight gain throughout treatment (Berner et al., 2013; Carter et al., 2015; Piers et al., 2019; Wildes

& Marcus, 2012), faster rate of weight gain (Carter et al., 2015; Wildes, & Marcus, 2012), and higher (healthy) BMI up to 18 years later (Witt et al., 2014). Absolute weight suppression at discharge has also predicted weight gain over the following year (Bodell et al., 2016). Both high absolute (Berner et al., 2013) and relative (Piers et al., 2019) weight suppression have been found to interact with low BMI to predict higher weight at discharge. The interaction of absolute weight suppression converted into BMI units and BMI has significantly predicted weight gain at 6 and 10 year follow-up (Witt et al., 2014). Weight suppression in AN has utility in predicting weight restoration during treatment and long-term weight maintenance.

Weight suppression has demonstrated ability to predict outcome of intensive behavioural treatments for AN. High weight suppression and low BMI at admission were associated with lower symptom severity at discharge (Berner et al., 2013). Given that this weight suppression and BMI interaction predicted weight gain in women with AN, weight restoration may explain this reduction in symptoms. Higher weight gain during treatment and lower weight suppression at follow-up were associated with AN recovery after a family-based intervention (Swenne et al., 2017), and weight restoration was significantly associated with decreased psychological and physical symptoms (Sysko et al., 2005). Wildes and Marcus (2012) found that absolute weight suppression at pre-treatment positively predicted binge eating and purging at end of treatment. High weight suppression and high BMI at admission were associated with higher symptom severity at discharge (measured with the Eating Disorder Examination Questionnaire, Berner et al., 2013; Bodell et al., 2016 and Eating Disorders Inventory-3, Berner et al., 2013), and greater frequency of purging throughout follow-up (Bodell et al., 2016). The association between absolute weight suppression and frequency of binge eating and purging has not been supported by all research as Carter and colleagues (2015) failed to replicate the findings of Wildes and Marcus (2012) that weight suppression at pre-treatment positively predicted binge eating and purging at end

of treatment. Uniacke and colleagues (2020) found that absolute weight suppression was not associated with weight gain over treatment, weight maintenance 12 months after discharge, or time to relapse. The research of Uniacke and colleagues (2020) included women with AN who had completed weight restoration and were above a BMI of 19 before beginning treatment which may have reduced the salience of weight suppression. In summary weight suppression in those with AN leads to weight gain (Berner et al., 2013; Carter et al., 2015; Piers et al., 2019; Wildes & Marcus, 2012), which contributes to recovery (Swenne et al., 2017). However, weight suppression at treatment admission has also been associated with poorer outcomes in treatment (Berner et al., 2013; Bodell et al., 2016; Wildes, & Marcus, 2012).

Limited research has been conducted focusing on weight suppression in BED. Absolute weight suppression as both a continuous and dichotomised variable was not associated with weight gain, change in frequency of binge eating, or treatment completion (Zunker et al., 2011). Given the lower levels of weight suppression in BED and clinical differences in eating patterns and compensatory behaviours with AN and BN, more research is needed to understand weight suppression for people with BED.

Weight suppression leads to weight gain in AN and BN and may perpetuate pathology or lead to reduced treatment success. Incorporating weight suppression into assessment and considering weight history during treatment has potential to improve outcomes (Juarascio et al., 2018). Weight suppression may be a unique aspect of eating disorder pathology that prolongs the course of these illnesses. More research is needed to understand weight suppression (Juarascio et al., 2018; Lowe et al., 2018).

Eating Behaviours and Weight Suppression

Weight suppression at admission has predicted the continuation of binge eating and purging at the end of treatment in samples with AN (Bodell et al., 2016; Wildes, & Marcus, 2012) and BN (Butryn et al., 2011; Butryn et al., 2006). Weight suppression has also been associated with eating behaviours in cross sectional studies. In a mixed eating disorder sample of AN, BN, BED and eating disorder not otherwise specified (EDNOS), restrictive eating behaviours were significantly positively correlated with absolute weight suppression (Lavender et al., 2015). In another mixed eating disorder sample dietary restraint was significantly positively associated with relative weight suppression (Romano et al., 2021). Weight suppression was not associated with dietary restraint in a sample of youth with BN (Accurso et al., 2016), however a significant positive association was found in a sample with AN (Berner et al., 2013). Existing evidence suggests that restriction and weight suppression are positively associated in AN and mixed eating disorder samples but not in BN.

Binge eating and compensatory behaviours have been associated with weight suppression in samples with BN. In mixed eating disorder samples, binge eating and compensatory behaviours have been found to have no significant association to weight suppression (Lavender et al., 2015; Romano et al., 2021). However, weight suppression has been associated with greater binge eating in BN (Bodell, & Keel, 2015). The interaction of high weight suppression and high BMI and the interaction of low weight suppression and low BMI were associated with greater frequency of binge eating in youth with BN (Accurso et al., 2016). Lower BMI was associated with greater frequency of compensatory behaviours, with this association weakest for those with high weight suppression (Accurso et al., 2016). In summary higher weight suppression in BN has been associated with greater binge eating, and

for those with low BMI high weight suppression has been associated with greater compensatory behaviours and less binge eating.

The findings of Cook and colleagues (2015) suggest that different eating behaviours might be associated with weight suppression for different disorders. Exercise frequency was found to moderate the association between BN or BED diagnosis and absolute weight suppression (Cook et al., 2015). Weight suppression was significantly higher in BN than in BED specifically for those with low exercise frequency. For those with high exercise frequency weight suppression was similar between the two diagnoses (Cook et al., 2015). Exercise moderated weight suppression in BED, such that greater exercise frequency was associated with greater weight suppression. AN, BN, and BED differ in the pattern and severity of eating and compensatory behaviours (Heaner, & Walsh, 2013), which may contribute to differences in weight suppression among diagnoses. Restriction has been found to be positively associated with weight suppression in AN (Berner et al., 2013) and mixed samples (Lavender et al., 2015; Romano et al., 2021), and binge eating (Accurso et al., 2016; Bodell, & Keel, 2015) and compensatory behaviours (Accurso et al., 2016) have been associated with weight suppression in BN. Exercise has been found to predict weight suppression in BED (Cook et al., 2015). Eating behaviours have been found to have different associations with weight suppression for different eating disorders, and these distinctions may be important for reducing the negative impact of weight suppression.

Body Dissatisfaction and Weight Suppression

Body dissatisfaction reflects the experience of feeling unhappy with specific areas of one's body, the belief areas of the body are too large and the desire to lose weight or return to a thinner body shape (Garner, 1991). High BMI increases the risk of experiencing body dissatisfaction (Burnette et al., 2020; Stice, & Shaw, 2002), however body dissatisfaction has

also been positively associated with weight suppression in non-clinical samples (Burnette et al., 2018; Goodman et al., 2018). Within a sample of undergraduate students, weight suppression motivated by appearance or for sports or military reasons (rather than weight suppression due to stress, illness or an unrelated psychological disorder) was significantly associated with body dissatisfaction (Burnette et al., 2020). In a community sample, for those who did not binge, weight suppression had a small negative association with body dissatisfaction, and for those who did binge, there was no association between weight suppression and body dissatisfaction (Mitchell et al., 2011).

Body dissatisfaction is a central psychopathology in AN, BN and BED (American Psychiatric Association, 2013; Laporta-Herrero et al., 2018). Greater body dissatisfaction has been identified in BN than in other eating disorders (Laporta-Herrero et al., 2018; Lavender et al., 2015). Using latent profile analysis, a sample with a diagnosis of AN, BN or EDNOS were grouped into six personality profiles defined by their scores on subscales of the TCI (Krug et al., 2011). Significantly more individuals with the binge-purging subtype of BN were characterised as 'inhibited', 'maladaptive', and 'self-focused'. These three profiles had significantly higher levels of body dissatisfaction than the other profiles (Krug et al., 2011).

Weight suppression and body image have been found to have different directions of association across diagnoses. Absolute weight suppression and relative weight suppression were positively associated with weight and shape concerns and dissatisfaction in mixed eating disorder samples (Lavender et al., 2015; Romano et al., 2021). The interaction of weight suppression and diagnosis were not found to predict weight and shape concerns (Lavender et al., 2015). Body dissatisfaction and absolute weight suppression were not significantly associated in a sample with AN (Berner et al., 2013), but were found to be significantly positively associated in a sample of youth with BN (Accurso et al., 2016). In a

large sample of outpatients using the Eating Disorder Inventory- body dissatisfaction

subscale, weight suppression (calculated using BMI to account for height) at the beginning of

treatment was positively correlated with body dissatisfaction for those with AN, and

negatively correlated with body dissatisfaction for those with BN (Solmi et al., 2018). These

findings of Solmi and colleagues (2018) may elucidate an important distinction between AN

and BN. For women with AN reaching the ideal weight is an unachievable goal (Zanetti et

al., 2013) as lower BMI increases sensitivity to weight gain and leads to an inflexibility to

update body image (Cornelissen, Bester, Cairns, Tovee, Cornelissen, 2015; Zanetti et al.,

2013), therefore no amount of weight loss is sufficient to experience body satisfaction. For

women with BN, achieving a lower weight than their historical weight could lead to

reductions in body dissatisfaction (Herzog et al., 2010), as reaching a low weight may lead to

satisfaction at achieving the thin ideal. In summary the association between body

dissatisfaction and weight suppression may be different across eating disorders, and warrants

further investigation.

Dimensions of Temperament, Weight, and Eating Disorders

Temperament is defined as the emotional responses that are relatively heritable and

stable over one's life (Cloninger, 1994). The Temperament and Character Inventory (TCI;

Cloninger et al., 1994) has been used to identify distinct temperament profiles for difference

eating disorders (Atiye et al., 2015; Buelens et al., 2020; Bulik et al., 1995; Fassino et al.,

2001; Fassino, Abbate-Daga, et al., 2002; Fassino et al., 2004; Klump et al., 2000; Krug et

al., 2011; Rybakowski et al., 2004). The TCI has also been used in non-clinical populations to

identify the associations between temperament dimensions and weight status (Fassino,

Leombruni, et al., 2002; Fernández-Aranda et al., 2014; Fukuhara-Makiyama et al., 2021;

Sullivan et al., 2007; Suzuki et al., 2009), and temperament dimensions and weight changes (Hintsanen et al., 2012; Koutras et al., 2021; Sullivan et al., 2007).

Novelty seeking is characterised by excitement for novel experiences, impulsivity, extravagance, short temper and avoidance of boredom or frustration (Cloninger, 1994). Novelty seeking has been found to be significantly higher in higher weight people than in healthy controls (Fassino, Leombruni, et al., 2002; Sullivan et al., 2007). People who attended a weight management program including behavioural therapy and diet education and lost body weight were lower in novelty seeking than those who did not lose weight during this program (Sullivan et al., 2007). In a longitudinal study, novelty seeking predicted increasing BMI over six years in healthy men and women (Hintsanen et al., 2012). Impulsiveness, a component of novelty seeking, was associated with weight regain after weight loss in adults without eating disorders (Koutras et al., 2021). In Japanese women under the age of 23, maintaining a BMI under 18.5 kg/m2 over three years was associated with lower novelty seeking (Fukuhara-Makiyama et al., 2021). Although in a sample of people with high weight with no history of an eating disorder, lower novelty seeking was found compared to healthy weight controls (Fernández-Aranda et al., 2014). This discrepancy may be explained by the samples used, as studies with people of high weight with BED find higher novelty seeking compared to a non-clinical healthy weight control group (Fassino, Leombruni, et al., 2002) and lower effortful control compared to a high weight non-binge eating control group (Müller et al., 2012). In summary novelty seeking has been associated with higher weight and weight gain in non-clinical samples.

Novelty seeking has been found to be lower for people with AN than for healthy controls, particularly for the restrictive AN subtype (characterised by restricted eating to reduce calorie intake; (Fassino, Abbate-Daga, et al., 2002; Klump et al., 2000; Nagata et al.,

2003; Rybakowski et al., 2004) and to a lesser extent the purging subtype (characterised by compensatory behaviours; (Buelens et al., 2020; Klump et al., 2000). Comparatively, novelty seeking has been found to be higher in those with BN than AN (Buelens et al., 2020; Bulik et al., 1995; Fassino et al., 2001) and higher in BN than in the non-clinical population (Atiye et al., 2015; Fassino, Abbate-Daga, et al., 2002; Fassino et al., 2004). However, in a Japanese sample novelty seeking was not significantly different between BN and a non-clinical control group (Nagata et al., 2003). Binge eating was associated with higher novelty seeking in a mixed AN, BN and BED sample (Rotella et al., 2018). Novelty seeking has been found to be distinctly low in AN, and higher in BN and in people who binge eat. Given these findings this dimension of temperament may contribute to lower weight suppression status and promote greater binge eating.

Harm avoidance is characterised by avoidance of negative outcomes and worry about potential future problems, fear of uncertainty, and shyness with new people (Cloninger, 1994). Higher weight was significantly associated with higher harm avoidance in a non-clinical sample of women (Suzuki et al., 2009). Women with higher weight have been found to have significantly higher levels of harm avoidance than healthy weight control groups (Fassino, Leombruni, et al., 2002; Fernández-Aranda et al., 2014). Weight gain over six years in non-clinical men and women was significantly associated with higher harm avoidance (Hintsanen et al., 2012). However, harm avoidance has also been associated with low weight. In Japanese women losing weight over three years from healthy to unhealthy weight was associated with higher harm avoidance (Fukuhara-Makiyama et al., 2021). Differences in the findings of associations between harm avoidance and weight may reflect a cultural difference as stronger pressure and desire to be thin has been found in Asian women (Fukuhara-Makiyama et al., 2021). Harm avoidance has been associated with higher weight in non-

clinical populations, and with both weight gain and weight loss which indicated that harm avoidance may be associated with unhealthy high and low weight status.

Harm avoidance has been found to be high in all eating disorders compared to the general population (Atiye et al., 2015; Fassino et al., 2001; Fassino, Abbate-Daga, et al., 2002; Klump et al., 2000; Krug et al., 2011). AN has been associated with the highest level of harm avoidance (Atiye et al., 2015) particularly the AN restrictive subtype (Fassino, Abbate-Daga, et al., 2002; Fassino et al., 2004; Rybakowski et al., 2004) and purging type (Klump et al., 2000). Harm avoidance may drive restriction designed to avoid weight gain and to achieve a thinner weight, therefore it could be positively associated with weight suppression. Harm avoidance may reflect a general risk for greater eating psychopathology or unhealthy eating behaviours, and there is potential that a positive association with weight suppression exists.

Reward dependence is characterised by social attachment, sentimentality, and dependence on the approval of others (Cloninger, 1994). In mixed samples of healthy men and women reward dependence has been found to be associated with higher weight (Suzuki et al., 2009). In a sample of people with high weight with no history of an eating disorder, higher reward dependence was found compared to that in healthy weight controls (Fernández-Aranda et al., 2014). Reward dependence predicted stable or decreasing BMI in women but not men over six years (Hintsanen et al., 2012). This gender discrepancy can be explained by the greater pressure for women to be thin and therefore for women high in reward dependence the drive for social acceptance may create greater cultural pressure (Hintsanen et al., 2012). In summary reward dependence has been associated with higher weight and may be implicated in weight loss for non-clinical women.

Reward dependence has been found to be higher in women with AN than women with BN (Bulik et al., 1995). Individuals with binge purging type BN have been found to be more likely to have a maladaptive TCI profile characterised by lower reward dependence, while individuals with restricting AN were more likely to have an adaptive profile characterised by higher reward dependence (Krug et al., 2011). Binge eating disorder was associated with TCI profiles associated with both higher and lower levels of reward dependence than other profiles (Krug et al., 2011). Purging has been associated with lower reward dependence in a sample with AN, BN, and BED (Rotella et al., 2018). In summary reward dependence has been found to be higher in AN, and lower in BN and in people who purge. Given these distinctions this dimension of temperament may contribute to weight suppression status. Reward dependence may promote restriction and attempts to lose weight or maintain a lower weight, and therefore be associated with greater weight suppression.

Persistence is characterised by industriousness and perseverance even when frustrated or fatigued (Cloninger, 1994). Persistence was significantly lower in people with higher weight than in healthy weight controls (Sullivan et al., 2007). Persistence has been found to be high among those with AN (Fassino, Abbate-Daga, et al., 2002; Fassino et al., 2004), higher in the restrictive subtype than in the purging or binge-purging subtypes (Klump et al., 2000; Rybakowski et al., 2004), and lower in individuals with BED than in a healthy control group (Atiye et al., 2015). Bulimia nervosa has been associated with a TCI profile including lower persistence than other profiles more common to AN or BED (Krug et al., 2011). Persistence was higher in those who endorse restriction and lower in those who endorse binge eating in a mixed AN, BN, BED sample (Rotella et al., 2018). To conclude persistence has been found to be low in a higher weight non-clinical sample, highest in AN, and lower in BN and BED. Overall persistence has been associated with lower weight status and may promote

dietary restriction. Existing research suggests persistence could promote greater weight suppression in people with eating disorders.

Distinct temperament profiles for AN, BN and BED have been identified. Harm avoidance has been found to be high in all eating disorders compared to the general population (Atiye et al., 2015; Fassino et al., 2001; Fassino, Abbate-Daga, et al., 2002; Klump et al., 2000; Krug et al., 2011). Anorexia nervosa has been associated with lower novelty seeking (Fassino, Abbate-Daga, et al., 2002; Klump et al., 2000; Nagata et al., 2003; Rybakowski et al., 2004), highest harm avoidance (Atiye et al., 2015;Fassino, Abbate-Daga, et al., 2002; Fassino et al., 2004; Rybakowski et al., 2004), highest reward dependence (Bulik et al., 1995), and highest persistence (Fassino, Abbate-Daga, et al., 2002; Fassino et al., 2004). Bulimia nervosa has been associated with higher novelty seeking (Buelens et al., 2020; Bulik et al., 1995; Fassino et al., 2001), lower reward dependence (Krug et al., 2011; Rotella et al., 2018), and lower persistence (Krug et al., 2011). Binge eating disorder has been associated with higher novelty seeking (Fassino, Leombruni, et al., 2002; Müller et al., 2012), and lower persistence (Atiye et al., 2015). Distinctions in temperament may be meaningful to the presentation of these illnesses and could play a role in promoting weight suppression.

Summary of Reviewed research

Weight suppression has been identified as a clinically relevant concept that has been found to predict eating disorder onset (Bodell et al., 2017; Burnette et al., 2020; Burnette, & Mazzeo, 2020; Goodman et al., 2018; Keel, & Heatherton, 2010; Stice et al., 2020), and prolong the symptoms of BN (Butryn et al., 2006; Keel, & Heatherton, 2010; Lowe et al., 2011), and AN (Berner et al., 2013; Bodell et al., 2016; Wildes, & Marcus, 2012). Limited research has been conducted focusing on weight suppression in BED. Given existing findings that AN, BN and BED can be meaningfully classified based on temperament profiles (Krug

et al., 2011) and that dimensions of temperament are associated with eating psychopathology (Krug et al., 2011; Rotella et al., 2018), temperament may also be associated with weight suppression. More research is needed to understand predictors of weight suppression in AN, BN, and BED, and understand whether weight suppression is a transdiagnostic factor with shared causes or unique predictors in each disorder.

Eating behaviours and body dissatisfaction have been associated with weight suppression, however differences among eating disorders in these associations are not well understood. Existing evidence suggests that restriction and weight suppression are positively associated in AN (Berner et al., 2013) and mixed eating disorder samples (Lavender et al., 2015; Romano et al., 2021). Binge eating and compensatory behaviours have been positively associated with weight suppression in samples with BN (Accurso et al., 2016; Bodell, & Keel, 2015). Exercise has been found to moderate weight suppression in BED, such that greater exercise frequency was associated with greater weight suppression (Cook et al., 2015). Weight suppression and body dissatisfaction have been found to have different directions of association across diagnoses. Weight suppression has been positively associated with body dissatisfaction for those with AN, and negatively associated with body dissatisfaction for those with BN (Solmi et al., 2018). There is the potential that AN, BN, and BED diagnosis moderate the associations among food restriction, binge eating, purging, and body dissatisfaction, and weight suppression. Different eating behaviours may predict weight suppression in each disorder, and body dissatisfaction and weight suppression may have different directions of association across eating disorders.

The current study

The current study investigates the impact of dimensions of temperament, body dissatisfaction, and eating behaviours on weight suppression in a group of women with a

primary AN, BN or BED diagnosis. It is hypothesised that lower novelty seeking, higher

harm avoidance, higher reward dependence, and higher persistence will positively predict

weight suppression in the total sample. It is hypothesised that diagnosis will moderate the

associations among eating behaviours and weight suppression, such that restriction will

predict weight suppression in AN, binge eating, and purging will predict weight suppression

in BN, and binge eating will predict weight suppression in BED. It is predicted that diagnosis

will moderate the association between body dissatisfaction and weight suppression, such that

the association will be negative for those with BN and BED, and positive for those with AN.

Method

Participants

Participants were 301 women with a current primary diagnosis of AN, BN or BED from three completed clinical trials. Study one included women with a primary diagnosis of AN, study two included women with a primary diagnosis of BN, and study three included women with a primary diagnosis of BN or BED. The mixed sample in study three will be separated into those with BED and those with BN. Women in all samples were recruited by professional referral through general practitioners or mental health providers or by self-referral. The current study includes three diagnostic groups. The AN group comprises 55 women, aged 16 to 40, with BMI between 14.5 and 19. The BN group comprises 192 women, aged 16 to 63, with BMI above 17.5. The BED group comprises 54 women, aged 16 to 63, with BMI above 17.5.

Exclusion criteria were current severe major depression, severe medical complications of an eating disorder, medical illness that could disrupt assessment or treatment, and currently undergoing other psychotherapy. Other exclusion criteria for study one and study three were a current learning disorder or cognitive impairment and current or past bipolar I disorder or schizophrenia. An additional exclusion criteria for study two was current AN, however a BN diagnosis in DSM-5 precludes a diagnosis of AN (American Psychiatric Association, 2013). An exclusion criterion for study three was treatment with one of the trial therapies in the previous year.

Procedure

Screening for the three studies was conducted over the phone by study coordinators, and participants were made aware of the research nature of the treatment trial. At the initial

in-person assessment, the study was described in more detail including the risks and benefits of treatments. Participants then provided written informed consent. All measures for the current study were collected prior to beginning therapy. Clinicians assessed frequency of restricting, binge eating, and purging using the Eating Disorder Examination (EDE; Fairburn & Cooper, 1993) and asked women about their weight history. A research assistant measured current weight and height. Participants completed the Eating Disorder Inventory-2 (EDI-2; Garner, 1991) and the Temperament and Character Inventory (TCI; Cloninger et al., 1994; Cloninger, 1999).

Measures

Demographic and Clinical Characteristics

Demographic information was collected by a study clinician as part of broader clinical assessment. The Structured Clinical Interview for DSM-IV (First et al., 1996) was conducted in studies one and three. The Structured Clinical Interview for DSM-III-R (Spitzer et al., 1987; Spitzer et al., 1988) was conducted in study two. The presence of eating, mood, anxiety, alcohol and substance use, and personality disorders and suicidality over the past month and lifetime were assessed in the structured clinical interview.

Weight Suppression

Two measures of weight suppression were calculated—absolute and relative weight suppression. Absolute weight suppression, using Lowe's (1993) definition, was calculated by subtracting current weight from highest ever weight and is reported in kilograms. Relative weight suppression which reflects weight percentage change, was calculated by subtracting current weight from highest ever weight (absolute weight suppression), divided by highest ever weight and multiplied by 100. Relative weight suppression takes into account the

potential that weight reduction has a larger biological and behavioural impact on a smaller person than the same weight reduction might have on a larger person.

In existing research, weight suppression has been calculated using highest adult weight (Carter et al., 2008), or highest weight at current height (Butryn et al., 2011), while other studies have not specified any age or height criteria for highest weight (Butryn et al., 2006; Lowe et al., 2006; Lowe et al., 2007). In the current study, highest weight may have occurred before the age of 18 and before adult or current height is reached. Given that some participants were 16 or 17 years old, using highest ever weight was appropriate. Current weight was measured by a research assistant and highest historical weight was self-reported. Validity of self-reported weight history is high. Among women aged 25 to 42 years, correlation between recalled and measured past weight at age 18 was .87 (Troy et al., 1995).

Temperament and Character Inventory

The Temperament and Character Inventory (Cloninger et al., 1994) and the Temperament and Character Inventory — Revised (TCI — R; (Cloninger, 1999) are self-report personality questionnaires that assess variations among people in temperament and character. Temperament is defined as emotional responses that are relatively heritable and stable over one's life. In a large twin study, significant genetic contributions account for between 54% and 61% of the variation in the temperament dimensions novelty seeking, harm avoidance, and reward dependence (Heath et al., 1994). Individual differences in temperament are thought to relate to procedural memory and learning and to be regulated by the limbic system (Cloninger, 1994). The TCI has four temperament dimensions:

- **Novelty seeking**: a pattern of initiating new behaviours, and excitement for novel experiences, characterised by impulsivity, extravagance, short temper and avoidance of boredom or frustration.

- **Harm avoidance**: a pattern of inhibiting behaviours to avoid negative outcomes and experiencing worry about potential future problems, being fearful of uncertainty, fatigability and shyness with new people.

- **Reward dependence**: a tendency to depend on the approval of others and maintain behaviours that are approved, characterised by social attachment and sentimentality.

- **Persistence**: a tendency to be industrious and to persist even when frustrated or fatigued.

Psychometric characteristics of the TCI have been tested extensively and have been found to be valid and reliable. Internal consistency of the temperament scales is high, demonstrated by a Cronbach's alpha value of .96 in the current sample. Test–retest intraclass correlation coefficients of subscales are between .32 and .75 in a sample of inpatients (Cloninger et al., 1994) and between .51 and .83 in a sample of psychiatric outpatients (Cloninger et al., 1994).

Different versions of the TCI were administered in the three studies, therefore dimension scores were converted to a standardised format so all cases were compatible. The following versions were utilised: the 238 item version with a true/false response format was completed in study two, the 293 item version with a true/false format was completed in study one, and the TCI — R 240 item version with a one to five response scale was completed in study three. Dimensions had different ranges of potential scores due to the number of items included and the different response and scoring formats. The four dimensions were converted to a scale from zero to one for consistency across studies.

The Eating Disorder Inventory-2 Body Dissatisfaction

The Eating Disorder Inventory-2 (Garner, 1991; Garner et al., 1984) is a self-report questionnaire measuring attitudes and behaviours associated with eating disorders. The EDI-2 has 11 subscales and 91 items scored from 1 = *always* to 6 = *never*. Body dissatisfaction reflects the experience of feeling unhappy with specific areas of one's body, the belief areas of the body are too large and a desire to lose weight or have a thinner body shape. The body dissatisfaction subscale consists of nine items. The positively scored items are *I think that my stomach is too big, I think that my thighs are too large, I think my hips are too big, I think my buttocks are too large.* The negatively scored items are *I think that my stomach is just the right size, I feel satisfied with the shape of my body, I like the shape of my buttocks, I think that my thighs are just the right size, I think that my hips are just the right size.*

All EDI-2 subscales have demonstrated good test-retest reliability in earlier studies, with intraclass correlation coefficients between .81 and .89 in a clinical sample (Thiel, & Paul, 2006). The body dissatisfaction subscale has a test-retest correlation of .89 (Thiel, & Paul, 2006). The body dissatisfaction subscale has good internal consistency demonstrated by Cronbach's alpha of .91 in the current sample. The body dissatisfaction subscale has good convergent validity with the Anorexia Nervosa Inventory for Self-Rating — figure consciousness subscale with a correlation of $r = .59$ (Rathner, & Rumpold, 1994). The scale has good divergent validity with the General Health Questionnaire somatic complaints subscale with a correlation of $r = .08$, and the General Health Questionnaire anxiety and insomnia subscale with a correlation of $r = .15$ (Rathner, & Rumpold, 1994).

Eating Behaviours

Frequency of food restriction, binge eating, and purging by vomiting, laxative misuse or diuretics misuse was assessed using the EDE (Fairburn, & Cooper, 1993). For women in study two, frequency of these behaviours was assessed over a two-week period. For women in studies one and three, binge eating and purging was assessed over a four-week period. In studies one and three, food restriction was measured using a scale from *0 = no attempt at restraint* to *6 = attempted to exercise restraint every day.* Participant responses were converted so all responses reflect number of food restriction days, binge eating episodes, and purging episodes (by self-induced vomiting, laxative misuse, and diuretics misuse) over a four-week period. Vomiting, laxative, and diuretics misuse were combined to make one purging episodes construct.

Statistical Analyses

Statistical analyses were conducted using IBM Statistical Package for the Social Sciences (SPSS) Statistics 25 (IBM Corp, 2017). Statistical significance was set at $p < .05$.

Screening Data and Outliers

Data were screened for errors, and none were found. Modifications were made to clinical data to be consistent with DSM-5. A subthreshold diagnosis for lifetime major depressive disorder was changed to no diagnosis. Eight women with current AN were described as having current BN, however these BN diagnoses were not included in the current study to reflect DSM-5 criteria in which a diagnosis of AN precludes a BN diagnosis.

Data were screened for missing data. Suicide attempts and lethality data were missing for two women (0.7%). Current bipolar II disorder data were missing for one woman (0.3%) who had a lifetime bipolar II diagnosis. Personality disorder data were missing for a

proportion of participants. Nine women (3.0%) had missing data for all personality disorders, while schizotypal, narcissistic, borderline and antisocial personality disorder data were missing for ten women (3.3%). Schizoid personality disorder data were missing for eleven women (3.7%). Data about current or past weight were missing for some participants, therefore three women (1.0%) had missing data for relative weight suppression. Temperament data were missing for four women (1.3%). EDI body dissatisfaction data were missing for three women (1.0%).

Outliers were identified by inspecting distributions and boxplots. 5% trimmed means were used to determine whether outliers should be removed; those that did not greatly affect the mean were retained. The outlier value of 364 vomiting episodes within a four-week period was removed from purging episodes. The closest data point was 120 purging episodes.

Analyses

Descriptive statistics were calculated for demographic and clinical characteristics of each diagnostic group and the total sample. ANOVA was used to compare diagnostic groups to determine whether they differed in levels of key variables—weight suppression, the four dimensions of temperament, body dissatisfaction, and frequency of restriction days, binge eating episodes, and purging episodes. Tukey's test was used for post-hoc comparisons.

Hierarchical multiple regression was calculated to assess the independent contribution of temperament dimensions, body dissatisfaction, and eating behaviours on relative weight suppression, and assess the contribution of the interactions of diagnosis and body dissatisfaction, and diagnosis and eating behaviours on relative weight suppression. Diagnosis was dummy coded into two levels; AN and BED, with BN as the reference group. Body dissatisfaction, restriction days, binge eating, and purging were mean centered to reduce multicollinearity among interaction terms and predictors. Interaction terms were

created for the interaction of the two levels of diagnosis dummy codes and body

dissatisfaction, restriction days, binge eating, and purging. The interaction terms are AN

diagnosis multiplied by body dissatisfaction, AN diagnosis multiplied by restriction, AN

diagnosis multiplied by binge eating, AN diagnosis multiplied by purging, BED diagnosis

multiplied by body dissatisfaction, BED diagnosis multiplied by restriction, BED diagnosis

multiplied by binge eating, and BED diagnosis multiplied by purging.

Predictor variables were selected for hierarchical multiple regression using the enter

method. Step one of the hierarchical model included temperament dimensions – novelty

seeking, harm avoidance, reward dependence, and persistence. Step two of the hierarchical

model included diagnosis dummy codes for AN and BED, body dissatisfaction, and eating

behaviours; restriction days, binge eating, and purging. Step three of the hierarchical model

included the eight interaction terms. The best fitting model to predict weight suppression was

selected based on r^2 values, the regression coefficients for each predictor, and model

simplicity.

Checking Assumptions

Preliminary analyses were calculated to ensure the assumptions of analysis of

variance (ANOVA) were met. Levene's test indicated many variables violated the

assumption of homogeneity of variances, thus there is a greater probability of a type one

error. To avoid falsely rejecting the null hypotheses, Welch's test, which is robust against

heteroscedasticity, was compared to the results of the ANOVA.

Preliminary analyses were conducted to investigate the assumptions of multiple

regression. The assumption of normality was checked for all variables. Univariate

distributions were inspected by examining histograms, fit to Q-Q plots, skewness and

kurtosis. The Kolmogorov-Smirnov statistic for some data was significant suggesting

normality could be violated, however, this is common with large samples (Field, 2018). The four temperament dimensions and body dissatisfaction were normally distributed. Eating behaviours were not normally distributed. Food restriction days were negatively skewed. Binge eating episodes and purging episodes were both positively skewed and leptokurtic. Absolute and relative weight suppression variables were not normally distributed, however, relative weight suppression had reasonable skewness and kurtosis values. The 5% trimmed mean differed less from the mean for relative weight suppression than the trimmed mean for absolute weight suppression, and relative weight suppression had fewer outliers. Relative weight suppression was chosen as the weight suppression measure as the distribution was closer to normal. Variable distributions will be considered further in inspecting the multivariate outliers and the distribution of residuals.

Correlations among predictor variables for multiple regression were inspected and indicated no multicollinearity. This was supported by tolerance values above .10 and variance inflation factor values below 10. Shapiro-Wilk test was significant for some variables indicating they were not normally distributed. Inspecting the Q-Q plots showed that residuals of restriction, binge eating, and purging were all not normally distributed. The Q-Q plots of all other variables indicated normality and homoscedasticity. The large sample is robust against the violation of homoscedasticity. Cook's distance was considered for outliers and none were identified.

Results

Descriptive Characteristics

Participants were female and had a mean age of 29.0 years. The AN group were the youngest and had a mean age of 23.2 years, the BN group had a mean age of 27.9 years, and the BED group were the oldest and had a mean age of 38.6 years. Participants were predominantly New Zealand European or Pākehā (83.4%). Demographic characteristics of the total sample and each diagnostic group are presented in Table 1.

Table 2 presents clinical characteristics of the total sample and each diagnostic group. A proportion of women with AN previously met criteria for BN (36.4%). A proportion of women with BN previously met criteria for AN (27.1%) and a small number previously met criteria for BED (2.1%). Some women with BED previously met criteria for BN (25.9%). Over half of women (58.5%) had experienced major depressive disorder in their lifetime and a quarter (27.6%) had current major depression. Almost a quarter of women (23.9%) had current social anxiety and a fifth (20.3%) had a current specific phobia. A quarter of women (24.9%) had attempted suicide, and 2.04 was the mean number of attempts. Lethality of the most serious suicide attempt, scored from *1 = no danger* to *6 = extreme*, had a mean of 3.45.

The highest rates of personality disorder diagnoses for the total sample were for avoidant (27.2%), borderline (17.9%), obsessive-compulsive (16.9%), and paranoid (16.9%) personality disorders. A quarter of women (24.5%) in the BN group had a borderline personality disorder.

Table 1

Demographic Characteristics of Total Sample and each Diagnostic Group (n = 301)

Variable	Total sample		Anorexia nervosa *(n = 55)*		Bulimia nervosa *(n = 192)*		Binge eating disorder *(n = 54)*	
	N/M	%/SD	N/M	%/SD	N/M	%/SD	N/M	%/SD
Age	28.95	10.35	23.15	6.27	27.90	8.71	38.61	12.59
Relationship status								
Single	161	53.5	34	61.8	105	54.7	22	40.7
Partnership/married	105	34.9	15	27.3	64	33.3	26	48.1
Divorced/separated	34	11.3	6	10.9	22	11.5	6	11.1
Widowed	1	0.3	0	0	1	0.5	0	0
Ethnicity								
NZ European or Pākehā	251	83.4	53	96.4	162	84.4	36	66.7
Māori	19	6.3	0	0	13	6.8	6	11.1
Pacific Islander	2	0.7	0	0	2	1.0	0	0
Asian	3	1.0	0	0	3	1.6	0	0
Indian	1	0.3	0	0	1	0.5	0	0
Other	25	8.3	2	3.6	11	5.7	12	22.2
Number of years of education	13.94	2.83	13.10	1.85	13.73	2.73	15.53	3.41
Occupation								
Employed	163	54.2	22	40.0	111	57.8	30	55.6
Student	73	24.3	19	34.5	47	24.5	7	13.0
Home responsibilities	26	8.6	2	3.6	15	7.8	9	16.7
Benefit (not unemployment)	20	6.6	5	9.1	10	5.2	5	9.3
Unemployed	19	6.3	7	12.7	9	4.7	3	5.6

Table 2

Clinical Characteristics of Total Sample and each Diagnostic Group (n = 301)

	Total sample		Anorexia nervosa		Bulimia nervosa		Binge eating disorder	
Variable	N/M	%/SD	N/M	%/SD	N/M	%/SD	N/M	%/SD
Anorexia nervosa								
Lifetime	107	35.5	55	100	52	27.1	0	0
Past month	55	18.3	55	100	0	0	0	0
Bulimia nervosa								
Lifetime	226	75.1	20	36.4	192	100	14	25.9
Past month	192		0	0	192	100	0	0
Binge eating disorder								
Lifetime	58	19.3	0	0	4	2.1	54	100
Past month	54	17.9	0	0	0	0	54	100
Bipolar II disorder								
Lifetime	29	9.6	2	3.6	25	13.0	2	3.7
Past month	14	4.7	2	3.6	11	5.7	1	1.9
Major depressive disorder								
Lifetime	176	58.5	35	63.6	102	53.1	39	72.2
Past month	83	27.6	24	43.6	46	24.0	13	24.1
Generalised anxiety disorder								
Past month	29	9.6	2	3.6	19	9.9	8	14.8
Social anxiety disorder								
Lifetime	88	29.2	17	30.9	58	30.2	13	24.1
Past month	72	23.9	14	25.5	48	25.0	10	18.5
Specific phobia								
Lifetime	76	25.2	13	23.6	49	25.5	14	25.9
Past month	61	20.3	10	18.2	39	20.3	12	22.2
Panic disorder or agoraphobia								
Lifetime	44	14.6	14	25.5	23	12.0	7	13.0

Variable	Total sample		Anorexia nervosa		Bulimia nervosa		Binge eating disorder	
	N/M	%/SD	N/M	%/SD	N/M	%/SD	N/M	%/SD
Past month	23	7.6	10	18.2	11	5.7	2	3.7
Obsessive-compulsive disorder								
Lifetime	24	8.0	12	21.8	9	4.7	3	5.6
Past month	16	5.3	8	14.5	5	2.6	3	5.6
Alcohol abuse or dependence								
Lifetime	115	38.2	15	27.3	84	43.8	16	29.6
Past month	28	9.3	2	3.6	25	13.0	1	1.9
Cannabis abuse or dependence								
Lifetime	56	18.6	12	21.8	38	19.8	6	11.1
Past month	11	3.7	4	7.3	7	3.6	0	0
Other drug abuse or dependence								
Lifetime	35	11.6	5	9.1	26	13.5	4	7.4
Past month	0	0	0	0	0	0	0	0
Suicide attempts								
Ever	75	24.9	15	27.3	53	27.6	7	13.0
Number	2.04	2.23	2.40	1.72	1.75	2.05	3.43	3.87
Lethality	3.45	1.32	3.93	1.39	3.26	1.24	3.86	1.57
Avoidant Personality Disorder	82	27.2	15	27.3	52	27.1	15	27.8
Dependent Personality Disorder	28	9.3	9	16.4	18	9.4	1	1.9
Obsessive Compulsive Personality Disorder	51	16.9	9	16.4	33	17.2	9	16.7
Paranoid Personality Disorder	51	16.9	10	18.2	36	18.8	5	9.3
Schizotypal Personality Disorder	8	2.7	2	3.6	6	3.1	0	0
Schizoid Personality Disorder	6	2.0	3	.5	2	1.0	1	1.9
Histrionic Personality Disorder	25	8.3	2	3.6	23	12.0	0	0
Narcissistic Personality Disorder	13	4.3	3	5.5	8	4.2	2	3.7
Borderline Personality Disorder	54	17.9	5	9.1	47	24.5	2	3.7
	12	.0	1	1.8	10	5.2	1	1.9

Differences Among Diagnoses in Weight Suppression, Temperament, Body

Dissatisfaction, and Eating Behaviours

A one-way between groups ANOVA was conducted to explore the impact of eating disorder diagnosis on key variables—weight suppression, novelty seeking, harm avoidance, reward dependence, persistence, body dissatisfaction, restriction days, binge episodes, and purging episodes. Tukey's test was used for post-hoc comparisons. Participants were divided into three groups according to ED diagnosis: AN, BN, and BED. Table 3 presents means for the total sample and for each diagnostic group and results of ANOVA. Welch's test indicated the same pattern of results as those from ANOVA.

Weight suppression was significantly different among diagnostic groups: $F(2, 295) = 57.03$, $p < .001$. Eta squared was .28 indicating that the differences among groups were large. The mean score of the AN group was significantly higher than that of the BN (95% CI (9.09, 15.72)) and BED groups (95% CI (13.78, 22.05)). The mean score of the BN group was significantly higher than that of the BED group (95% CI (2.20, 8.82)).

Novelty seeking was significantly different among diagnostic groups: $F(2, 294) = 8.38$, $p < .001$. Eta squared was .05 indicating that the differences among groups were small. The mean score for the AN group was significantly lower than that of the BN group (95% CI (-.136, -.034)) with no other significant differences found among diagnoses.

Harm avoidance was significantly different among diagnostic groups: $F(2, 294) = 5.72$, $p = .004$. Eta squared was .04 indicating that the differences among groups were small. The mean score for the AN group was significantly higher than that of the BN (95% CI (.022, .159)) and BED (95% CI (.022, .193)) groups. The BN and BED groups did not differ significantly from one another.

Table 3

One Way Between Groups Analysis of Variance of Eating Disorder Diagnosis on Weight Suppression, Temperament Dimensions, Body Dissatisfaction, and Eating Behaviours.

Variable	Total		Anorexia nervosa		Bulimia nervosa		Binge eating disorder		*F*	p	*ES*
	Mean	SD	Mean	SD	Mean	SD	Mean	SD			
Weight suppression	11.57	10.70	22.72	9.67	10.32	9.71	4.81	5.76	57.03	<.001	0.28
Temperament											
Novelty seeking	.53	.14	.46	.16	.55	.14	.50	.11	8.38	<.001	0.06
Harm avoidance	.58	.19	.66	.24	.57	.18	.55	.16	5.72	.004	0.04
Reward dependence	.64	.16	.64	.18	.65	.16	.59	.12	2.49	.084	0.02
Persistence	.58	.21	.61	.19	.59	.22	.51	.18	3.91	.021	0.03
Body dissatisfaction	17.18	8.59	7.82	7.05	19.02	7.63	20.30	6.58	55.41	<.001	0.27
Eating behaviours											
Restriction days	20.91	10.70	25.45	6.71	21.09	10.56	15.64	12.30	12.40	<.001	0.08
Binge eating episodes	17.68	18.01	5.69	11.63	21.10	19.60	17.70	11.08	17.37	<.001	0.10
Purging episodes	16.58	22.53	11.04	20.01	22.77	23.72	0.35	1.40	26.82	<.001	0.15

Note. ES = effect size

Persistence was significantly different among diagnostic groups: F (2, 294) = 3.91, p = .021. Eta squared was .03 indicating that the differences among groups were small. The mean score for the AN group was significantly higher than that of the BED group (95% CI (.004, .193)). The mean score for the BN group was significantly higher from that of the BED group (95% CI (.007, .159)). The AN and BN groups did not differ significantly from one another.

Body dissatisfaction was significantly different among diagnostic groups: F (2, 295) = 55.41, p < .001. Eta squared was .27 indicating that the differences among groups were large. The mean score for the AN group was significantly lower than that of the BN (95% CI (-13.85, -8.55)) and BED (95% CI (-15.79, -9.16)) groups. The BN and BED groups did not differ significantly from one another.

Number of food restriction days was significantly different among diagnostic groups: F (2, 298) = 12.40, p < .001. Eta squared was .08 indicating that the differences among groups were moderate. The mean score for the AN group was significantly higher than that of the BN (95% CI (.65, .8.08)) and BED (95% CI (5.16, 14.47)) groups. The mean score of the BN group was significantly higher than that of the BED group (95% CI (1.70, 9.19)).

Number of binge eating episodes was significantly different among diagnostic groups: F (2, 298) = 17.37, p < .001. Eta squared effect size was .10 indicating that the differences among groups were large. The mean score for the AN group was significantly lower than that of the BN (95% CI (-21.57. -9.25)) and BED (95% CI (-19.73, -4.30)) groups. The mean score of the BN group was significantly higher than that of the BED group (95% CI (2.80, 9.61)).

Number of purging episodes was significantly different among diagnostic groups: F (2, 297) = 26.82, p < .001. Eta squared effect size was .15 indicating that the differences

among groups were large. The mean score for the BN group was significantly higher that of the AN (95% CI (4.23, 19.23)) and BED (95% CI (14.86, 29.97)) groups. The mean score for the AN group was significantly higher than that of the BED group (95% CI (1.29, 20.07)).

Association of Weight Suppression with Temperament, Body Dissatisfaction, and Eating Behaviours, with Diagnosis as a Moderator

Table 4 presents univariate associations among weight suppression, temperament dimensions, body dissatisfaction and eating behaviours. Variables were entered into a moderated hierarchical regression analysis predicting relative weight suppression.

An enter method hierarchical regression model was conducted to predict relative weight suppression. Temperament dimensions – novelty seeking, harm avoidance, reward dependence, and persistence were entered into step one of the hierarchical model. Diagnosis dummy codes for AN and BED, body dissatisfaction, and eating behaviours; restriction days, binge eating, and purging were entered into step two of the hierarchical model. The eight interaction terms were entered into step three of the hierarchical model. The interaction terms are AN diagnosis multiplied by body dissatisfaction, AN diagnosis multiplied by restriction, AN diagnosis multiplied by binge eating, AN diagnosis multiplied by purging, BED diagnosis multiplied by body dissatisfaction, BED diagnosis multiplied by restriction, BED diagnosis multiplied by binge eating, and BED diagnosis multiplied by purging. Cases were excluded pairwise to include all available data for each variable.

The first model including novelty seeking, harm avoidance, reward dependence, and persistence explained 6.8% of the variance in weight suppression ($r^2 = .068$, $F(4, 289) = 5.27$, $p < .001$). In this model, harm avoidance ($p < .001$) was a significant unique predictor of weight suppression.

Table 4

Univariate Associations Among Relative Weight Suppression, Novelty Seeking, Harm Avoidance, Reward Dependence, Persistence, Body Dissatisfaction, Restriction Days, Binge Eating Episodes, and Purging Episodes.

Variable	Relative weight suppression	Novelty seeking	Harm avoidance	Reward Dependence	Persistence	Body dissatisfaction	Restriction days	Binge eating episodes
Novelty seeking	-0.17**							
Harm avoidance	0.23**	-0.32**						
Reward Dependence	-0.04	0.16**	-0.06					
Persistence	0.06	-0.22**	-0.14**	0.008				
Body dissatisfaction	-0.24**	0.15*	0.17**	0.02	-0.14*			
Restriction days	0.23**	-0.06	0.19**	0.04	0.04	0.08		
Binge eating episodes	-0.08	0.14**	-0.05	-0.02	0.03	0.12*	-0.17**	
Purging episodes	0.05	0.20**	0.03	0.05	0.05	0.02	0.02	0.56**

Note. ** Correlation is significant at the 0.01 level
    * Correlation is significant at the 0.05 level

Diagnosis dummy codes for AN and BED, body dissatisfaction, and restriction days, binge eating frequency, and purging frequency were entered in the second step. The total variance explained by the second model was 31.7% ($r^2 = .317$, $F(10, 283) = 13.16$, $p < .001$). Variables added in step two explained an additional 25% of the variance in weight suppression, after controlling for temperament dimensions (r^2 change $= .250$, $F(6, 283) = 17.24$, $p < .001$). In this model, AN ($p < .001$), and BED ($p = .002$) were significant unique predictors. Restriction days was approaching significance as a unique predictor ($p = .057$).

Interactions of the two diagnosis dummy codes with body dissatisfaction, restriction days, binge eating, and purging were entered in the third step. The total variance explained by the third model was 32.6% ($r^2 = .326$, $F(18, 275) = 7.40$, $p < .001$). The interactions added in step three explained an additional .009% of the variance in weight suppression, after controlling for temperament dimensions, diagnosis, body dissatisfaction, and eating behaviours (r^2 change $= .009$, $F(8, 275) = .458$, $p = .885$). In this model, AN ($p = .002$) was the only significant unique predictor. The third model including interaction terms did not explain a significantly greater variance in weight suppression.

To reduce the degrees of freedom and simplify the model, relevant predictors of weight suppression identified in steps one and two of the hierarchical regression were entered into a new model. Harm avoidance, restriction days, and AN and BED dummy codes were included in an enter multiple regression model. This model explained 30.3% of the variance in weight suppression ($r^2 = .303$, $F(4, 289) = 31.46$, $p < .001$), with harm avoidance ($p = .016$), AN dummy code ($p < .001$), and BED dummy code ($p < .001$) as significant unique predictors. This model was selected as the best model, as it explains a significant proportion of the variance in weight suppression and is a simpler model with fewer predictors than the hierarchical regression models.

Table 5 presents the final regression model predicting relative weight suppression. The beta weights indicated that for a one unit increase in relative weight suppression, harm avoidance increased by .12 units, and restriction days increased by .09 units. The beta weights indicated that the AN diagnostic group was .41 units higher in weight suppression than the BN diagnostic group, and the BED diagnostic group was .18 units lower in weight suppression than the BN diagnostic group.

Table 5

Unstandardized and Standardised Regression Coefficients of Multiple Regression Analysis Predicting Relative Weight Suppression

Source	B	SE B	B	t	p
Harm avoidance	6.86	2.84	.12	2.42	.016
Restriction days	0.09	0.05	0.09	1.66	.097
Anorexia nervosa	11.37	1.43	0.41	7.97	<.001
Binge eating disorder	-4.95	1.43	-0.18	-3.46	<.001

Discussion

The current study investigated the association of weight suppression and temperament dimensions and the moderating effect of eating disorder diagnosis on the association between weight suppression and (the predictors) body dissatisfaction, food restriction, binge eating, and purging. Harm avoidance, food restriction, and eating disorder diagnosis were significantly associated with weight suppression in women with a primary diagnosis of AN, BN, or BED. Harm avoidance positively predicted weight suppression as hypothesised, and restriction days positively predicted weight suppression in the final model. The impact of AN, BN, and BED diagnosis accounted for significant variation in weight suppression. Novelty seeking, rewards dependence, and persistence were not significantly associated with weight suppression. Diagnosis did not moderate the association between eating behaviours and weight suppression as was hypothesised. Body dissatisfaction was not identified as a predictor of weight suppression and diagnosis did not moderate the association between body dissatisfaction and weight suppression as was hypothesised. Findings of the current study contribute to understanding weight suppression and suggest that harm avoidance, and food restriction are risk factors for greater weight suppression.

Current Findings in Context of Previous Research

As hypothesised, the TCI temperament dimension harm avoidance (Cloninger et al., 1994) was positively associated with weight suppression and was a significant unique predictor in the final model. Women higher in harm avoidance—characterised by avoidance of negative outcomes and experiencing worry and fear of uncertainty—had higher weight suppression. Previous research has found harm avoidance is high across all eating disorders compared to the general population (Atiye et al., 2015; Fassino et al., 2001; Fassino et al., 2002; Klump et al., 2000; Krug et al., 2011) and highest in AN (Atiye et al., 2015; Fassino et

al., 2002; Fassino et al., 2004; Klump et al., 2000; Rybakowski et al., 2004), the eating disorder diagnosis associated with the greatest weight suppression (Carter et al., 2015; Piers et al., 2019; Solmi et al., 2018; Wildes & Marcus, 2012). Harm avoidance may promote eating psychopathology including fear of weight increase and may contribute to keeping strict control of eating to promote weight loss. It is also possible that weight suppression may increase harm avoidance as the impact of undernourishment causes a reduction in openness to new experiences (Klump et al., 2004). The current study found that for women with an eating disorder having a temperament profile higher in harm avoidance (consisting of avoidance of negative outcomes, worry, and fear of uncertainty) is associated with greater weight suppression.

Food restriction days were positively associated with weight suppression in the total AN, BN, and BED sample. Restriction was not found to be a significant unique predictor of weight suppression in the final model; however, restriction was identified as a potential predictor of weight suppression in step two of the hierarchical regression and is included in the final regression model as it increases the variance in weight suppression explained by the model. Restriction was measured using the EDE (Fairburn & Cooper, 1993) and reflects number of food restriction days over a four-week period. The high correlation between harm avoidance and restriction may explain why restriction is not a unique predictor in the final model, however both variables are worthy of consideration in their association with weight suppression as harm avoidance reflects a relatively stable component of temperament and restriction accounts for eating behaviours over the last four weeks, and both have theoretical and practical implications. Women with AN, BN, and BED who reported a greater number of restriction days had a greater degree of weight suppression.

The association between restriction and weight suppression is consistent with previous research that has found an association between restriction and weight suppression in

mixed eating disorder samples (Lavender et al., 2015; Romano et al., 2021). It has been proposed that the association between weight suppression and current restriction and subsequent binge eating and purging accounts for weight yo-yoing that is common for women with eating disorders (Lowe et al., 2018). According to the theory that weight suppression promotes weight fluctuations, dietary restriction is maintained for a period of time and therefore weight loss occurs, however the ensuing weight suppression cannot be sustained and biologically and psychologically promotes weight gain. Weight reduction is rewarding, and weight increase is distressing to people with an eating disorder. According to this theory weight suppression leads to a cycle of disordered eating and a series of weight fluctuations which promote continued pathology for people with eating disorders (Lowe et al., 2018). The finding that restriction is associated with weight suppression is consistent with the theory that weight suppression promotes a cycle of eating patterns and weight fluctuations.

Eating disorder diagnosis accounted for significant variation in weight suppression. Anorexia nervosa diagnosis was associated with the greatest weight suppression, BED diagnosis was associated with the lowest weight suppression, and BN diagnosis was associated with weight suppression that fell between the two other diagnostic groups. Weight suppression was significantly different among the three diagnostic groups. Previous research has identified distinctions in weight suppression between eating disorders (Cook et al., 2015; Piers et al., 2019; Solmi et al., 2018). A diagnosis of AN is associated with the greatest relative weight suppression.

The TCI temperament dimensions novelty seeking, reward dependence, and persistence (Cloninger et al., 1994) were not significantly associated with weight suppression. It was hypothesised that novelty seeking—characterised by excitement for novel experiences, impulsivity, and avoidance of boredom or frustration—would negatively predict weight

suppression; reward dependence—characterised by social attachment, sentimentality, and dependence on the approval of others—would positively predict weight suppression; and persistence—characterised by industriousness and perseverance even when frustrated or fatigued—would positively predict weight suppression. Distinct temperament profiles have been identified for a diagnosis of AN, BN, and BED (Atiye et al., 2015; Buelens et al., 2020; Bulik et al., 1995; Fassino et al., 2001; Fassino et al., 2002; Klump et al., 2000; Krug et al., 2011; Rybakowski et al., 2004). Dimensions of temperament have been associated with eating symptomatology including disordered eating and compensatory behaviours, body dissatisfaction, perfectionism, and impulsivity, and profiles on the TCI have been found to categorise people with eating disorders into distinct groups, each with a distinct combination and severity of symptoms (Krug et al., 2011). The current study's findings indicate harm avoidance plays a role in the degree of weight suppression for women with an eating disorder. More research is needed to replicate this finding and investigate further whether novelty seeking, reward dependence, and persistence are associated with weight suppression, and whether the combination of scores on multiple or all dimensions of the TCI are relevant in predicting weight suppression.

Diagnosis did not moderate the association between eating behaviours and weight suppression as hypothesised, with restriction expected to predict weight suppression in AN, binge eating, and purging expected to predict weight suppression in BN, and binge eating expected to predict weight suppression in BED. The eating behaviour, exercise frequency, has been found to moderate the association between diagnosis and weight suppression (Cook et al., 2015). Weight suppression was found to be significantly higher in BN than in BED and not significantly different when exercise frequency is considered (Cook et al., 2015). Given this finding, results of the current study are unexpected. Restriction predicted weight suppression without any interaction with diagnosis and eating disorder diagnosis accounted

for significant variation in weight suppression. No interactions between eating behaviours and diagnosis were found, suggesting that food restriction is a shared risk factor for greater weight suppression across the diagnoses.

Diagnosis did not moderate the association between body dissatisfaction and weight suppression as was hypothesised. It was predicted that the association between body dissatisfaction and weight suppression would be negative for those with BN and BED, and positive for those with AN. Previous research has found that weight suppression and body dissatisfaction are negatively correlated for women with BN (Solmi et al., 2018), and positively correlated for women with AN (Solmi et al., 2018). The current study found that body dissatisfaction was significantly higher in the BN and BED groups than in the AN group. Lavender and colleagues (2015) found the interaction of weight suppression and diagnosis did not predict weight and shape concerns but that the interaction of weight suppression and BMI was positively associated with weight and shape concerns. Given the findings that higher weight is associated with greater body dissatisfaction (Burnette et al., 2020; Stice & Shaw, 2002) and the extensive literature that reports the relevance of a weight suppression and BMI interaction on eating pathology (Berner et al., 2013; Bodell et al., 2016; Butryn et al., 2011; Piers et al., 2019; Witt et al., 2014), the impact of the interaction of body dissatisfaction and BMI on weight suppression could be investigated in future research.

Limitations and Strengths

The current study has limitations that should be considered when interpreting these results. The sample size is large, however, an even larger sample would have been favourable for the moderated hierarchical regression analysis. The sample size required for multiple regression depends on the number of predictor variables with recommendations between 10 and 15 cases per item (Field, 2018). Tabachnick and Fidell (2013) suggest a formula of 50

plus eight multiplied by the number of independent variables for calculating the minimum adequate sample size. According to this formula the current study would need a sample of at least 194 cases. In the current study 297 cases (301 without missing data) and 18 predictor variables in the hierarchical regression including dummy codes and interaction terms equate to a ratio of 16 cases per item. This ratio is adequate, however a larger sample size would increase statistical power and decrease the chance of a type two error (failing to detect an association when an association exits). The final multiple regression model included only four predictor variables which means there was a ratio of 74 cases per item, considerably more than required for adequate power.

Strengths of the current study are the weight suppression calculation, statistical techniques, sample, and identifying potential predictors of weight suppression. Relative weight suppression was utilised as the weight suppression construct within this study. Relative weight suppression reflects a weight percentage change that is beneficial in considering the potential that weight reduction has a larger biological and behavioural impact on a smaller person than the same weight reduction might have on a larger person. This calculation compared to absolute weight suppression (weight change score) has statistical and conceptual strengths (Lowe et al., 2018). Relative weight suppression has a less skewed distribution within this study than absolute weight suppression, as has also been reported previously (Schaumberg et al., 2016). There is evidence that a weight percentage change also improves other methodological concerns, such as low reliability in a weight change score due to high correlation between highest and current weight (Schaumberg et al., 2016). As the current study has a mixed eating disorder sample relative weight suppression is helpful for making evaluations that are not conflated by differences in weight among diagnostic groups.

Analysing the total sample in one multiple regression analysis means that shared factors across eating disorders that are relevant to understanding weight suppression could be

identified, such as harm avoidance and food restriction. It is possible that these shared factors across AN, BN, and BED and also other eating behaviours or psychological phenomenon are associated with weight suppression specifically for each eating disorder. More research is needed to identify whether diagnosis is a moderator that is pertinent to the association between weight suppression and both eating behaviours and body dissatisfaction, and whether different predictors of weight suppression are relevant for different eating disorders.

The mixed eating disorder sample used in the current study allows the findings to be applicable to a broad range of eating disorder populations. The clinical utility of weight suppression in therapeutic settings and in treatment outcome has been examined in many longitudinal studies. The current study is one of few studies that has examined potential predictors of weight suppression. Few studies have examined weight suppression in samples with BED and the current understanding of this construct is based on research with AN and BN samples. The impact of temperament on weight suppression has limited previous investigation. Harm avoidance was associated with weight suppression in the current mixed eating disorder sample. Identifying temperament dimensions and eating behaviours which are associated with weight suppression at the beginning of treatment contributes to understanding weight suppression and could identify those at risk of greater weight suppression and be used to improve outcomes in treatment.

Implications and Applications

Harm avoidance and restriction are associated with weight suppression at the beginning of treatment and could identify those at risk of greater weight suppression and be used to inform clinical decision making. The potential for improving outcomes and reducing dropout and relapse rates by considering weight suppression in treatments for BN has been identified (Juarascio et al., 2018). Incorporating understanding of the implications of weight

suppression in cognitive behavioural therapy could include distress tolerance techniques and acceptance around weight gain and psychoeducation about the role of weight suppression in symptom maintenance. Weight restoration in treatment for AN is crucial and reaching a healthy body weight has been associated with lower relapse weights (Bulik et al., 2007). Incorporating weight suppression into assessment and treatment could improve outcomes (Juarascio et al., 2018), and the current findings indicate that particular attention to reducing harm avoidance in treatment could have a positive impact on weight suppression and recovery.

Treatments for eating disorders have been found to impact harm avoidance (Klump et al., 2004). Women who have recovered from AN or BN show lower levels of harm avoidance than women with a current diagnosis (Klump et al., 2004). Lower levels of harm avoidance were found in women with BN a year after cognitive behavioural therapy (Anderson et al., 2002). Therapy and psychological improvement cause temperamental change and result in more adaptive levels of harm avoidance. A focus on distress tolerance, flexibility and acceptance, exposure-based techniques, and psychoeducation could be beneficial in fostering reduced levels of harm avoidance. Higher harm avoidance is associated with greater weight suppression and there is the potential reducing this dimension of temperament could lead to a reduction in weight suppression and potentially improve the course of the illness and promote recovery.

The current findings are applicable to non-clinical populations and could be used to help prevent eating disorder onset in those at risk. Weight suppression can identify those who are at risk for developing an eating disorder, as weight suppression in non-clinical samples has been found to predict future eating disorder symptoms (Burnette et al., 2020; Burnette, & Mazzeo, 2020; Goodman et al., 2018; Keel, & Heatherton, 2010) symptoms of BN up to 20

years later (Bodell et al., 2017), and onset of AN and BN (Stice et al., 2020). Targeting harm avoidance (by promoting distress tolerance, and through psychoeducation on the impact of harm avoidance) could be beneficial in intervention strategies to reduce weight suppression in people at risk for developing an eating disorder.

Future Research Suggestions

The current findings contribute to understanding weight suppression in AN, BN, and BED. Further research on the association among dimensions of temperament and weight suppression could expand on the current findings. The current study suggests novelty seeking, persistence, and reward dependence are not predictors of weight suppression, however, given limited research exists in this area, further investigation is warranted. Furthermore, considering scores on all dimensions of the TCI in conjunction with one another could be considered in future research. Examining all temperament and character dimensions together rather than each in isolation could be valuable for identifying their impact on weight suppression.

Body dissatisfaction and weight suppression could be researched to contribute understanding to the strength and direction of the association that may exist between the two factors for different eating disorders. The direction of the association of weight suppression and body dissatisfaction is important because it could contribute to understanding the psychological mechanisms that promote weight suppression. If the two factors are negatively associated this suggests that weight suppression alleviates body dissatisfaction and that feeling satisfied with one's body could sustain weight suppression. If the two features are positively associated this suggests that weight suppression promotes body dissatisfaction and that feeling dissatisfied with one's body could sustain weight suppression. The impact of

BMI as a moderator of the association between body dissatisfaction and weight suppression could also be a pertinent area of research.

Findings of the current study demonstrate potential for harm avoidance to be a preceding factor that may predispose people with eating disorders to greater weight suppression. An investigation of the direction of the association between weight suppression and harm avoidance in future research could contribute to understanding which factor promotes the other. The impact of harm avoidance on weight suppression could be investigated using a longitudinal design to determine whether weight suppression decreases if harm avoidance reduces during treatment. This research could be especially pertinent to AN and BN given what is known about the negative impact of weight suppression. Associations between harm avoidance, restricting and weight suppression could be studied with other populations such as non-clinical groups, those who have a history of chronic dieting or disordered eating, and people at risk of eating disorder onset.

Conclusion

The current study examined the associations of temperament, eating behaviours, and body dissatisfaction with weight suppression, and investigated whether AN, BN and BED diagnoses impacted the strength or direction of associations. Findings of the current study contribute to understanding the clinically relevant construct of weight suppression and found that harm avoidance, food restriction, and AN diagnosis were associated with greater weight suppression. These findings suggest shared rather than unique factors are associated with weight suppression across eating disorders. A focus on lowering harm avoidance could contribute to reducing weight suppression within therapeutic interventions and reduce eating psychopathology.

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