

Is the Association Between Appearance Overvaluation
and Dietary Restraint Robust to Substantive and Methodological
Specifications? A Specification Curve Analysis

by

Sarah Enouy

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Abstract

In the cognitive-behavioural model, dietary restraint follows from appearance overvaluation (i.e., the core psychopathology of disordered eating). However, little research has examined the association between appearance overvaluation and dietary restraint when accounting for shared variance with other factors. Moreover, results generally hinge on researchers' decision-making, including addressing outliers and covariates. Herein, specification curve analysis was used to examine the association between appearance overvaluation and dietary restraint under 80 unique regression models based on different combinations of substantive factors and methodological decisions. Results indicated a positive association between appearance overvaluation and dietary restraint among university women ($N=569$; mean $\beta=0.26$), however, the association was not statistically significant when all factors were included in the model, and removal of outliers made results unstable. Hence, it is possible that sociocultural and cognitive-behavioural factors may be mediating or confounding the association. Findings also highlight the importance of limiting researcher degrees of freedom during data analysis.

In loving memory of Meghan Reid

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Is the Association Between Appearance Overvaluation and Dietary Restraint Robust to Substantive and Methodological Specifications? A Specification Curve Analysis

In the transdiagnostic cognitive-behavioural theory of eating disorders (Fairburn, 2008; Fairburn, Cooper et al., 2003), the extent to which people overvalue the importance of appearance in their self-concept is the core psychopathology underlying eating disorders. There is evidence that appearance overvaluation is a predictor of disordered eating (e.g., Tabri et al., 2015). However, there are other etiological and maintenance factors outlined in the cognitive-behavioural model that have seldom been examined simultaneously with appearance overvaluation, such as perfectionism and global self-esteem. As such, it is unclear how robust the link between appearance overvaluation and disordered eating is when considering these additional factors.

Furthermore, although the transdiagnostic cognitive-behavioural model of eating disorders is arguably the leading framework for understanding disordered eating, there exist other influential frameworks for understanding the etiology and maintenance of disordered eating. One such framework is the sociocultural perspective on disordered eating, in which perceived pressures to be thin, and internalization of thinness, propel disordered eating (Ata et al., 2015; Dittmar, 2008). Critically, little research has examined whether appearance overvaluation remains associated with disordered eating when statistically controlling for relevant factors from the cognitive-behavioural and sociocultural theories. This dearth of research raises many questions about how best to examine the association between appearance overvaluation and disordered eating.

Moreover, researchers must make important methodological decisions to enhance the external and internal validity of the results. In particular, researchers often statistically control for

participants' characteristics in the analyses - such as body mass index (BMI) and age - to enhance the generalizability of the results. The treatment of outliers, another methodological factor researchers must contend with, may also influence results. Some researchers remove outliers, others keep them, and some compare differences in the results to examine the impact of outliers. Accordingly, there are a large number of potential options with which to examine the robustness of the association between appearance overvaluation and disordered eating under different substantive and methodological specifications.

When faced with these multiple substantive methodological specifications in an analysis, researchers generally pick and choose specifications that they believe are important (known as researcher degrees of freedom). However, a given specification may be perceived as important by some researchers and unimportant by others, resulting in many different approaches researchers can take in analyzing their data. As a remedy, Simonsohn et al. (2015) developed Specification Curve Analysis, which helps to mitigate the issue of researcher degrees of freedom. In specification curve analyses, researchers report on results for all theoretically reasonable, non-redundant specifications one could make during data analysis. For example, specification curve analysis has been used to examine the association between dysregulated computer gaming and well-being (Ballou & Van Rooij, 2021). Ballou and Van Rooij tested the robustness of the association between dysregulated gaming and well-being to three different measures of well-being: 1) mental health, 2) depressive mood, and 3) life satisfaction. As well, Ballou and Van Rooij examined the impact of including or excluding outliers on the statistical significance of the association between dysregulated gaming and well-being. Results showed that no matter how researchers operationalized well-being (i.e., whether they chose mental health, depressive mood, or life satisfaction measures), and regardless of whether outliers were included or excluded from

analyses, dysregulated gaming was always significantly negatively associated with well-being. Hence, specification curve analysis allowed the researchers to test the robustness of the association between dysregulated gaming and well-being under hundreds of different specifications. Accordingly, specification curve analysis helps to increase confidence in research results.

In my thesis, I used specification curve analysis (Simonsohn et al., 2015) to shed light on the relationship between appearance overvaluation and disordered eating behaviours when different correlates of disordered eating (based on the cognitive-behavioural and sociocultural models of eating disorders) and participants' characteristics are included in the analyses. At the same time, I tested the robustness of the association between appearance overvaluation and disordered eating behaviours to researcher decisions about how to handle outliers and whether to statistically control for certain variables (e.g., participants' age).

Eating Disorders

Eating disorders are characterized by maladaptive weight-control behaviours. Eating disorders affect at least 10% of the population worldwide and the number of people afflicted with an eating disorder is rising (Galmiche et al., 2019). Eating disorders typically manifest in adolescence and early adulthood (Frank, 2015), and are particularly harmful because they are long-lasting (e.g., 20 – 30 years; Eddy et al., 2017), pervasive (Schaefer et al., 2019), and have a profound impact on quality of life and physical health (Brown & Mehler, 2013). Moreover, eating disorders have the highest mortality rate among the psychiatric disorders, with many dying by suicide or from physical health complications caused by their disordered eating (Arcelus et al., 2011).

There are four main categories of eating disorders outlined in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). The first is anorexia nervosa, one of the most well-known and understood eating disorders affecting about 1% of women (Hudson et al., 2007). Anorexia nervosa is a psychiatric illness characterized by extreme body image distortions, intense fear of becoming fat, and maintenance of a body weight below what is minimally expected for one's age (American Psychiatric Association, 2013; Arcelus et al., 2011). There are two subtypes of anorexia nervosa outlined in the DSM-5: anorexia nervosa – restricting type, and anorexia nervosa – binge/purging type. In both subtypes, people engage in extreme fasting (i.e., restricting food intake) and excessive exercise in an effort to maintain as low a body weight as possible, despite already being extremely thin. However, in the binge/purging subtype, people also engage in purging behaviour (e.g., self-induced vomiting) as well as binge eating (i.e., perceived loss of control over the amount of food consumed within a 2-hour period in which the amount of food consumed is larger than a typical individual would consume in a similar period of time).

Another well-known eating disorder is bulimia nervosa, which affects about 1.5% of women (Hudson et al., 2007). Bulimia nervosa is characterized by recurrent episodes of binge eating followed by compensatory behaviours (Arcelus et al., 2011). Compensatory behaviours are weight-control behaviours intended to compensate for the amount of food consumed during a binge eating episode. Examples of compensatory behaviours include, among other things, purging (i.e., self-induced vomiting), taking laxatives or diuretics, engaging in excessive exercise, fasting, or any combination of the above. Consequences of anorexia nervosa and bulimia nervosa include, but are not limited to, low bone density, tooth decay, infertility, as well as heart, kidney and liver damage (Brown & Mehler, 2013).

A third type of eating disorder is binge eating disorder. Binge eating disorder is the most common eating disorder, affecting about 3.5% of women (Hudson et al., 2007). Binge eating disorder is very similar to bulimia nervosa in that people affected will experience loss of control during binge eating episodes and consume, in a short period of time, an amount of food that is larger than typically expected. Those engaging in binge eating disorder often eat faster than what is normal, eat past the point of feeling full, eat alone out of embarrassment, and feel guilty or depressed after a binge eating episode. However, the important distinction between binge eating disorder and bulimia nervosa is that individuals with binge eating disorder do not engage in compensatory behaviours after the binge eating episode. As a result, binge eating disorder is often associated with higher body weight or obesity. The consequences of binge eating disorder are as serious as those from anorexia nervosa and bulimia nervosa, and include high blood pressure, low energy, and stomach rupture.

Finally, other eating disorders that do not fit into the diagnostic requirements for anorexia nervosa, bulimia nervosa, or binge eating disorder exist, and cause significant distress and impairment in everyday functioning. These eating disorders are classified as “other specified feeding and eating disorders”, and represent about 75% of adults with a diagnosed eating disorder (Le Grange et al., 2012). Other specified feeding and eating disorders have varied characteristics, but can include: anorexia symptoms in a person with a normal weight (i.e., atypical anorexia nervosa), an extended period between bingeing and purging episodes (i.e., atypical bulimia nervosa), binge eating disorder with less frequent binge eating episodes (e.g., every few weeks), and compensatory behaviours without a binge eating episode (i.e., purging disorder), among other variants (American Psychiatric Association, 2013). Moreover, more common than any of the eating disorders outlined above are disordered eating patterns that do

not meet the threshold severity for a clinical diagnosis of an eating disorder, but are nevertheless harmful to health and well-being (Melve & Baerheim, 1994). All this is to say, eating disorders are harmful and life-threatening psychiatric conditions that affect the general population (Arcelus et al., 2011; Brown & Mehler, 2013).

Disordered Eating and Appearance Overvaluation

Early cognitive-behavioural theories of eating disorders were specific to anorexia nervosa or bulimia nervosa. In both models, appearance overvaluation is theorized to be the core psychopathology underlying anorexia nervosa and bulimia nervosa that motivates disordered eating. Appearance overvaluation occurs among people who value their physical appearance above – and to the detriment of – functioning in other life domains. In essence, those who overvalue their appearance base most of their self-worth on the way that they look.

In the anorexia nervosa model (Fairburn, 2008), appearance overvaluation motivates non-compensatory weight-control behaviours (i.e., behaviours, such as strict dieting and excessive exercise to try to reduce weight and burn calories that are not in response to a perceived or actual binge eating episode). People who frequently engage in non-compensatory behaviours will maintain a significantly low weight, which reinforces their appearance overvaluation. In the bulimia nervosa model, appearance overvaluation motivates non-compensatory weight-control behaviours, but frequent engagement in these behaviours is followed by binge eating episodes. Following a binge eating episode, people turn to compensatory weight-control behaviours (i.e., behaviour to try to reduce weight/calorie intake in response to a perceived or actual binge eating episode). Like the anorexia nervosa model, in the bulimia model, the disordered eating behaviours reinforce appearance overvaluation.

However, these disorder-specific theories do not explain “atypical” eating disorders (now called other specified feeding and eating disorders in the DSM-5), which are more common than anorexia nervosa and bulimia nervosa (Arcelus et al., 2011). Moreover, the specific theories do not explain why many people seem to move between diagnostic categories - from meeting the criteria of one eating disorder to another (Fairburn, Cooper et al., 2003). For example, it is impossible for a person to literally never eat, so once a person with anorexia nervosa reaches a point in starvation where the hunger is unbearable, they will binge eat. To address this limitation, Fairburn, Cooper et al. (2003) developed the transdiagnostic theory of eating disorders by merging the anorexia nervosa and bulimia nervosa theories.

In the transdiagnostic theory, eating disorders are theorized to have a common underlying core psychopathology which drives and maintains the disordered eating. This common mechanism underlying all subtypes of eating disorders is appearance overvaluation. According to the transdiagnostic cognitive-behavioural theory of eating disorders, people who overvalue their appearance engage in non-compensatory weight-control activities. In turn, engagement in non-compensatory behaviours motivates binge eating or the maintenance of low weight. Importantly, achieving a low weight can lead to binge eating episodes. Following binge eating episodes, people may engage in compensatory weight-control behaviours. Of note, all these behaviours reinforce appearance overvaluation. Illustrating the reciprocal relationship between appearance overvaluation and disordered eating behaviours, Tabri et al. (2015) found that appearance overvaluation on a given week was associated with engagement in non-compensatory weight control behaviours on the following ($OR = 1.61$) week among women with anorexia nervosa or bulimia nervosa over a five-year period.

Appearance overvaluation has since become a core focus of theory and research on eating disorders. In fact, appearance overvaluation has become such an important component of understanding eating disorders that it is listed as an essential diagnostic criterion for anorexia nervosa and bulimia nervosa in the DSM-5 (American Psychiatric Association, 2013) and warrants consideration as a diagnostic specifier for binge eating disorder (Grilo, 2013). Research has shown that appearance overvaluation is positively associated with disordered eating behaviours among people diagnosed with an eating disorder (Fairburn & Harrison, 2003; Goldschmidt et al., 2010; Lampard et al., 2011; Sharpe et al., 2018; Tabri et al., 2015). For instance, in cross-sectional research involving women with binge eating disorder, greater overvaluation has been linked to binge eating ($\eta\rho^2 = .65$; Grilo et al., 2010). Similarly, in other cross-sectional research, overvaluation has been shown to be associated with dietary restraint among people diagnosed with anorexia nervosa, bulimia nervosa, or other specified feeding and eating disorders ($\beta = .23$; Lampard et al., 2011; $\beta = .31$; Lampard et al., 2013). Furthermore, findings from longitudinal research suggest that overvaluation may motivate these behaviours (Fairburn & Harrison, 2003; Tabri et al., 2015). For example, greater overvaluation at study intake predicted persistent binge eating among women with bulimia nervosa over a 5-year period ($\beta = .19$; Fairburn & Harrison, 2003).

Appearance overvaluation has also been linked to disordered eating in vulnerable community samples. For instance, among women high school students, appearance overvaluation was positively associated with disordered eating such as fasting and excessive exercise ($\beta = .62$; Wade & Lowes, 2002). In addition, findings from longitudinal research suggests that overvaluation has long-term negative consequences (Sharpe et al., 2018; Sonnevile et al., 2015; Stice et al., 2002). For instance, Stice et al. (2002) showed that appearance

overvaluation at study intake was associated with greater binge eating at 10 and 20 months later among adolescent girls ($r = .56$). Likewise, greater appearance overvaluation at study intake was associated with binge eating 15 years later among adolescent females ($OR = 1.29$; Sharpe et al., 2018).

In sum, there is evidence that appearance overvaluation plays a role in the development and maintenance of disordered eating.

Correlates of Appearance Overvaluation and Disordered Eating

Although there is evidence that appearance overvaluation proliferates and maintains disordered eating, there are many variables that have been linked to appearance overvaluation and disordered eating that may be important to consider when examining the link between appearance overvaluation and disordered eating. In particular, body dissatisfaction, perfectionism, and global self-esteem from the cognitive-behavioural model, as well as internalization of attractiveness ideals and perceived pressure to attain the attractiveness ideal in the sociocultural model of eating disorders, may all be important covariates as researchers do not always agree on which combination of factors are most important to examine. As such, I describe the research evidence pointing to the importance of examining body dissatisfaction, perfectionism, global self-esteem, and sociocultural factors when considering the association between appearance overvaluation and disordered eating.

Body Dissatisfaction

Body dissatisfaction is a maladaptive negative emotion, or feeling, about one's weight and body composition that results from upward social comparisons to idealized body shapes (i.e., when people compare themselves to someone who they perceive to have a superior body appearance; Myers & Crowther, 2009). There is some debate as to whether body dissatisfaction

or appearance overvaluation is the main precursor to eating disorders. For instance, in longitudinal research among a community sample of 8 to 13-year-old girls, body dissatisfaction predicted dietary restraint ($\beta = .32$; Allen et al., 2008). Other studies found that body dissatisfaction predicted increased risk for, and severity of, binge eating at 20-month follow-up among adolescent females ($r = .26$; Stice et al., 2002) and 15-year follow-up among adolescent females ($OR = 1.62$; Sharpe et al., 2018).

Importantly, although body dissatisfaction and appearance overvaluation are moderately and positively associated, research indicates that they are distinct constructs (Cooper & Fairburn, 1993; Mitchison et al., 2017; Sharpe et al., 2018; Wade et al., 2011). For example, body dissatisfaction and appearance overvaluation are associated with different clinical markers. A longitudinal study among clinical samples of women with bulimia nervosa found that body dissatisfaction and depressed mood moved together over time ($r = .51$), whereas appearance overvaluation and self-esteem moved together over time ($r = .34$; Cooper & Fairburn, 1993). Sharpe et al. (2018) found similar results among adolescent females across 15 years, where body dissatisfaction predicted depressive symptoms ($OR = 0.64$) and appearance overvaluation predicted the onset of binge eating ($OR = 1.29$) in adulthood. As well, appearance overvaluation better differentiated women with bulimia nervosa from healthy controls compared to body dissatisfaction (Goldfein et al., 2000). In a community sample, body dissatisfaction predicted dietary restraint ($\beta = .20$), but appearance overvaluation predicted binge eating ($\beta = .62$; Allen et al., 2008).

Given the moderate and positive associations between body dissatisfaction, appearance overvaluation, and disordered eating, it may be important to include body dissatisfaction as a

covariate in analyses that examine the association between appearance overvaluation and disordered eating.

Global Self-Esteem

In the cognitive-behavioural model, low global self-esteem is theorized to be an antecedent of appearance overvaluation and a maintenance factor of disordered eating (Fairburn, 2008). Global self-esteem refers to a person's negative or positive view of themselves as a whole (i.e., not specific to any one aspect of the self; Rosenberg et al., 1995). Low global self-esteem refers to having a pervasive and long-lasting low self-value that is not explained by other psychopathology (e.g., depression). Like appearance overvaluation, self-esteem has been shown to be an important predictor of treatment outcomes among people with eating disorders. In longitudinal research, self-esteem and appearance overvaluation were the only two significant predictors of treatment outcome (Fairburn et al., 1993). Specifically, those with lower self-esteem and higher appearance overvaluation had worse treatment outcomes at one-year follow up. Similarly, in a meta-analysis investigating treatment outcomes for eating disorders, higher self-esteem predicted better outcome at end of treatment ($r = .22$; Vall & Wade, 2015). As well, a systematic review found that, although self-esteem did improve with treatment, initial self-esteem was predictive of remission and weight-related outcomes at follow-ups ($r = .33$; Kastner et al., 2019).

Appearance overvaluation and self-esteem are also associated. For instance, in cross-sectional research among men and women with binge eating disorder, higher levels of appearance overvaluation were correlated with lower self-esteem ($r = -0.44$; Hrabosky, 2007). In community samples, cross-sectional research has found associations between low global self-esteem and greater overvaluation among high school students ($\beta = -0.49$; Wade & Lowes, 2002)

and university students ($\beta = -0.22$; Lampard et al., 2011). Likewise, in longitudinal research among people with binge eating disorder, the presence of appearance overvaluation was related to lower self-esteem when compared to people without overvaluation at baseline ($\eta^2 = .140$; Grilo et al., 2012). Also, among people who received bariatric surgery for obesity, change in appearance overvaluation was significantly correlated with change in self-esteem after surgery ($r = -0.35$; Masheb et al., 2006).

Given the evidence indicating a relationship between self-esteem and appearance overvaluation, and self-esteem and disordered eating behaviour, it could be argued that self-esteem should be included as a covariate in a model measuring the association between appearance overvaluation and disordered eating. For example, it is possible that self-esteem might equally or better predict disordered eating behaviour than appearance overvaluation. In other words, because self-esteem and appearance overvaluation are correlated, it is important to partition out the amount of variance in disordered eating behaviours that is accounted for by self-esteem when measuring the association between appearance overvaluation and disordered eating. Importantly, it can also be argued that because self-esteem and appearance overvaluation are reliably correlated, that measuring one assumes the other exists, and including both in the model can cause multicollinearity. Hence, the inclusion or exclusion of self-esteem as a covariate in the model is an important analytical decision.

Perfectionism

According to the transdiagnostic cognitive-behavioural theory of eating disorders, perfectionism drives and maintains appearance overvaluation and disordered eating (Fairburn, 2008). People with perfectionism often feel incompetent and uncertain of themselves. To remedy this, they work to attain self-imposed, extremely high standards in life domains that offer them a

sense of security (Egan et al., 2014; Stoeber & Stoeber, 2009). In the cognitive-behavioural model of perfectionism (Shafran et al., 2002), perfectionism is driven by an overvaluation of achievement in valued life domains, often including work, sports, and among women with eating disorders, their body shape and weight (Fairburn, 2008). Failure to meet any self-imposed standards in a domain is met with extreme self-criticism (Shafran et al., 2002). Individuals suffering from perfectionism fear failure, are preoccupied with their performance on important tasks to the detriment of success in other areas of life, and continue to pursue personally demanding standards despite the harm to other areas of life. Perfectionism is a particularly harmful trait because once a goal is met, an individual with perfectionism will set another, even more difficult goal (i.e., a lower weight), perpetuating a never-ending cycle of harm.

Research has found that clinical samples of women with eating disorders have higher scores on measures of perfectionism compared to community samples ($\eta\rho^2 = .03$; Lethbridge et al., 2011). Likewise, a meta-analysis of 23 studies by Dahlenburg et al. (2019) found that people with eating disorders score higher on evaluative concerns and personal standards dimensions of perfectionism compared to people without an eating disorder or other mental health problems (*Hedges' g* = 1.00). Evaluative concerns perfectionism occurs when someone has high self-standards and is harmfully self-critical when standards are not met, whereas personal standards perfectionism is considered less harmful, and occurs among people who enjoy achieving difficult goals but do not become self-critical if they fail to do so. Both dimensions of perfectionism (i.e., personal standards and evaluative concerns) have been associated with disordered eating behaviours and appearance overvaluation in cross-sectional research involving women with eating disorders. For example, Steele et al. (2011) found that both dimensions of perfectionism were strongly associated with appearance overvaluation ($r = .62$ evaluative concerns, $r = .54$

personal standards) among women receiving treatment for eating disorders. In other research, personal standards perfectionism ($r = .23$; Watson et al., 2011) and both personal standards and evaluative concerns perfectionism ($r = .37$; Puttevils et al., 2019) were related to dietary restraint and drive for thinness, but these relationships were moderated by self-esteem and appearance overvaluation respectively. Personal standards perfectionism has also been associated with eating pathology in community samples ($r = .38$; Joyce et al., 2012).

Perfectionism also predicts disordered eating behaviours over time. In longitudinal research among community samples, perfectionism and appearance overvaluation at time 1 interacted to predict change in disordered eating behaviours 14 months later ($\beta = .13$; Bardone-Cone et al., 2016). Specifically, perfectionism was associated with increases in disordered eating when appearance overvaluation was high, but not when appearance overvaluation was low. In other longitudinal research among undergraduate women, high levels of perfectionism at baseline predicted high levels of disordered eating behaviours at 1 ($r = .129$ evaluative concerns, $r = .247$ personal standards) and 2-year follow-up ($r = .156$ evaluative concerns, $r = .190$ personal standards; Soares et al., 2009). Among clinical samples, lower perfectionism upon admission to treatment programs was associated with better response to treatment and predicted good outcomes (i.e., absence of any eating disorder) at 8 and 16-year follow-up (Nilsson et al., 2008).

Importantly, although many researchers argue that perfectionism consists of two factors (i.e., evaluative concerns and personal standards), recent findings suggest a bifactor model (i.e., one general factor that all items load onto) provides a better fit to the data compared to a bi-dimensional model that includes evaluative concerns and personal standards among samples of

university students (Smith & Saklofske, 2017) and people from the community (Howell et al., 2020).

Taken together, this body of research indicates why some researchers may choose to account for perfectionism when examining the association between appearance overvaluation and disordered eating behaviours.

Sociocultural Factors

Every culture has its own set expectations for how ideal individuals should look and act. For instance, in Western cultures, women are expected to have a thin body (Ata et al., 2015; Dittmar, 2008; Schaefer et al., 2019). It is well-established that sociocultural factors of perceived pressure to be thin and thin-ideal internalization play a role in the development of eating disorders (for a review, see Ata et al., 2015). Thin-ideal internalization occurs when someone buys into, or strongly believes that, attaining the culturally prescribed “ideal” thin body will bring them happiness and success in life. Perceived pressure to be thin comes from social interactions and everyday experiences (e.g., social media advertisements) that encourage attainment of the thin-ideal. According to the sociocultural theory, thin-ideal internalization and perceived pressure are risk factors for eating disorders because they elicit body dissatisfaction (Ata et al., 2015; Dittmar, 2008).

Importantly, it is theorized that sociocultural factors are also related to appearance overvaluation. This is based on Oyserman and colleagues’ (Oyserman, 2001; Oyserman & Markus, 1993; Oyserman et al., 2012) sociocultural model of the self-concept. The self-concept contains ideas about who you are, who you want to become, and judgments about self-worth based on the current and desired self. The self-concept is where appearance overvaluation would develop and be maintained, and the thin-ideal would be the desired self. Importantly, in the

sociocultural model, the self-concept is partially shaped by our interactions with important people and information sources in our lives (e.g., from friends, family, dating partners, and media). Accordingly, perceived pressure to attain the attractiveness ideal, and internalization of the attractiveness ideal, may contribute to cultivating a self-concept focused on appearance (i.e., appearance overvaluation). It is also possible that appearance overvaluation may cultivate thin-ideal internalization. For example, one longitudinal study found that appearance overvaluation is a prospective predictor of thin-ideal internalization in a community sample of adolescent women ($r = .54$; Spangler, 2002).

However, little research has examined the link between sociocultural factors and appearance overvaluation. For example, appearance overvaluation was positively correlated with thin-ideal internalization in cross-sectional research among male and female college students ($r = .54$; Spangler & Stice, 2001b) and positively correlated with perceived pressure to be thin among adolescent females ($r = .57$; Stice et al., 2002). As well, people who overvalue appearance have an attentional bias towards stimuli related to the attractiveness ideal ($\beta = .07$; Tabri & Palmer, 2020). Together, these findings indicate that appearance overvaluation and thin-ideal internalization, and appearance overvaluation and perceived pressure to be thin, are positively associated.

In sum, there is evidence that sociocultural factors are related to disordered eating, but little research has examined the link between sociocultural factors and appearance overvaluation. Nevertheless, theory from social psychology and the self-concept model provide a good rationale for a link between sociocultural factors and appearance overvaluation. As such, thin-ideal internalization, and perceived pressure to be thin, should be considered when trying to predict disordered eating from appearance overvaluation.

Methodological Considerations

Data analysis is not always straightforward. Unfortunately, even if researchers adhere to best practice recommendations (e.g., pre-registration, clear *a priori* hypothesis), there will always be ambiguous decisions that can impact the outcomes of the analysis. For example, researchers must decide what, if any, covariates to include in a model. Covariates may obfuscate results if their inclusion does not have a compelling methodological (e.g., include age because there is a wide range in the sample) or substantive (e.g., theory-driven) rationale. This is because the statistical significance of a test can hinge on the inclusion or exclusion of one or multiple covariates. Simonsohn et al. (2020) note that results of a study hinge on these arbitrary decisions made by researchers, and introduce specification curve analysis as a way to remedy the problem. The following section outlines the most pertinent researcher decisions that had to be made in my study.

Covariates

It is common for studies predicting disordered eating and health outcomes from appearance overvaluation to control for body mass index (BMI; a measure of height to weight ratio) and age in the analyses (Goldschmidt et al., 2009; Mitchison et al., 2017; Santana et al., 2019; Sharpe et al., 2018). Generally, the rationale for controlling BMI is based on the association between BMI and body dissatisfaction. However, there is no evidence that BMI is related to appearance overvaluation, and it has been established that appearance overvaluation is conceptually and empirically distinct from body dissatisfaction. In fact, in most cases, BMI and appearance overvaluation are not correlated. For example, BMI was not correlated with appearance overvaluation among men and women seeking treatment for binge eating disorder ($\eta^2 = .002$; Grilo et al., 2012; Pearl et al., 2014) and among women receiving inpatient treatment

for an eating disorder ($r = -0.01$; Berner et al., 2013). In a community sample of adolescents and adults aged 15 and up, BMI was unrelated to appearance overvaluation, and did not predict overvaluation in a linear regression analysis ($d = .03$; da Luz et al., 2018). Likewise, in a community sample of adult men and women, BMI and appearance overvaluation were not correlated ($r = .09$; Tabri & Palmer, 2020). Although BMI is unrelated to appearance overvaluation, it is related to body dissatisfaction. Hence, accounting for variance due to BMI in body dissatisfaction and disordered eating may help clarify the importance of looking at body dissatisfaction in relation to appearance overvaluation.

Controlling for age is also common in eating disorder research, however the rationale for this is less clear. Whether a researcher controls for age likely depends on the nature of the sample. For example, if the sample narrowly focuses on one age group (e.g., adolescents), then controlling for age is not necessary. However, if the sample is more diverse in age, it may be important to control for age depending on the relationship between age and appearance overvaluation. Berner et al. (2013) controlled for age when predicting eating disorder inpatient treatment outcomes because participants' aging could be partially responsible for improvement in symptoms over time. Santana et al. (2019) controlled for age because it was correlated with weight suppression (i.e., how far below the ideal weight a participant is). The underlying problem in both scenarios is that age is correlated to eating disorder symptoms and severity, in that symptoms tend to decrease with time (Eddy et al., 2017). Thus, participant age could obfuscate results, especially in a non-clinical sample that includes older people. In sum, because some researchers think it is important to include age as a covariate, while others do not, it is important to consider it as a specification.

Outliers

Outliers are values in a data set that fall outside of the expected, or average, range of values. Outliers can occur for a number of reasons, including participant response error, data entry errors, or because participants actually score outside the average range. Problems arise from outliers because they influence the average, which causes under- or overestimation of effects. As such, it is important to address outliers in data analysis. However, researchers do not always agree on what constitutes an outlier (e.g., 3 *SDs* from the mean, or based on the median and quartile range), and there are no clear guidelines on how outliers should be handled (e.g., counted as missing data and replaced with group averages, or removed from the study completely; Kwak & Kim, 2017). Illustrating this, Aguinis and colleagues' (2013) literature review of methodological sources for conducting regression analyses and related models uncovered 39 possible techniques for identifying outliers, and 20 different ways of addressing them. Based on their review, the authors recommend that researchers be transparent in their decisions around outliers and provide a strong rationale for their decisions on how to handle them. Importantly, researchers should report results from all approaches used and include an explanation for any different results. As such, I included outliers as a specification in my analysis to see if results hinge on inclusion or exclusion of a few results. Given the large number of variables in the analysis, it was most appropriate to use multivariate outlier analysis. As such, I used Mahalanobis distance to detect multivariate outliers (i.e., right-tail *p*-value for mahalanobis distance <.001). This resulted in an additional two specifications: a) removing all outliers based on Mahalanobis distance and b) retaining all outliers.

Overview of the Proposed Research

The goal of my thesis research was to explore the relationship between appearance overvaluation and maladaptive dietary restraint behaviours under different model specifications. I chose to focus on dietary restraint above other disordered eating behaviours (e.g., binge eating or purging) because dietary restraint directly follows from appearance overvaluation in the cognitive-behavioural model (Fairburn, 2008). In the model, other disordered eating behaviours follow dietary restraint, not appearance overvaluation.

The model specifications were substantive or methodological. The substantive specifications involved the inclusion of different combinations of factors in the analysis drawn from the cognitive-behavioural and sociocultural models of eating disorders. These factors are body dissatisfaction, perfectionism, self-esteem, perceived pressure to be thin, and thin-ideal internalization. I tested the robustness of the relationship between appearance overvaluation and disordered eating in different analytic models that included all possible combinations of factors as main effects (e.g., perceived pressure to be thin, self-esteem) that were theoretically relevant. My key hypothesis was that people with higher appearance overvaluation would report more dietary restraint than people with lower appearance overvaluation (i.e., a positive association).

In terms of methodological specifications, I examined whether including or excluding covariates (i.e., BMI and age) and outliers affect the association between appearance overvaluation and disordered eating. These analyses help determine how robust the relationship between overvaluation and dietary restraint is to different methodological variances, and highlight the importance of limiting and documenting researcher degrees of freedom in order to produce more replicable and reliable research.

In sum, the specification curve analysis involved all theoretically relevant combinations of the following specifications: 1) five substantive factors from theoretical frameworks included as additional predictor variables (e.g., perfectionism from the cognitive-behavioural framework); 2) two covariates (i.e., age and BMI); 3) two outlier specifications (i.e., retain outliers or remove them based Mahalanobis distance). The resulting regression analyses tested the relationship between appearance overvaluation and dietary restraint.

Method

Participants

This research was a secondary analysis of existing data collected from female undergraduate students at Carleton University. Undergraduate women are an appropriate population for at least three reasons. First, the prevalence of eating disorder psychopathology and disordered eating behaviours is higher among undergraduate women relative to the general population (Fitzsimmons-Craft, 2019 [6.8–40.2% depending on screening criteria]; Fitzsimmons-Craft, 2011 [review suggests between 4 – 9%]; Luce et al., 2008 [7.9% dietary restraint]). Second, many university-aged women experience subclinical levels of disordered eating (Hoerr et al., 2002; Luce et al., 2008). Lastly, the developmental period of young adult women is a psychological context in which the self-concept is being formed (Klimstra & Doeselaar, 2017). Hence, the timing of the transition to university leaves young women especially vulnerable to sociocultural messages as they become more reliant on peer interactions and have more opportunity to compare themselves to “ideal” individuals (Fitzsimmons-Craft, 2011).

Five-hundred and sixty-nine female undergraduate psychology students from Carleton University participated in this study for course credit. Participants had a mean age of 19.69 (range 17 - 68, $SD = 4.61$) and mean BMI of 23.60 (range 13.79 - 54.82, $SD = 5.20$).

Materials and Procedure

Participants were recruited through Carleton University’s SONA system to complete an online questionnaire. At the beginning of the assessment, participants completed the informed consent. This research received ethics approval from Carleton University’s Research Ethics Board–B.

Perceived Pressure to be Thin and Thin-ideal Internalization

The Sociocultural Attitudes Towards Appearance Questionnaire-4-Revised (SATAQ-4R; Schaefer et al., 2017) is a 31-item scale which measures perceived pressure to be thin (e.g., “how much pressure do you feel to look thinner, lose weight, or be in shape from friends?”) and thin-ideal internalization (e.g., “I want my body to look very thin”) using a 5-point Likert scale ranging from 1 (definitely disagree) to 5 (definitely agree). The SATAQ-4R has good internal consistency in these data ($\alpha = .87$ internalization, $.93$ pressure). The SATAQ-4R has also been shown to have test-retest reliability at two weeks (i.e., all correlations $\geq .72$), and convergent validity (i.e., all correlations significant at $p < .05$) with measures of body dissatisfaction, eating disturbance, and self-esteem (Schaefer et al., 2017).

Appearance Overvaluation

The Beliefs About Appearance Scale (Spangler & Stice, 2001a) is a 20-item scale that measures appearance overvaluation. Questions measure strength of belief in statements about the influence of physical appearance on relationships, achievement, feelings, and self-view. Agreement is measured on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Because I used secondary data for my thesis, four items from this scale were used: 1) “how I feel about myself is largely based on my appearance”; 2) “my moods are influenced by how I look; 3) “people will think less of me if I don’t look my best; 4) “the opportunities that are made available to me depend upon how I look”. These four items were selected because all 20 items of the Beliefs About Appearance Scale measure one underlying construct (i.e., appearance overvaluation). Hence, including all 20 questions was both redundant and put unnecessary burden on participants with many other measures in the study. One item from each domain (i.e., relationships, achievement, feelings, and self-view) with a high factor loading were selected. The

Beliefs About Appearance Scale had good internal consistency in these data ($\alpha = .82$) and has predicted dietary restraint over time in other studies (Spangler & Stice, 2001b).

Global Self-esteem

The Rosenberg Self-esteem Scale (Rosenberg, 1965) is a 10-item measure of global self-esteem (e.g., “I feel that I have a number of good qualities”). Participants rate their agreement with a 4-point Likert scale from 1 (*strongly agree*) to 4 (*strongly disagree*). The Rosenberg Self-esteem Scale had good internal consistency ($\alpha = .91$).

Perfectionism

Perfectionism was assessed using three questionnaires. The first is the Depressive Experiences Questionnaire – Self-Criticism scale (Blatt et al., 1976), which is a 6-item measure of self-criticism. The Depressive Experiences questionnaire – Self-Criticism Subscale has been shown to have good internal consistency ($\alpha = .80$), and test-retest reliability over 5 ($r = .89$) and 13 weeks ($r = .83$, Lehman et al., 1997). An example from this subscale is “I tend to be very critical of myself”. The second scale involves 10 items from the Personal Standards and Concern Over Mistakes Subscales of the Frost Multidimensional Perfectionism Scale (Frost et al., 1990). The Personal Standards Subscale measures personal standards perfectionism (e.g., “I set higher goals than most people”). The Concern over Mistakes Subscale measures evaluative concerns perfectionism (e.g., “If I fail at work/school, I am a failure as a person”). The Frost Multidimensional Perfectionism scale has been shown to have good internal consistency for both the Personal Standards Subscale ($\alpha = .83$) and the Concern Over Mistakes Subscale ($\alpha = .88$, Frost et al., 1990). The third scale involves 8 items from the Short Almost Perfect Scale – High Standards Subscale and Discrepancy Subscale (Rice et al., 2014). The High Standards Subscale measures personal standards perfectionism (e.g., “I expect the best from myself”), and the

Discrepancy Subscale measures evaluative concerns (e.g., “I am hardly ever satisfied with my performance”). The Short Almost Perfect Scale has been found to have good internal consistency ($\alpha = .85$ standards, $\alpha = .87$ discrepancy, Rice et al., 2014).

In line with prior research (Dunkley et al., 2006; Levine et al., 2020), perfectionism was measured using a combination of the 24 items from the Depressive Experiences Questionnaire – Self-Criticism scale (Blatt et al., 1976), the Frost Multidimensional Perfectionism Scale – Concerns over Mistakes and Personal Standards subscales (Frost et al., 1990) and the Short Almost Perfect Scale – Discrepancy and High Standards subscales (Rice et al., 2014). Participants responded to each of the 24 items using a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Exploratory factor analysis was used to determine whether an average score that combines the evaluative concerns and personal standards subscale scores should be used in the analyses, or if they should be entered separately (see Appendix A for a complete list of the final questions used and their factor loadings). This is because a general factor of perfectionism has been shown to provide a better fit to the data relative to two factors, however, it is not the norm (i.e., evaluative concerns and personal standards; Howell et al., 2020; Smith & Saklofske, 2017). The analysis revealed two separate factors with eight questions loading onto personal standards from the FMPS and the APS-R, and seven questions loading onto self-criticism perfectionism from the DEQ and APS-R. The measures of self-critical perfectionism ($\alpha = .91$) and personal standards perfectionism ($\alpha = .92$) identified via the factor analysis both showed good internal consistency and were used in the current research.

Body Dissatisfaction

Body Dissatisfaction was measured using a 4-item questionnaire based on the Personal Relative Deprivation Scale (i.e., a measure used in gambling research; Callan et al., 2008). The adapted version has been used in recent eating disorders research and was moderately and positively correlated with appearance overvaluation ($r = .44$, Tabri & Palmer, 2020). The questions were “When I think about my body compared to others, I feel dissatisfied”, “I am satisfied with my body compared to other people like me” (reverse-coded), “I feel distressed when I look at other people's bodies”, and “When I compare my body to other people, I realize that I am quite satisfied”. The measure was scored using a 7-item Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The measure of body dissatisfaction had good internal consistency ($\alpha = .91$).

Dietary Restraint

The Eating Disorder Examination Questionnaire (Fairburn & Beglin, 2008) is a 41-item questionnaire which assesses disordered eating symptoms over the past 28 days under four subscales: dietary restraint, shape concern, weight concern, and eating concern. Responses are made on a scale with seven options for frequency of disordered eating behaviour: 0 (*no days*), 1 (*1 – 5 days*), 2 (*6 – 12 days*), 3 (*13 – 15 days*), 4 (*16 – 22 days*), 5 (*23 – 27 days*), 6 (*every day*). Only the 5-item dietary restraint subscale was used for this research because it was the only measure available in the secondary data. However, dietary restraint is most appropriate above other disordered eating behaviours because dietary restraint directly follows from appearance overvaluation in the cognitive-behavioural model (Fairburn, 2008). An example of a question from this subscale is “On how many of the past 28 days have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight

(whether or not you have succeeded)?”. The restraint subscale has good internal consistency in these data ($\alpha = .89$) and has shown good test-retest reliability in other research ($r = .81$, Rose et al., 2013).

Data Analytic Approach

The main analysis was an ordinary least squares regression in which appearance overvaluation was the independent variable and dietary restraint was dependent variable. I examined whether the association between appearance overvaluation and dietary restraint was robust to different specifications. To do this, I conducted a specification curve analysis (Simonsohn et al., 2015) using R (Version 4.0.0; R Core Team, 2019) and the R-packages *specr* (Version 0.2.1; Masur & Scharkow, 2019). The specification curve analysis was used to identify and test all theoretically justifiable decisions a researcher will make during data analysis (e.g., which covariates to include). I selected the simplest model (i.e., main effect of appearance overvaluation on dietary restraint). The analysis pathways are described in detail below and summarized in Table 1.

Table 1

Reasonable Specifications for Examining the Relationship between Appearance Overvaluation and Dietary Restraint.

Decision	Possible Specifications
1. <i>What substantive factors are included</i>	perfectionism, self-esteem, body dissatisfaction, perceived pressure, thin-ideal internalization
2. <i>Covariates</i>	BMI and age
3. <i>How outliers are handled</i>	leave all outliers in, remove all outliers based on Mahalanobis distance

Substantive Factors

The listed substantive factors are derived from the cognitive-behavioural and sociocultural models of disordered eating, each of which are known predictors of disordered eating behaviours. I examined the association between appearance overvaluation and dietary restraint with sociocultural factors included as additional predictor variables: perceived pressure to be thin and thin-ideal internalization as individual factors and as a set of factors (i.e., three specifications). I did the same for the cognitive-behavioural model including body dissatisfaction, self-critical perfectionism, personal-standards perfectionism, and self-esteem as individual additional predictor variables and as a set of predictor variables (i.e., five specifications). I also ran the model with all additional predictors and no additional predictors (i.e., two specifications), making a total of ten substantive factor specifications. I analyzed each model for a main effect of appearance overvaluation.

Covariates

The included covariates (i.e., age and BMI) are derived from general observation of norms while reviewing the eating disorder literature. I looked at the association between appearance overvaluation and disordered eating behaviours with age and BMI included as covariates both individually and as a set (i.e., three specifications). I also ran the model with no covariates (i.e., one specification), making a total of four covariate specifications.

Outliers

There were two specifications for handling outliers. First, probable outliers based on any extreme scores were excluded from data analysis. Extreme scores on any variable were determined by Mahalanobis distance. All outliers could also be retained. Hence, I examined the effects of (1) leaving all outliers in and (2) removing all outliers based on Mahalanobis distance.

Importantly, both situations are justifiable analysis decisions, and therefore must be included as an analysis choice in the specification curve, totaling two additional specifications.

In sum, the total number of models to be estimated in the specification curve analysis is 80. This is based on 10 (substantive factors) x 4 (covariates) x 2 (outliers) design, which is 80 models.

Results

Data Cleaning

Original data included responses from 772 undergraduate university students at Carleton University. Cases were removed because the participants chose to withdraw from the study ($n = 62$), did not identify as female, or did not answer the question ($n = 42$), did not provide age, height, or weight information ($n = 28$; this is because it was needed to calculate the BMI variable), did not complete responses for one or more key variables ($n = 71$). The final sample consisted of 569 undergraduate females ($Mage = 19.69$, $SD = 4.61$). Descriptive statistics for all variables are available in Table 2. Figure 1 shows the correlations between all variables.

Outlier Detection

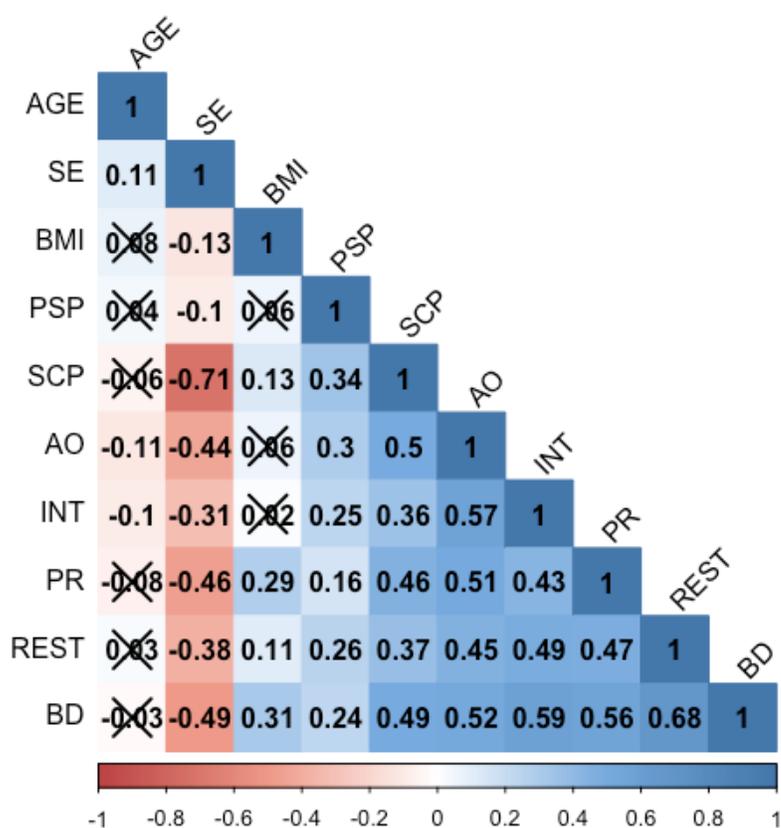
Mahalanobis distance was used to detect multivariate outliers. Based on Mahalanobis distance, 12 cases were outliers (i.e., right-tail p -value for mahalanobis distance $<.001$). The outliers were retained in the data as they were needed for analyses.

Regression Analysis Assumptions

Assumptions were checked for a simple linear regression analysis including all possible predictor variables. Visual inspection of the P-P plot indicated no major departures from normality. Visual inspection of a scatterplot of the standardized residuals indicated very few outliers (i.e., only 2 cases larger than ± 3 SD), and no visible patterns in the data, indicating homoscedasticity. All tolerance levels were greater than .02 and variance inflation factors below 10, indicating an absence of multicollinearity.

Table 2
Descriptive Statistics for all variables

	Min.	Max.	<i>M</i>	<i>SD</i>
Age	17	68	19.69	4.61
BMI	13.79	54.82	23.60	5.19
Appearance Overvaluation	1	5	3.29	0.99
Dietary Restraint	1	7	2.86	1.73
Pressure	1	7	3.51	1.32
Internalization	1	7	4.78	0.94
Self-Esteem	1	7	4.30	1.22
Personal Standards Perfectionism	1	7	4.99	1.18
Self-Criticism Perfectionism	1	7	4.64	1.36
Body Dissatisfaction	1	7	4.49	2.07

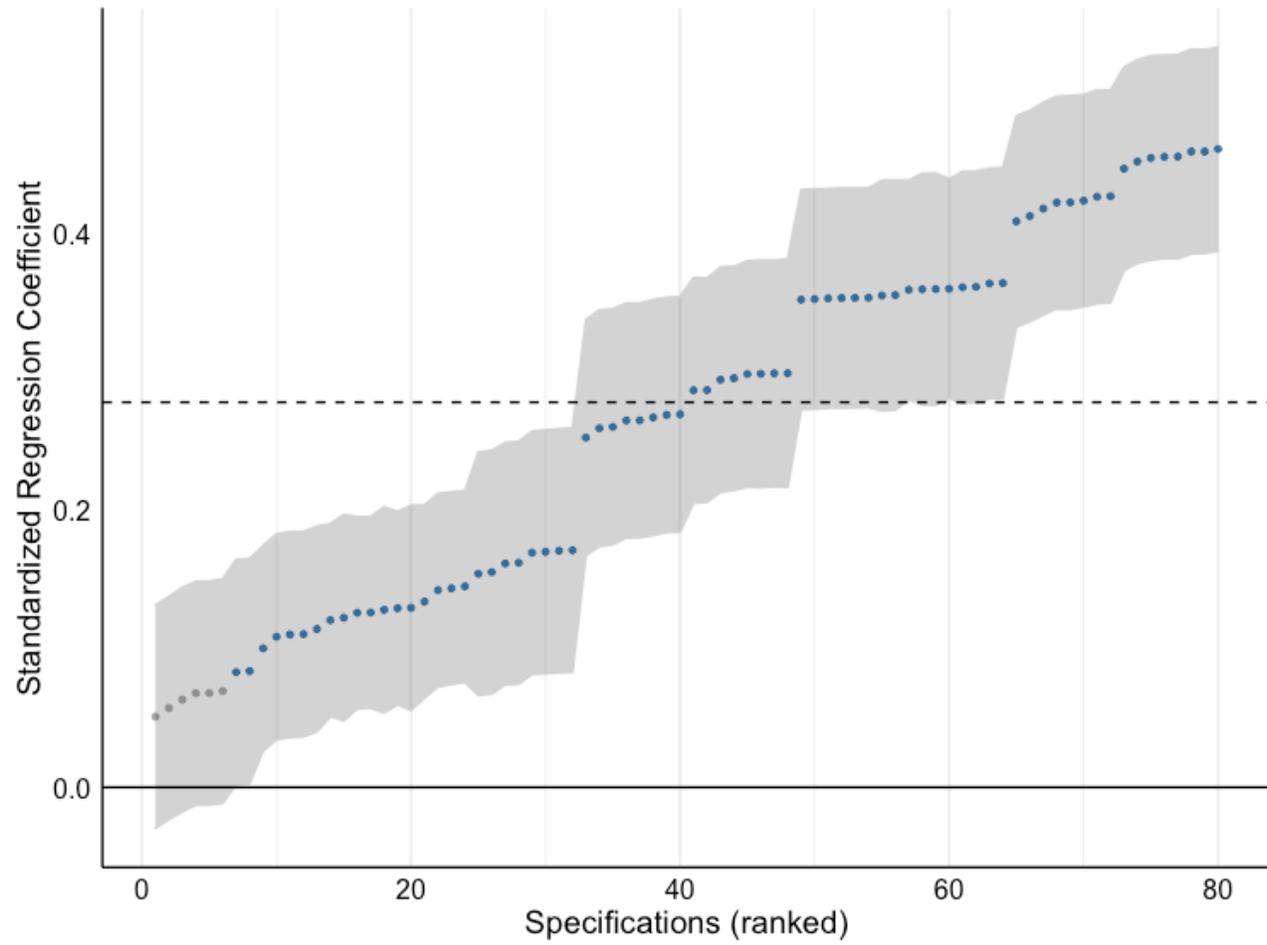
Figure 1*Correlations between all Variables*

Note. Boxes that are crossed out are non-significant at the .05 level. Red boxes have a negative correlation, with darker colour representing a stronger relationship. Blue boxes have a positive correlation, with darker colour representing a stronger relationship. SE = self-esteem, PSP = personal standards perfectionism, SCP = self-critical perfectionism, AO = appearance overvaluation, INT = thin-ideal internalization, PR = perceived pressure to be thin, REST = dietary restraint, BD = body dissatisfaction.

Specification Curve Analysis

All 80 models under investigation yielded positive associations between appearance overvaluation and dietary restraint (see Figure 2). The mean R^2 across all models = 0.335 (see Figure 3 for a plot of R^2 for each specification). When the models were run on data with outliers included, the association between appearance overvaluation and dietary restraint was not statistically significant in four of the 40 models. However, when outliers were removed, the association was not statistically significant in two of the 40 models. The specifications of all models in which the association between appearance overvaluation and dietary restraint was not statistically significant are shown in Table 3. These models included all sociocultural (i.e., perceived pressure to be thin and internalization of the thin-ideal) and all cognitive-behavioural (i.e., body dissatisfaction, self-esteem, and perfectionism) factors. Importantly, in these models, removing outliers changed the association between appearance overvaluation and dietary restraint from statistically non-significance to significant. The same findings were observed when participants' age was included in the model (i.e., the association is statistically significant only when multivariate outliers are removed).

Figure 2
Specification Curve of the Association between Appearance Overvaluation and Dietary Restraint



Note. This figure shows Specification Curve results comparing the effect of analytical choices on effect sizes for the association between appearance overvaluation and dietary restraint. The blue dots represent statistically significant positive associations, while the grey dots represent non-significant associations at the .05 threshold. The grey shading represents 95% CIs. The dashed line represents the median effect size of 0.29.

Table 3

All Models in which the Standardized Regression Coefficient showing the Association between Appearance Overvaluation and Dietary Restraint was Statistically Non-significant.

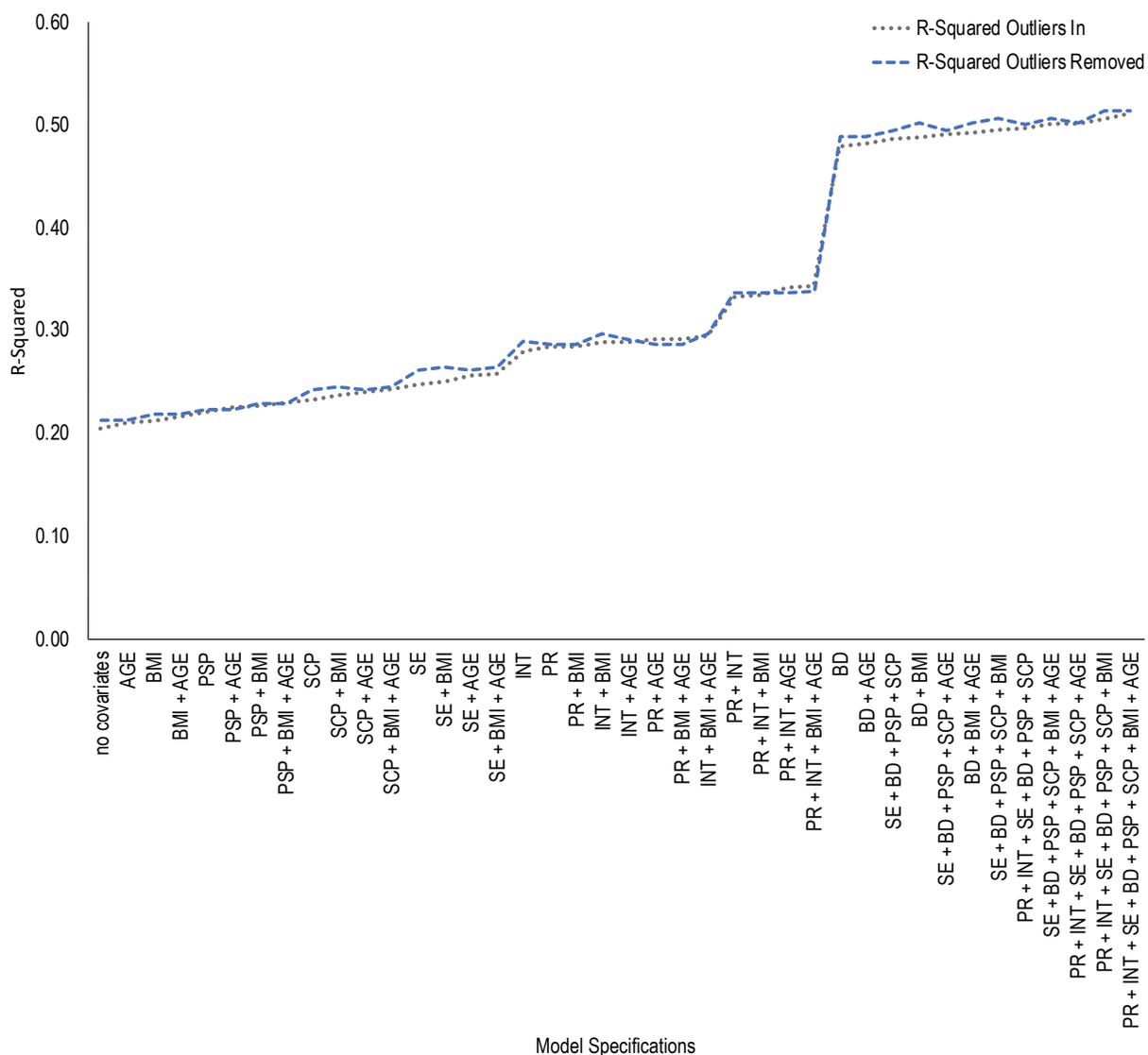
Covariates in Model	B	Lower	Upper	R²
PR + INT + SE + BD + PSP + SCP + BMI	0.051	-0.030	0.132	0.507
PR + INT + SE + BD + PSP + SCP + BMI + AGE	0.057	-0.023	0.138	0.512
PR + INT + SE + BD + PSP + SCP	0.063	-0.018	0.145	0.497
r.PR + INT + SE + BD + PSP + SCP + BMI	0.068	-0.013	0.149	0.514
r.PR + INT + SE + BD + PSP + SCP + BMI + AGE	0.068	-0.013	0.149	0.514
PR + INT + SE + BD + PSP + SCP + AGE	0.070	-0.011	0.151	0.501

Note. Model specifications beginning with “r.” were run on data with multivariate outliers removed. SE = self-esteem, PSP = personal standards perfectionism, SCP = self-critical perfectionism, AO = appearance overvaluation, INT = thin-ideal internalization, PR = perceived pressure to be thin, REST = dietary restraint, BD = body dissatisfaction.

The median standardized regression coefficient across all models was 0.29, with the median model accounting for 29% of the variance in dietary restraint ($R^2 = 0.289$). Overall, the model with the largest coefficient (i.e., largest effect size) regressed dietary restraint on appearance overvaluation with only age as a covariate, and outliers included in the model, resulting in an effect size of 0.46 (95% CI[0.39,0.54]). This model explained 21% of the variance in dietary restraint ($R^2 = 0.211$).

The model with the smallest coefficient (i.e., the smallest effect size) regressed dietary restraint onto appearance overvaluation as well as both sociocultural factors (i.e., perceived pressure to be thin, internalization of the thin ideal), all cognitive-behavioural factors (i.e., body dissatisfaction, self-esteem, self-critical perfectionism, and personal standards perfectionism), and BMI as covariates, with outliers included in the model. These specifications resulted in an effect size of 0.05 (95%CI[-0.03 – 0.13]). This model explained 51% of the variance in dietary restraint ($R^2 = 0.507$). All models with their respective effect sizes (i.e., standardized regression coefficient), confidence intervals, and R^2 are in Appendix B.

Figure 3
R² for each Unique Model in the Specification Curve



Note. The mean R^2 across all models = 0.335. SE = self-esteem, PSP = personal standards perfectionism, SCP = self-critical perfectionism, AO = appearance overvaluation, INT = thin-ideal internalization, PR = perceived pressure to be thin, BD = body dissatisfaction.

Discussion

In the eating disorders literature, there is a known association between appearance overvaluation and dietary restraint that is consistent with the cognitive-behavioural model of eating disorders (e.g., Lampard et al., 2011; Lampard et al., 2013). However, less is known about how robust the association between appearance overvaluation and dietary restraint is when other important determinants of disordered eating are included in the model. For example, the sociocultural model puts forth important psychological factors, namely perceived pressure to be thin and thin-ideal internalization, that may also explain variance in dietary restraint. Indeed, researchers may choose to include different factors from the cognitive-behavioural (e.g., perfectionism, self-esteem, body dissatisfaction) or sociocultural (e.g., thin-ideal internalization, perceived pressure to be thin) theories of disordered eating when trying to predict dietary restraint. Hence, I used specification curve analysis to assess the robustness of the association between appearance overvaluation and dietary restraint when different substantive factors from leading theories are included in the model.

Moreover, like how different researchers pick and include different factors, researchers also pick and use different methodological aspects of their analyses. Namely, researchers must decide whether to remove or retain outliers, and whether to control for participants' characteristics (e.g., BMI, age). Hence, I considered covariate and outlier decisions in the specification curve analysis as well. I hypothesized a positive association between appearance overvaluation and dietary restraint and tested how robust this association was to different specifications.

In line with the cognitive-behavioural theory of eating disorders (Fairburn, 2008) and previous research (e.g., Lampard et al., 2011; Lampard et al., 2013), evidence was found for a

positive association between appearance overvaluation and dietary restraint that remained statistically significant for most the specifications examined in the specification curve analysis. Indeed, of 80 unique regression models examined in the specification curve, all showed positive associations between appearance overvaluation and dietary restraint, and 74 of those associations reached statistical significance. The results indicate a robust association between appearance overvaluation and dietary restraint that remained under many different substantive (e.g., including or excluding sociocultural or cognitive-behavioural factors in the model) and methodological specifications (e.g., different covariates in the model, removal of outliers, or retention of outliers).

Changes in Effect Size

There were two notable changes in effect size for the relationship between appearance overvaluation and dietary restraint. The first was a drop in effect size in specification number 32 (see Figure 3). In specification number 32, the moderate effect size dropped from around the median effect size (i.e., standardized regression coefficient) of 0.29 to 0.16. The reason is that all sociocultural factors (i.e., perceived pressure to be thin and thin-ideal internalization) were included in the model (i.e., as opposed to only one at a time, or none). All the large effect sizes (i.e., greater than the median) only included one sociocultural factor in each unique model, or one cognitive-behavioural variable (i.e., perfectionism or self-esteem) except for body dissatisfaction.

The second specification (i.e., numbers 7 to 24), which led to a smaller effect size, included body dissatisfaction in the regression model. When body dissatisfaction was included in the model, the effect size for the association between appearance overvaluation and dietary restraint was about the same size as when all sociocultural variables were included (i.e., ~0.16).

When body dissatisfaction or sociocultural factors were in the model, the effect size remained small despite the inclusion of methodological covariates (i.e., age and BMI), and changes in outliers (i.e., retained or removed).

Critically, in specifications number 1 to 6, the association between appearance overvaluation and dietary restraint was not statistically significant. In models 1 to 6, all sociocultural and cognitive-behavioural factors were included in the regression models (i.e., sociocultural factors and body dissatisfaction were in the model together). There are at least two possible explanations for why body dissatisfaction and sociocultural factors reduce the association between appearance overvaluation and dietary restraint. The first explanation is that body dissatisfaction and sociocultural factors are confounding factors in the link between appearance overvaluation and dietary restraint. A confounder is an extraneous variable that obfuscates the relationships between the two variables of interest (Baños, 2018). In the current research, body dissatisfaction and sociocultural factors may be confounders because they may cause both appearance overvaluation and dietary restraint. However, there is very little research on the link between appearance overvaluation, body dissatisfaction, and sociocultural factors. A rare longitudinal study showed that appearance overvaluation may cause body dissatisfaction and thin-ideal internalization (Spangler, 2002). As such, based on the available evidence, it is unlikely that a confounders explanation is the best explanation for why body dissatisfaction and sociocultural factors reduce the association between appearance overvaluation and dietary restraint.

The second explanation for why body dissatisfaction and sociocultural factors reduce the association between appearance overvaluation and dietary restraint is mediation. In mediation analyses, the aim is to identify the mechanism or process by which two or more variables are

related. Importantly, mediation cannot be assessed with cross-sectional data, but mediation models can be developed based on findings from cross-sectional research, and later tested longitudinally or experimentally. In particular, the finding that including both sociocultural factors or body dissatisfaction in the model weakens the association between appearance overvaluation and dietary restraint may suggest a mediation process in which sociocultural and cognitive-behavioural theories are integrated. In the sociocultural theory of eating disorders, thin-ideal internalization, and perceived pressure (i.e., both sociocultural factors) are risk factors for eating disorders because they elicit body dissatisfaction (Ata et al., 2015; Dittmar, 2008). In the cognitive-behavioural theory, appearance overvaluation directly leads to disordered eating, particularly dietary restraint. It is possible that appearance overvaluation indirectly leads to disordered eating *via* sociocultural factors (i.e., perceived pressure to be thin and thin-ideal internalization) and body dissatisfaction. Indeed, longitudinal research has shown that appearance overvaluation predicts thin-ideal internalization over time whereas thin-ideal internalization does not predict appearance overvaluation over time (Spangler, 2002), which supports a possible causal unidirectional link between appearance overvaluation and thin-ideal internalization.

To my knowledge, there is only one cross-sectional study on the link between appearance overvaluation and sociocultural factors (i.e., perceived pressure to be thin; Stice et al., 2002). However, longitudinal research has started to make connections between cognitive-behavioural and sociocultural theories of eating disorders using mediation models. For example, in research among adolescent males and females, personal standards perfectionism (i.e., from the cognitive-behavioural model) was indirectly associated with increased bulimic symptoms (e.g., binge eating) via thin-ideal internalization and perceived pressure to be thin (i.e., sociocultural

variables), and evaluative concerns perfectionism was both directly and indirectly associated with increased bulimic symptoms via perceived pressure to be thin and thin-ideal internalization (Boone et al., 2011). Of note, perfectionism in the cognitive-behavioural theory is an antecedent of appearance overvaluation. Thus, one possible integrative model may involve a serial mediation in which perfectionism leads to appearance overvaluation, which leads to thin-ideal internalization, which leads to body dissatisfaction, which leads to disordered eating. Future research should examine this mediation process.

In sum, it is possible that a complex mediation (as opposed to confounding) process involving appearance overvaluation, thin-ideal internalization, perceived pressure to be thin, body dissatisfaction, and dietary restraint may provide a better explanation of the link between appearance overvaluation and dietary restraint.

Methodological Decisions which Impact Statistical Significance

Another goal of my thesis research was to determine how robust the association between appearance overvaluation and dietary restraint is to different methodological specifications. Amid rapidly advancing research and data analysis techniques, it is critical to limit and outline which decisions were made during data analysis, as many of the decisions can be arbitrary. The reason is that the statistical significance of a finding can be influenced by one or more methodological decisions. Optimistically, the results of the current research show that the association between appearance overvaluation and dietary restraint is very robust (i.e., 74 of 80 specifications reached statistical significance). Critically, in the 6 models in which the association was not statistically significant, there were different specifications for outlier retention or removal in some cases. Specifically, when outliers were retained in the data, and all sociocultural and cognitive-behavioural factors were included in the model, the association

between appearance overvaluation and dietary restraint was not statistically significant. However, when multivariate outliers were removed, and all sociocultural and cognitive-behavioural factors were included in the model, the association between appearance overvaluation and dietary restraint was statistically significant. The same results were observed (i.e., when outliers were retained the association between appearance overvaluation and dietary restraint was not statistically significant, but when the outliers were removed, the association was statistically significant) in the above model (i.e., all substantive factors included) when age was included as a covariate as well.

Critically, although the overwhelming evidence points toward a robust association, if a researcher had run the analyses from specifications 1 - 6, they may have erroneously concluded that there is no association between appearance overvaluation and dietary restraint. Moreover, a researcher running models 1 – 6 may have concluded that the lack of an association between appearance overvaluation and dietary restraint may be due to confounding variables in the model, when in fact the non-significant association is due to how outliers were handled. While the solution to these researcher degrees of freedom (i.e., different plausible models) is definitely *not* to run all the models, all the time, the solution *is* to report on all decisions made during data analysis, limit arbitrary decisions (i.e., leave outliers in if they do not affect the outcomes, and carefully consider why you are removing them when they do), and to be transparent about data cleaning and analysis decisions to ensure replicable, reliable research.

Novelty of Findings and Future Direction

To my knowledge, the current research is the first to examine the association between appearance overvaluation and dietary restraint when considering key factors from both sociocultural and cognitive-behavioural theories. Moreover, my thesis research is among the first

to examine two leading theories simultaneously which otherwise have not been considered together in prior research (i.e., the cognitive-behavioural and sociocultural theories of eating disorders). The current research highlights the importance of considering both cognitive-behavioural and sociocultural theories for a more comprehensive explanation of disordered eating. Indeed, the cognitive-behavioural theory is useful for understanding the dysfunctional thinking that leads to disordered eating (e.g., perfectionism, low self-esteem), but is agnostic about the well-known role of sociocultural factors (e.g., societal standards of attractiveness and internalizing these standards) in the etiology of disordered eating. An integration of both theories can provide a more complete analysis of disordered eating. It is not surprising then, that more of the variance in dietary restraint was explained when important factors from both theories were considered together. Future research should consider examining how cognitive-behavioural and sociocultural factors may combine to foster disordered eating and eating disorders.

Importantly, considering sociocultural and cognitive-behavioural factors together could have practical utility for both treatment and preventive efforts. This is because the gold-standard treatment for eating disorders that directly target appearance overvaluation—the cognitive-behavioural treatment approach (Fairburn, 2008)—are only moderately successful. Indeed, for example, results of a meta-analysis indicated a 48% recovery rate (i.e., no longer purging or no longer binge eating and purging at the end of treatment) for cognitive-behavioural therapy among those who completed treatment (Thompson-Brenner, 2002). Likewise, a more recent study indicated that 42% of patients with bulimia nervosa stopped binge eating and purging after completing a 20-session course of cognitive-behavioural therapy (Poulsen et al., 2014). Critically, many people who recover following cognitive-behavioural treatment for eating disorders relapse. For example, 26% of women treated for binge eating disorder developed

symptoms (e.g., binge eating) within 12 months of completing cognitive-behavioural treatment (Agras et al., 1997). Likewise, Halmi et al. (2002) showed that 44% of women with bulimia nervosa resumed binge eating and purging within just four months of completing treatment. These results dovetail with other research showing that eating disorders can last many years (e.g., Dobrescu et al., 2019; Eddy et al., 2017; Fichter et al., 2006). For example, Eddy and colleagues (2017) showed that most women diagnosed with bulimia nervosa at study intake recovered (i.e., one year of no symptoms) after nine years. In contrast, among women diagnosed with anorexia nervosa at study intake, most recovered after 20 years since study intake. In summary, while cognitive-behavioural treatment is the standard of care for disordered eating treatment, it is only effective in half the people who complete treatment, and the chances of relapse are high. Accordingly, future research on cognitive-behavioural therapy for eating disorders should consider addressing sociocultural factors, such as thin-ideal internalization, which may help treatment efficacy and facilitate longer recovery.

Limitations

The current research must be interpreted in light of certain limitations. Namely, the sample used was a convenience sample of university undergraduate women. This means the sample is Western, educated, industrialized, rich, and democratic (WEIRD; Henrich et al., 2010). Issues arise when using WEIRD participants, as research has shown that these participants are usually outliers on psychological measures, and results of these studies do not extend to other populations. Importantly, however, university age women living in Western societies are a known vulnerable population to eating disorders (Fitzsimmons-Craft, 2019). As well, pressure to be thin is particularly salient in Western cultures (Schaefer et al., 2019). As such, this sample

was appropriate for the research question studied, but caution against generalizing these findings beyond university-age women or to other non-Western cultures should be exercised.

Moreover, the current research was limited because it was performed on secondary data. As such, I was unable to test the robustness of the association between appearance overvaluation and other markers of disordered eating (e.g., excessive exercise, binge eating) because they were not in the data. A common theme in research using specification curve analysis is to test the robustness of associations under different measures of key variables (e.g., using three different measures of well-being as the dependent variable, or using different operational definitions for feminine hurricane names as the independent variable; Ballou & Van Rooij, 2021; Simonsohn et al., 2019). Changing up the measures of key variables has important practical utility for research, as it determines whether results of a study hinge on what measures are used. Testing the robustness of an association to different measures of the same factor can uncover measurement issues if two measures which are supposed to capture the same underlying construct do not show the same results.

As well, because this study used cross-sectional data, I was unable to determine the direction of the association between appearance overvaluation and dietary restraint. Determining the direction of the association would have practical utility for both prevention and treatment, as it would help determine whether appearance overvaluation or dietary restraint should be the focus of treatment. However, previous research has shown the association between appearance overvaluation and dietary restraint is reciprocal (Tabri et al. 2015), so longitudinal research may reinforce the notion that both should be targeted in preventative and treatment efforts.

Another possible limitation has to do with the specification curve analysis in that hurdle regression models were not used as a methodological specification. Hurdle models produce two

regression estimates: One based on a binary outcome for all participants (predicting non-engagement vs. engagement in dietary restraint) and the other based on a continuous outcome among a subset of participants that engaged in dietary restraint. Hurdle models have been recommended in the eating disorders literature when examining predictors of disordered eating behaviours (see Schaumberg et al., 2018). That said, hurdle models are appropriate when there is little engagement in disordered eating in a given sample. In the current research, engagement in dietary restraint was relatively normally distributed in that most participants engaged in some level of dietary restraint. Accordingly, a hurdle model specification was not needed as an additional methodological specification in the current research.

Conclusion

In sum, the current research showed that the cross-sectional association between appearance overvaluation and dietary restraint in a sample of young adult university women is robust to substantive and methodological statistical specifications. The results also highlight the need to reduce researcher degrees of freedom during data analysis, as decisions about outliers and covariates changed the statistical significance of some results, but only in a minority of specifications. A key takeaway of the current research is that it may be important for future research to integrate sociocultural and cognitive-behavioural factors when examining disordered eating.

References

- Agras, W. S., Telch, C. F., Arnow, B., Eldredge, K., & Marnell, M. (1997). One-year follow-up of cognitive-behavioral therapy for obese individuals with binge eating disorder. *Journal of Consulting and Clinical Psychology, 65*(2), 343-347. doi:10.1037/0022-006X.65.2.343
- Aguinis, H., Gottfredson, R. K., & Joo, H. (2013). Best-Practice Recommendations for Defining, Identifying, and Handling Outliers. *Organizational Research Methods, 16*(2), 270–301. <https://doi.org/10.1177/1094428112470848>
- Ahern, A. L., Bennett, K. M., Kelly, M., & Hetherington, M. M. (2011). A qualitative exploration of young women's attitudes towards the thin ideal. *Journal of Health Psychology, 16*(1), 70-79. doi:10.1177/1359105310367690
- Allen, K. L., Byrne, S. M., McLean, N. J., & Davis, E. A. (2008). Overconcern with weight and shape is not the same as body dissatisfaction: Evidence from a prospective study of pre-adolescent boys and girls. *Body image, 5*(3), 261-270.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Aparicio-Martinez, P., Perea-Moreno, A. J., Martinez-Jimenez, M. P., Redel-Macías, M. D., Pagliari, C., & Vaquero-Abellan, M. (2019). Social Media, Thin-Ideal, Body Dissatisfaction and Disordered Eating Attitudes: An Exploratory Analysis. *International journal of environmental research and public health, 16*(21), 4177. <https://doi.org/10.3390/ijerph16214177>
- Arcelus, J., Mitchell, A. J., Wales, J., & Nielsen, S. (2011). Mortality rates in patients with anorexia nervosa and other eating disorders: a meta-analysis of 36 studies. *Archives of General Psychiatry, 68*(7), 724-731.

- Ashikali, E.M., & Dittmar, H. (2011). The effect of priming materialism on women's responses to thin-ideal media. *British Journal of Social Psychology, 51*(4), 514–533.
[doi:10.1111/j.2044-8309.2011.02020.x](https://doi.org/10.1111/j.2044-8309.2011.02020.x)
- Ata, R. N., Schaefer, L M., & Thompson, J. K. (2015). Sociocultural theories of eating disorders. In L. Smolak & M. P. Levine (eds.) *The Wiley Handbook of Eating Disorders, Assessment, Prevention, Treatment, Policy, and Future Directions* (pp. 269-282). New York: John Wiley & Sons, Ltd.
- Ballou, N., & Van Rooij, A. J. (2021). The relationship between mental well-being and dysregulated gaming: a specification curve analysis of core and peripheral criteria in five gaming disorder scales. *Royal Society open science, 8*(5), 201385.
- Baños J.H. (2018) Confounding Variables. In: Kreutzer J., DeLuca J., Caplan B. (eds) *Encyclopedia of Clinical Neuropsychology*. Springer, Cham.
https://doi.org/10.1007/978-3-319-56782-2_2023-3
- Bardone-Cone, A., Lin, S., & Butler, R. (2016). Perfectionism and Contingent Self-worth in Relation to Disordered Eating and Anxiety. *Behavior Therapy, 48*(3), 380–390.
<https://doi.org/10.1016/j.beth.2016.05.006>
- Berner, L. A., Shaw, J. A., Witt, A. A., & Lowe, M. R. (2013). The relation of weight suppression and body mass index to symptomatology and treatment response in anorexia nervosa. *Journal of abnormal psychology, 122*(3), 694–708.
<https://doi.org/10.1037/a0033930>
- Blatt S. J., D’Afflitti J. P., Quinlan D. P. (1976). *Depressive experiences questionnaire*. New Haven, CT: Yale University, School of Medicine, Department of Psychiatry.
- Boone, L., Soenens, B., & Braet, C. (2011). Perfectionism, body dissatisfaction, and bulimic

- symptoms: The intervening role of perceived pressure to be thin and thin ideal internalization. *Journal of Social and Clinical Psychology*, 30(10), 1043-1068.
- Brown, C. A., & Mehler, P. S. (2013). Medical Complications of Self-Induced Vomiting. *Eating Disorders*, 21(4), 287–294. doi:10.1080/10640266.2013.797317
- Cafri, G., Yamamiya, Y., Brannick, M., & Thompson, J. K. (2005). The influence of sociocultural factors on body image: A meta-analysis. *Clinical Psychology: Science and Practice*, 12(4), 421-433. doi:10.1093/clipsy/bpi053
- Callan, M. J., Ellard, J. H., Will Shead, N., & Hodgins, D. C. (2008). Gambling as a search for justice: Examining the role of personal relative deprivation in gambling urges and gambling behavior. *Personality and Social Psychology Bulletin*, 34(11), 1514–1529. <https://doi.org/10.1177/0146167208322956>
- Cash, T. F., Morrow, J. A., Hrabosky, J. I., & Perry, A. A. (2004). How Has Body Image Changed? A Cross-Sectional Investigation of College Women and Men From 1983 to 2001. *Journal of Consulting and Clinical Psychology*, 72(6), 1081–1089. <https://doi.org/10.1037/0022-006x.72.6.1081>
- Coelho, G., Monteiro, R., Vilar, R., Hanel, P., Moizeis, H. & Gouveia, V. (2021). Psychometric Evidence of the Short Almost Perfect Scale (SAPS) in Brazil. *The Counseling Psychologist*, 49(1), 6–32. <https://doi.org/10.1177/0011000020949146>
- Cogley, C. B., & Keel, P. K. (2003). Requiring remission of undue influence of weight and shape on self-evaluation in the definition of recovery for bulimia nervosa. *The International journal of eating disorders*, 34(2), 200–210. <https://doi.org/10.1002/eat.10187>
- Cooper, P., & Fairburn, C. (1993). Confusion over the core psychopathology of bulimia nervosa.

- International Journal of Eating Disorders, 13(4), 385–389. [https://doi.org/10.1002/1098-108X\(199305\)13:4<385::AID-EAT2260130406>3.0.CO;2-W](https://doi.org/10.1002/1098-108X(199305)13:4<385::AID-EAT2260130406>3.0.CO;2-W)
- Crocker, J., & Park, L.E. (2004). The costly pursuit of self-esteem. *Psychological Bulletin*, 130, 392–414. doi: 10.1037/0033-2909.130.3.392
- Dahlenburg, S. C., Gleaves, D. H., & Hutchinson, A. D. (2019). Anorexia nervosa and perfectionism: A meta-analysis. *The International journal of eating disorders*, 52(3), 219–229. <https://doi.org/10.1002/eat.23009>
- da Luz, F. Q., Sainsbury, A., Mannan, H., Touyz, S., Mitchison, D., Girosi, F., & Hay, P. (2018). An investigation of relationships between disordered eating behaviors, weight/shape overvaluation and mood in the general population. *Appetite*, 129, 19–24. <https://doi.org/10.1016/j.appet.2018.06.02>
- de Freitas, C., Jordan, H., & Hughes, E. K. (2018). Body image diversity in the media: A content analysis of women’s fashion magazines. *Health Promotion Journal of Australia*, 29, 251–256. doi: 10.1002/hpja.21
- Dittmar, H. (2008). *Consumer culture, identity, and well-being*. New York: Psychology Press.
- Dobrescu, S. R., Dinkler, L., Gillberg, C., Råstam, M., Gillberg, C., & Wentz, E. (2019). *Anorexia nervosa: 30-year outcome*. *The British Journal of Psychiatry*, 1–8. doi:10.1192/bjp.2019.113
- Dunkley D. M., Blankstein K. R., Zuroff D. C., Lecce S., Hui D. (2006). Self-critical and personal standards factors of perfectionism located within the five-factor model of personality. *Personality and Individual Difference*, 40, 409–420.
- Eddy, K. T., Tabri, N., Thomas, J. J., Murray, H. B., Keshaviah, A., Hastings, E., Eddins, K.,

- Krishna, M., Herzog, D. B., Keel, P. K., & Franko, D. L. (2017). Recovery from anorexia nervosa and bulimia nervosa at 22-year follow-up. *The Journal of Clinical Psychiatry*, 78, 184–189.
- Egan, S. J., Wade, T. D., Shafran, R., & Antony, M. M. (2014). *Cognitive-behavioral treatment of perfectionism*. New York, NY: Guilford Press.
- Egan, S., Watson, H., Kane, R., McEvoy, P., Fursland, A., & Nathan, P. (2013). Anxiety as a Mediator Between Perfectionism and Eating Disorders. *Cognitive Therapy and Research*, 37(5), 905–913. <https://doi.org/10.1007/s10608-012-9516-x>
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report? *International Journal of Eating Disorders*, 16, 363-370. doi: 10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-%23
- Fairburn, C. G., & Beglin, S. J. (2008). *Eating disorder examination questionnaire*. [Database record]. Retrieved from PsycTESTS. doi:<http://dx.doi.org.proxy.library.carleton.ca/10.1037/t03974-000>
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy*, 41(5), 509-528.
- Fairburn, C. G., & Harrison, P. J. (2003). Eating disorders. *Lancet*, 361(9355), 407-416. doi:10.1016/S0140-6736(03)12378-1
- Fairburn, C. G. (2008). *Cognitive behavior therapy and eating disorders*. New York: Guilford Press.
- Fairburn, C. G., Peveler, R., Jones, R., Hope, R., & Doll, H. (1993). Predictors of 12-month

- outcome in bulimia nervosa and the influence of attitudes to shape and weight. *Journal of Consulting and Clinical Psychology*, 61(4), 696–698. <https://doi.org/10.1037//0022-006X.61.4.696>
- Fairburn, C. G., Stice, E., Cooper, Z., Doll, H. A., Norman, P. A., & O'Connor, M. E. (2003). Understanding persistence in bulimia nervosa: A 5-year naturalistic study. *Journal of Consulting and Clinical Psychology*, 71(1), 103-109. <http://dx.doi.org/10.1037/0022-006X.71.1.103>
- Falgares, D., De Santis, S., Gullo, S., Kopala-Sibley D., Scrima, F. & Livi, S. (2018). Psychometric Aspects of the Depressive Experiences Questionnaire: Implications for Clinical Assessment and Research. *Journal of Personality Assessment*, 100(2), 207–218. <https://doi.org/10.1080/00223891.2017.1282493>
- Fallon, A. (1990). Culture in the mirror: Sociocultural determinants of body image. In T. F. Cash & T. Pruzinsky (Eds.), *Body images: Development, deviance, and change* (pp. 80-109). New York: Guilford Press.
- Fichter, M., Quadflieg, N., Hedlund, S. (2006) Twelve-year course and outcome predictors of anorexia nervosa. *International Journal of Eating Disorders*. 39(2): 87-100.
- Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research*, 14, 449-468.
- Ghaznavi, J., & Taylor, L. D. (2015). Bones, body parts, and sex appeal: An analysis of #thinspiration images on popular social media. *Body Image*, 14, 54–61. [doi:10.1016/j.bodyim.2015.03.006](https://doi.org/10.1016/j.bodyim.2015.03.006)
- Goldfein, J. A., Walsh, B. T., & Midlarsky, E. (2000). Influence of shape and weight on self-

- evaluation in bulimia nervosa. *The International journal of eating disorders*, 27(4), 435–445. [https://doi.org/10.1002/\(sici\)1098-108x\(200005\)27:4<435::aid-eat8>3.0.co;2-2](https://doi.org/10.1002/(sici)1098-108x(200005)27:4<435::aid-eat8>3.0.co;2-2)
- Goldschmidt, A. B., Hilbert, A., Manwaring, J. L., Wilfley, D. E., Pike, K. M., Fairburn, C. G., & Striegel-Moore, R. H. (2010). The significance of overvaluation of shape and weight in binge eating disorder. *Behaviour research and therapy*, 48(3), 187-193.
- Grabe, S, Ward, LM and Hyde, JS (2008), The Role of the Media in Body Image Concerns Among Women: A Meta-Analysis of Experimental and Correlational Studies, *Psychological Bulletin*, 134 (3), pp. 460–76.
- Gray-Little, W. (1997). An Item Response Theory Analysis of the Rosenberg Self-Esteem Scale. *Personality & Social Psychology Bulletin*, 23(5), 443–451.
<https://doi.org/10.1177/0146167297235001>
- Grilo, C. M. (2012). Why no cognitive body image feature such as overvaluation of shape/weight in the binge eating disorder diagnosis? *International Journal of Eating Disorders*, 46(3), 208–211. <https://doi.org/10.1002/eat.22082>
- Grilo, C. M., Masheb, R. M., & White, M. A. (2010). Significance of overvaluation of shape/weight in binge-eating disorder: Comparative study with overweight and bulimia nervosa. *Obesity*, 18(3), 499-504.
- Grilo, C. M., White, M. A., Gueorguieva, R., Wilson, G. T., & Masheb, R. M. (2012). Predictive significance of the overvaluation of shape/weight in obese patients with binge eating disorder: findings from a randomized controlled trial with 12-month follow-up. *Psychological Medicine*, 43(06), 1335–1344. doi:10.1017/s0033291712002097
- Halmi, K. A., Agras, W. S., Mitchell, J., Wilson, G. T., Crow, S., Bryson, S. W., & Kraemer, H.

- (2002). Relapse predictors of patients with bulimia nervosa who achieved abstinence through cognitive behavioral therapy. *Archives of General Psychiatry*, *59*(12), 1105-1109. doi:10.1001/archpsyc.59.12.1105
- Hausenblas, H., Campbell, A., Menzel, J., Doughty, J., Levine, M., & Thompson, J. (2013). Media effects of experimental presentation of the ideal physique on eating disorder symptoms: A meta-analysis of laboratory studies. *Clinical Psychology Review*, *33*(1), 168–181. <https://doi.org/10.1016/j.cpr.2012.10.011>
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences*, *33*(2-3), 45–67.
<https://doi.org/10.1017/S0140525X0999152X>
- Holland, G., & Tiggemann, M. (2016). *A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes*. *Body Image*, *17*, 100–110. doi:10.1016/j.bodyim.2016.02.008
- Howell, J., Anderson, R., Egan, S. & McEvoy, P. (2020) One factor? Two factor? Bi-factor? A psychometric evaluation of the Frost Multidimensional Scale and the Clinical Perfectionism Questionnaire, *Cognitive Behaviour Therapy*, *49*(6), 518-530, DOI: 10.1080/16506073.2020.1790645
- Hrabosky, J. I., Masheb, R. M., White, M. A., & Grilo, C. M. (2007). Overvaluation of shape and weight in binge eating disorder. *Journal of Consulting and Clinical Psychology*, *75*(1), 175–180. doi:10.1037/0022-006x.75.1.175
- Hudson, J. I., Hiripi, E., Pope, H. G., Jr., & Kessler, R. C. (2007). The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. *Biol Psychiatry*, *61*(3), 348-358. doi:10.1016/j.biopsych.2006.03.040

- Joyce, F., Watson, H. J., Egan, S. J., & Kane, R. T. (2012). Mediators between perfectionism and eating disorder psychopathology in a community sample. *Eating Behaviors, 13*(4), 361-365. doi:10.1016/j.eatbeh.2012.07.002
- Kästner, D., Löwe, B., & Gumz, A. (2019). The role of self-esteem in the treatment of patients with anorexia nervosa - A systematic review and meta-analysis. *The International Journal of Eating Disorders, 52*(2), 101–116. <https://doi.org/10.1002/eat.22975>
- Klimstra, T. & Doeselaar (2017). Personality Development Across the Lifespan. *Identity formation in adolescence and young adulthood. 293–308*. doi:10.1016/B978-0-12-804674-6.00018-1
- Kwak, S. K., & Kim, J. H. (2017). Statistical data preparation: management of missing values and outliers. *Korean journal of anesthesiology, 70*(4), 407–411. <https://doi.org/10.4097/kjae.2017.70.4.407>
- Lampard, A. M., Byrne, S. M., McLean, N., & Fursland, A. (2011). An evaluation of the enhanced cognitive-behavioural model of bulimia nervosa. *Behaviour Research and Therapy, 49*(9), 529-535. doi:10.1016/j.brat.2011.06.002
- Lampard, A. M., Tasca, G. A., Balfour, L., & Bissada, H. (2013). An evaluation of the transdiagnostic Cognitive-behavioural model of eating disorders. *European Eating Disorders Review, 21*(2), 99-107. doi:10.1002/erv.2214
- Leahey, T. M., Crowther, J. H., & Mickelson, K. D. (2007). The frequency, nature, and effects of naturally occurring appearance-focused social comparisons. *Behavior Therapy, 38*, 132–143.
- Le Grange, D., Swanson, S. A., Crow, S. J., & Merikangas, K. R. (2012). Eating disorder not

- otherwise specified presentation in the US population. *The International journal of eating disorders*, 45(5), 711–718. <https://doi.org/10.1002/eat.22006>
- Lehman, E., Ellis, B., Becker, J., Rosenfarb, I., Devine, R., Khan, A. & Reichler, R. (1997). Personality and depression: A validation study of the Depressive Experiences Questionnaire. *Journal of Personality Assessment*, 68(1), 197–210.
- Lethbridge, J., Watson, H., Egan, S., Street, H., & Nathan, P. (2011). The role of perfectionism, dichotomous thinking, shape and weight overvaluation, and conditional goal setting in eating disorders. *Eating Behaviors: an International Journal*, 12(3), 200–206. <https://doi.org/10.1016/j.eatbeh.2011.04.003>
- Levine, M., Milyavskaya, M., Zuroff, D. (2020). Perfectionism in the Transition to University: Comparing Diathesis-Stress and Downward Spiral Models of Depressive Symptoms. *Clinical Psychological Science*, 8(1), 52–64. <https://doi.org/10.1177/2167702619865966>
- Linardon, J. (2016). Correlates of the over-evaluation of weight and shape in binge eating disorder and mixed eating disorder samples: A meta-analytic review. *Eating Disorders*, 25(3), 183–198. <https://doi.org/10.1080/10640266.2016.1260374>
- Linardon, J., Wade, T. D., de la Piedad Garcia, Xochitl, & Brennan, L. (2017). The efficacy of cognitive-behavioral therapy for eating disorders: A systematic review and meta-analysis. *Journal of Consulting and Clinical Psychology*, 85(11), 1080-1094. [doi:10.1037/ccp0000245](https://doi.org/10.1037/ccp0000245)
- Luce, K. H., Crowther, J. H., & Pole, M. (2008). Eating Disorder Examination Questionnaire (EDE-Q): Norms for undergraduate women. *International Journal of Eating Disorders*, 41(3), 273–276. [doi:10.1002/eat.20504](https://doi.org/10.1002/eat.20504)
- Masheb, R. M., Grilo, C. M., Burke-Martindale, C. H., & Rothschild, B. S. (2006). Evaluating

- oneself by shape and weight is not the same as being dissatisfied about shape and weight: A longitudinal examination in severely obese gastric bypass patients. *International Journal of Eating Disorders*, 39(8), 716-720. doi:10.1002/eat.20311
- Mingoia, J., Hutchinson, A. D., Wilson, C., & Gleaves, D. H. (2017). The Relationship between Social Networking Site Use and the Internalization of a Thin Ideal in Females: A Meta-Analytic Review. *Frontiers in Psychology*, 8. doi:10.3389/fpsyg.2017.01351
- Mitchison, D., Hay, P., Griffiths, S., Murray, S., Bentley, C., Gratwick-Sarll, K., Harrison, C., & Mond, J. (2017). Disentangling body image: The relative associations of overvaluation, dissatisfaction, and preoccupation with psychological distress and eating disorder behaviors in male and female adolescents: Disentangling body image disturbance. *The International Journal of Eating Disorders*, 50(2), 118–126.
<https://doi.org/10.1002/eat.22592>
- Mond, J. M., & Hay, P. J. (2011). Dissatisfaction versus over-evaluation in a general population sample of women. *The International journal of eating disorders*, 44(8), 721–726.
<https://doi.org/10.1002/eat.20878>
- Mond, J., Mitchison, D., Latner, J., Hay, P., Owen, C., & Rodgers, B. (2013). Quality of life impairment associated with body dissatisfaction in a general population sample of women. *BMC Public Health*, 13(1), 920–920. <https://doi.org/10.1186/1471-2458-13-920>
- Myers, T. A., & Crowther, J. H. (2009). Social comparison as a predictor of body dissatisfaction: A meta-analytic review. *Journal of Abnormal Psychology*, 118(4), 683-698.
<http://dx.doi.org/10.1037/a0016763>
- Nilsson, K., Sundbom, E., & Hägglöf, B. (2008). A longitudinal study of perfectionism in

- adolescent onset anorexia nervosa-restricting type. *European Eating Disorders Review*, 16(5), 386–394. doi:10.1002/erv.850
- Oyserman, D. (2001). Self-concept and identity. In A. Tesser & N. Schwarz, *The Blackwell Handbook of Social Psychology* (pp. 499-517). Malden, MA: Blackwell.
- Oyserman, D., Elmore, K., & Smith, G. (2012). Self, self-concept, and identity. In M. R. Leary & J. P. Tangney, *Handbook of Self and Identity* (pp. 69-104). New York: Guilford Press.
- Oyserman, D., & Markus, H. R. (1993). The sociocultural self. In J. Suls (ed.), *Psychological Perspectives on the Self* (vol. 4, 187-220). New Jersey: Lawrence Erlbaum Associates.
- Pearl, White, M. A., & Grilo, C. M. (2014). Overvaluation of shape and weight as a mediator between self-esteem and weight bias internalization among patients with binge eating disorder. *Eating Behaviors: an International Journal*, 15(2), 259–261.
<https://doi.org/10.1016/j.eatbeh.2014.03.005>
- Poulsen, S., Lunn, S., Daniel, S. I. F., Folke, S., Mathiesen, B. B., Katznelson, H., & Fairburn, C. G. (2014). *A Randomized Controlled Trial of Psychoanalytic Psychotherapy or Cognitive-Behavioral Therapy for Bulimia Nervosa*. *American Journal of Psychiatry*, 171(1), 109–116. doi:10.1176/appi.ajp.2013.12121511
- Puttevils, L., Vanderhasselt, M., & Vervaeke, M. (2019). Investigating transdiagnostic factors in eating disorders: Does self-esteem moderate the relationship between perfectionism and eating disorder symptoms? *European Eating Disorders Review*, 27(4), 381–390.
<https://doi.org/10.1002/erv.2666>
- Rice, K. G., Richardson, C. M., & Tueller, S. (2014). The Short Form of the Revised Almost Perfect Scale. *Journal of Personality Assessment*, 96, 368-379.
- Rose, J. S., Vaewsorn, A., Rosselli-Navarra, F., Wilson, G. T., & Weissman, R. S. (2013). Test-

retest reliability of the eating disorder examination-questionnaire (EDE-Q) in a college sample. *Journal of Eating Disorders*, 1(1).

https://link.gale.com/apps/doc/A534835881/AONE?u=ocul_carleton&sid=AONE&xid=e43c214b

Rosenberg, M. (1979). *Conceiving the self*. Malabar, FL: Robert E. Krieger.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Rosenberg, M., Schooler, C., Schoenbach, C., & Rosenberg, F. (1995). *Global Self-Esteem and Specific Self-Esteem: Different Concepts, Different Outcomes*. *American Sociological Review*, 60(1), 141. doi:10.2307/2096350

Santana, D. D., Mitchison, D., Griffiths, S., Appolinario, J. C., Veiga, G. V., Touyz, S., & Hay, P. (2019). Ten-year time trends in mental and physical health correlates of weight/shape overvaluation. *European Eating Disorders Review*, 27(5), 531–540.
<https://doi.org/10.1002/erv.2672>

Schaefer, L. M., Burke, N. L., Anderson, L. M., Thompson, J. K., Heinberg, L. J., Bardone-Cone, A. M., Higgins Neyland, M. K., Frederick, D. A., Anderson, D. A., Schaumberg, K., Nerini, A., Stefanile, C., Dittmar, H., Klump, K., Vercellone, A. C., & Paxton, S. J. (2019). Comparing internalization of appearance ideals and appearance-related pressures among women from the United States, Italy, England, and Australia. *Eating and Weight Disorders*. doi: 10.1007/s40519-018-0544-8

Schaefer, L. M., Burke, N. L., Thompson, J. K., Dedrick, R. F., Heinberg, L. J., Calogero, R. M., Bardone-Cone, A. M., Higgins, M. K., Frederick, D. A., Kelly, M., Anderson, D. A., Schaumberg, K., Nerini, A., Stefanile, C., Dittmar, H., Clark, E., Adams, Z., Macwana,

- S., Klump, K. L., . . . Swami, V. (2015b). Development and validation of the Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). *Psychological Assessment*, 27(1), 54–67. <https://doi.org/10.1037/a0037917>
- Schaefer, L. M., Harriger, J. A., Heinberg, L. J., Soderberg, T., & Kevin Thompson, J. (2017). Development and validation of the sociocultural attitudes towards appearance questionnaire-4-revised (SATAQ-4R). *The International journal of eating disorders*, 50(2), 104–117. <https://doi.org/10.1002/eat.22590>
- Schaumberg, K., Reilly, E. E., Anderson, L. M., Gorrell, S., Wang, S. B., & Sala, M. (2018). Improving prediction of eating-related behavioral outcomes with zero-sensitive regression models. *Appetite*, 129, 252–261. doi:10.1016/j.appet.2018.06.030
- Shafran, R., Cooper, Z., & Fairburn, C. G. (2002). Clinical perfectionism: A cognitive-behavioural analysis. *Behaviour Research and Therapy*, 40(7), 773-791. doi:10.1016/S0005-7967(01)00059-6
- Sharpe, H., Griffiths, S., Choo, T., Eisenberg, M. E., Mitchison, D., Wall, M., & Neumark-Sztainer, D. (2018). The relative importance of dissatisfaction, overvaluation and preoccupation with weight and shape for predicting onset of disordered eating behaviors and depressive symptoms over 15 years. *International Journal of Eating Disorders*, 51(10), 1168-1175. doi:10.1002/eat.22936
- Shisslak, C., Crago, M., Renger, R. & Clark-Wagner, A. (1998). Self-esteem and the prevention of eating disorders, *Eating Disorders*, 6:2, 105-117, DOI: 10.1080/10640269808251247
- Silverstone, P. H. (1990). Low Self-Esteem in Eating Disordered Patients in the Absence of Depression. *Psychological Reports*, 67(1), 276–278. <https://doi.org/10.2466/pr0.1990.67.1.276>

- Simonsohn, U., Simmons, J. P., & Nelson, L. D. (2019). Specification curve: Descriptive and inferential statistics on all reasonable specifications. *Available at SSRN 2694998*.
- Simonsohn, U., Simmons, J. P., & Nelson, L. D. (2020). Specification curve analysis. *Nature Human Behaviour, 4*(11), 1208-1214.
- Slaney R. B., Rice K. G., Mobley M., Trippi J., Ashby J. S. (2001). The revised almost perfect scale. *Measurement and Evaluation in Counseling and Development, 34*, 130–145
- Smith, M. & Saklofske, D. (2017) The Structure of Multidimensional Perfectionism: Support for a Bifactor Model With a Dominant General Factor. *Journal of Personality Assessment, 99*(3), 297-303, DOI: 10.1080/00223891.2016.1208209
- Soares, M., Macedo, A., Bos, S., Marques, M., Maia, B., Pereira, A., Gomes, A., Valente, J., Pato, M., & Azevedo, M. (2009). Perfectionism and eating attitudes in portuguese students: A longitudinal study. *European Eating Disorders Review, 17*(5), 390–398.
<https://doi.org/10.1002/erv.926>
- Sonneville, K. R., Grilo, C. M., Richmond, T. K., Thurston, I. B., Jernigan, M., Gianini, L., & Field, A. E. (2015). Prospective association between overvaluation of weight and binge eating among overweight adolescent girls. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine, 56*(1), 25–29.
[doi:10.1016/j.jadohealth.2014.08.017](https://doi.org/10.1016/j.jadohealth.2014.08.017)
- Spangler, D. L. (2002). Testing the cognitive model of eating disorders: The role of dysfunctional beliefs about appearance. *Behavior Therapy, 33*, 87-105. doi:
[https://doi.org/10.1016/S0005-7894\(02\)80007-7](https://doi.org/10.1016/S0005-7894(02)80007-7)
- Spangler, D. L., & Stice, E. (2001a). *Beliefs about appearance scale*
[doi:http://dx.doi.org.proxy.library.carleton.ca/10.1037/t61667-000](https://dx.doi.org.proxy.library.carleton.ca/10.1037/t61667-000)

- Spangler, D. L., & Stice, E. (2001b). Validation of the beliefs about appearance scale. *Cognitive Therapy and Research, 25*(6), 813–827. <https://doi.org/10.1023/a:1012931709434>
- Steele, A. L., O'Shea, A., Murdock, A., & Wade, T. D. (2011). Perfectionism and its relation to overevaluation of weight and shape and depression in an eating disorder sample. *International Journal of Eating Disorders, 44*(5), 459-464. doi:10.1002/eat.2081
- Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin, 128*(5), 825-848. doi:10.1037/0033-2909.128.5.825
- Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology, 21*(2), 131-138. doi:10.1037/0278-6133.21.2.131
- Stoeber, J., & Stoeber, F. S. (2009). Domains of perfectionism: Prevalence and relationships with perfectionism, gender, age, and satisfaction with life. *Personality and Individual Differences, 46*, 530–535. doi:10.1016/j.paid.2008.12.006
- Tabri, N., Murray, H. B., Thomas, J. J., Franko, D. L., Herzog, D. B., & Eddy, K. T. (2015). Overvaluation of body shape and weight and engagement in non-compensatory weight-control behaviors in eating disorders: Is there a reciprocal relationship? *Psychological Medicine, 45*, 2951-2958. doi:10.1017/S0033291715000896
- Tabri, N. & Palmer, L., (2020). People who overvalue appearance selectively attend to descriptors of the attractiveness ideal: Findings from an emotional Stroop task. *The International Journal of Eating Disorders, 53*(12), 2003–2012. <https://doi.org/10.1002/eat.23391>
- Talbot, C. V., Gavin, J., van Steen, T., & Morey, Y. (2017). A content analysis of thinspiration,

- fitspiration, and bonespiration imagery on social media. *Journal of eating disorders*, 5, 40. <https://doi.org/10.1186/s40337-017-0170-2>
- Thompson-Brenner, H. J. (2002). *Implications for the treatment of bulimia nervosa: A meta-analysis of efficacy trials and a naturalistic study of treatment in the community* (Doctoral dissertation). Available from ProQuest Dissertations and Theses A&I database. (UMI No. 3068981)
- Trottier, K., McFarlane, T., & Olmsted, M. (2013). A Test of the Weight-Based Self-Evaluation Schema in Eating Disorders: Understanding the Link between Self-Esteem, Weight-Based Self-Evaluation, and Body Dissatisfaction. *Cognitive Therapy and Research*, 37(1), 122–126. <https://doi.org/10.1007/s10608-012-9446-7>
- Vall, E., & Wade, T. (2015). Predictors of treatment outcome in individuals with eating disorders: A systematic review and meta-analysis. *The International Journal of Eating Disorders*, 48(7), 946–971. <https://doi.org/10.1002/eat.22411>
- Vartanian, L. R. (2009). When the body defines the self: Self-concept clarity, internalization, and body image. *Journal of Social and Clinical Psychology*, 28(1), 94-126. <https://doi.org/10.1521/jscp.2009.28.1.94>
- Veale, D. (2002). Over-valued ideas: A conceptual analysis. *Behaviour Research & Therapy*, 40, 383-400. doi: 10.1016/S0005-7967(01)00016-X
- Wade, T. D., & Lowes J. (2002). Variables associated with disturbed eating habits and overvalued ideas about the personal implications of body shape and weight in a female adolescent population. *International Journal of Eating Disorders*, 32, 39-45. doi: 10.1002/eat.10054
- Wade, T. D., Zhu, G., & Martin, N. G. (2011). Undue influence of weight and shape: Is it

distinct from body dissatisfaction and concern about weight and shape? *Psychological Medicine*, *41*, 819-828. doi: 10.1017/S0033291710001066

Watson, H., Raykos, B., Street, H., Fursland, A., & Nathan, P. (2011). Mediators between perfectionism and eating disorder psychopathology: Shape and weight overvaluation and conditional goal-setting. *International Journal of Eating Disorders*, *44*(2), 142–149.
<https://doi.org/10.1002/eat.20788>

Appendix A

Exploratory Factor Analysis on Perfectionism Measures

	Personal Standards Perfectionism	Self-Criticism Perfectionism
I set very high standards for myself.	.874	
I have high expectations for myself.	.846	
I have extremely high goals.	.785	
I have a strong need to strive for excellence.	.749	
I expect the best from myself.	.732	
I set higher goals than most people.	.723	
I expect higher performance in my daily tasks than most other people do.	.704	
Other people seem to accept lower standards for themselves than I do.	.532	
My performance rarely measures up to my standards.		.963
I am hardly ever satisfied with my performance.		.899
I often feel disappointment after completing a task because I know I could have done better.		.619
Doing my best never seems to be enough.		.616
I often find that I don't live up to my own standards or ideals.		.591
There is a considerable difference between how I am now and how I would like to be.		.578
I tend not to be satisfied with what I have		.334

Appendix B

This table shows the association between appearance overvaluation and dietary restraint in all models run in the specification curve (i.e., standardized beta weight, lower and upper confidence intervals) as well as the proportion of variance in dietary restraint explained by the model (i.e., R^2). Where models are highlighted in grey, the association between appearance overvaluation and dietary restraint was statistically non-significant at the .05 level.

Covariates in Model	<i>B</i>	Lower	Upper	R^2
PR + INT + SE + BD + PSP + SCP + BMI	0.051	-0.030	0.132	0.507
PR + INT + SE + BD + PSP + SCP + BMI + AGE	0.057	-0.023	0.138	0.512
PR + INT + SE + BD + PSP + SCP	0.063	-0.018	0.145	0.497
r.PR + INT + SE + BD + PSP + SCP + BMI	0.068	-0.013	0.149	0.514
r.PR + INT + SE + BD + PSP + SCP + BMI + AGE	0.068	-0.013	0.149	0.514
PR + INT + SE + BD + PSP + SCP + AGE	0.070	-0.011	0.151	0.501
r.PR + INT + SE + BD + PSP + SCP + AGE	0.083	0.002	0.165	0.502
r.PR + INT + SE + BD + PSP + SCP	0.084	0.003	0.165	0.502
SE + BD + PSP + SCP + BMI	0.100	0.026	0.175	0.496
SE + BD + PSP + SCP + BMI + AGE	0.109	0.035	0.183	0.501
r.SE + BD + PSP + SCP + BMI + AGE	0.110	0.036	0.185	0.507
r.SE + BD + PSP + SCP + BMI	0.111	0.037	0.185	0.507
SE + BD + PSP + SCP	0.114	0.040	0.189	0.488
BD + BMI	0.121	0.051	0.191	0.488
SE + BD + PSP + SCP + AGE	0.123	0.048	0.197	0.491
r.BD + BMI + AGE	0.126	0.057	0.196	0.502
r.BD + BMI	0.126	0.057	0.196	0.502
r.SE + BD + PSP + SCP + AGE	0.128	0.054	0.203	0.495
BD + BMI + AGE	0.129	0.060	0.199	0.493
r.SE + BD + PSP + SCP	0.130	0.056	0.204	0.495
BD	0.134	0.065	0.204	0.479
BD + AGE	0.143	0.073	0.213	0.483
r.BD + AGE	0.144	0.074	0.213	0.490
r.BD	0.145	0.076	0.215	0.489
PR + INT	0.154	0.067	0.242	0.334
PR + INT + BMI	0.156	0.068	0.244	0.334
PR + INT + AGE	0.162	0.074	0.249	0.343
PR + INT + BMI + AGE	0.162	0.075	0.250	0.343
r.PR + INT	0.170	0.082	0.258	0.338
r.PR + INT + AGE	0.170	0.082	0.258	0.338
r.PR + INT + BMI	0.171	0.083	0.259	0.338

r.PR + INT + BMI + AGE	0.171	0.083	0.260	0.338
INT + BMI	0.253	0.168	0.338	0.288
INT	0.260	0.174	0.345	0.281
INT + BMI + AGE	0.261	0.175	0.346	0.295
r.INT + BMI + AGE	0.265	0.180	0.350	0.297
r.INT + BMI	0.265	0.181	0.350	0.297
INT + AGE	0.267	0.182	0.353	0.289
r.INT	0.269	0.184	0.354	0.291
r.INT + AGE	0.270	0.185	0.355	0.291
PR + BMI	0.287	0.206	0.369	0.284
PR	0.287	0.206	0.368	0.284
PR + BMI + AGE	0.295	0.213	0.376	0.292
PR + AGE	0.296	0.215	0.377	0.292
r.PR	0.299	0.217	0.381	0.287
r.PR + BMI	0.299	0.217	0.381	0.287
r.PR + AGE	0.299	0.217	0.381	0.287
r.PR + BMI + AGE	0.299	0.217	0.382	0.287
SE + BMI	0.353	0.273	0.432	0.251
SE	0.353	0.273	0.433	0.247
r.SE	0.354	0.274	0.433	0.262
r.SE + AGE	0.354	0.274	0.433	0.262
r.SE + BMI + AGE	0.354	0.274	0.433	0.264
r.SE + BMI	0.354	0.275	0.433	0.264
SCP	0.356	0.272	0.439	0.233
SCP + BMI	0.356	0.273	0.439	0.237
SE + BMI + AGE	0.360	0.280	0.439	0.259
r.SCP	0.360	0.277	0.444	0.243
r.SCP + AGE	0.360	0.276	0.444	0.243
SE + AGE	0.361	0.281	0.440	0.256
r.SCP + BMI + AGE	0.362	0.278	0.445	0.246
r.SCP + BMI	0.362	0.278	0.445	0.246
SCP + BMI + AGE	0.364	0.281	0.448	0.243
SCP + AGE	0.365	0.281	0.448	0.240
PSP + BMI	0.409	0.333	0.485	0.227
PSP	0.413	0.337	0.489	0.221
PSP + BMI + AGE	0.418	0.342	0.495	0.231
PSP + AGE	0.423	0.346	0.500	0.226
r.PSP + BMI + AGE	0.423	0.346	0.500	0.229
r.PSP + BMI	0.424	0.347	0.501	0.229
r.PSP + AGE	0.427	0.350	0.504	0.224

r.PSP	0.427	0.351	0.504	0.224
BMI	0.447	0.374	0.521	0.212
no covariates	0.452	0.379	0.526	0.205
r.BMI + AGE	0.455	0.381	0.529	0.219
r.BMI	0.456	0.382	0.529	0.219
BMI + AGE	0.456	0.382	0.530	0.217
r.AGE	0.460	0.386	0.534	0.213
r.no covariates	0.460	0.386	0.533	0.213
AGE	0.462	0.388	0.535	0.211

Note. SE = self-esteem, PSP = personal standards perfectionism, SCP = self-critical perfectionism, AO = appearance overvaluation, INT = thin-ideal internalization, PR = perceived pressure to be thin, REST = dietary restraint, BD = body dissatisfaction. Specifications beginning with “r.” are run on data with outliers removed.