Disentangling the Relationships between Upward Social Comparison Frequency, Body Shame, Attachment Anxiety and Weight-loss Dieting in College Women: A Moderated Mediation Analysis

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Abstract

The present study was intended to clarify the roles of upward social comparison frequency (USCF), body shame, and attachment anxiety on weight-loss dieting (WLD). A moderated mediation model was predicted over and above levels of body dissatisfaction and attachment avoidance. It was hypothesized that with increasing USCF and increasing attachment anxiety, the more episodes of body shame women would experience, and in turn, the greater would be the frequency of WLD. A total of 206 college women participated in the study by completing an online self-report questionnaire via Qualtrics. The bootstrap analysis of PROCESS-macro (Hayes, 2013) did not support the predicted moderated mediation model. However, further data exploration showed that body shame mediates the relationship between USCF and WLD as well as the relationship between attachment anxiety and WLD after excluding body dissatisfaction. The non-significant findings when body dissatisfaction was included as a control variable, indicate that other emotions related to body dissatisfaction might also mediate the relationship between attachment anxiety and WLD. Nevertheless, the present findings are making contributions to the field of eating pathologies, suggesting a role of body shame in WLD. Future research should examine this relationship to a greater extent, especially in clinical samples.

Keywords: upward social comparison, body shame, attachment anxiety, weight-loss dieting

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A significant number of females intentionally restrict their food intake with the purpose to lose weight (Goldstein et al., 2013; Doran & Lewis, 2012; Ferreira et al., 2015). Female university students are specifically perceived to be at risk for weight loss dieting (WLD) (Fayet et al., 2012), as previous studies found 43% of all participants responded to deliberately diet, while 78% were classified to have a healthy BMI (Fayet et al., 2012). WLD is previously found to be an important predictor of eating pathologies in women (Johnson & Wardle, 2005; Neumark-Sztainer et al., 2006). Thus, to effectively intervene weight-loss behavior, it is crucial to understand the psychological mechanisms behind it. The processes of upward social comparison are shown to play an important role in the development of WLD (Bamford & Halliwell, 2009; Morse & Gergen, 1970). However, the exact nature of the relationship between upward social comparison and WLD remains unclear. Yet, several studies address that body shame might provide some clarity in terms of the relationship between upward social comparison and WLD (Doran & Lewis, 2012; Ferreira et al., 2015). Notably, not every female seems to be affected by comparing oneself to others who are perceived as better looking, suggesting individual differences may impact the vulnerability to body shame (Jones & Buckingham, 2005; Dalley et al., 2019). Therefore, the present study turned to attachment theory to fill in the gaps, as body shame appears to be higher in women who are high in attachment anxiety (DeVille & Ellmo, 2015). With this in mind, the present study aims to disentangle the relationship between USCF, attachment anxiety, body shame, and WLD within a moderated mediation model.

Upward Social Comparison Frequency

How Does USCF Relate to Weight-loss Dieting?

Upward social comparison frequency (USCF) refers to the tendency of comparing oneself to others that are perceived as better in a certain quality (Festinger, 1954). This cognitive process provides information about one's social standing regarding their performance in valued domains (Buunk & Gibbons, 2000). Moreover, it also shapes an image about the self that one desires to become in the future (Lockwood & Kunda, 2000). However, this tendency can be at the cost of someone's self-esteem, as social comparison appears to have a major impact on body dissatisfaction and eating disorders (Bamford & Halliwell, 2009; Morse & Gergen, 1970). In Western cultures, there is a strong positive association with thin bodies, while there is a negative perception of being overweight (Brownell, 1991; Crandall, 1994). As a result of the continuous exposure of cultural body ideal through media platforms, women create an internalized ideal of the thin body (Pedalino & Camerini, 2021). Previous research showed that women have a tendency to compare themselves to others who are perceived as better, such as media models, to extent how discrepant their body is from the cultural thin ideal (Thompson et al., 1999*;* Thompson & Stice, 2001*)*. However, high USCF will increase the awareness of this discrepancy, and consequently, is this associated with greater body dissatisfaction (Bamford & Halliwell, 2009; Morse & Gergen, 1970). Moreover, women with high USCF, do not only have a strong desire for this thin ideal but also face more pressure to achieve this body ideal (Tsiantas & King, 2001; Wood, 1996). One way to achieve this thin ideal is to engage in WLD (Bamford & Halliwell, 2009; Morse & Gergen, 1970). Therefore, it is hypothesized that women with higher USCF will have a greater tendency to WLD. Yet, previous studies suggest that women's motivation to engage in WLD goes beyond the drive for physical appearance (Bordo, 1993). Although the precise nature of the relationship between USCF and WLD remains unclear, several studies address that body

shame might provide some clarity in terms of the relationship between USCF and WLD (Doran & Lewis, 2012; Ferreira et al., 2015).

Body Shame

How Does USCF Relate To Body Shame?

Shame is an emotion that appears after one assumes to fail the social standard and causes feelings of humiliation, inadequacy, and worthlessness (Lim & Yang, 2015; Keltner & Buswell, 1996). Shame is thought to arise when individuals experience a sense of failure in meeting societal expectations and feel that their social standing is lowered as a consequence of that (Keltner & Haidt, 1999; Power & Dalgleish, 1997; Tangney, 1996). From an evolutionary perspective, shame motivates individuals to conform closely to societal norms to promote group cohesion and ensure survival (Gilbert, 2011; Keltner & Haidt, 1999). Consequently, this causes an internalized idea of what one not wishes to be and motivates individuals to change their behavior to conform more closely to others.

As previously mentioned, women compare their bodies to others whom they perceive as better looking to indicate discrepant their physical appearance is from others. Within this framework, body shame is thought to arise as a perception that one has failed to comply with body ideals that are seen in others (Lazarus, 1991; Dalley et al., 2019). These women may believe that their social status is lowered after failing to the societal body standard. However, as it is hard to achieve the thin ideal, shame is thought to arise as they feel that their body is too distant from others (Thomson & Stice, 2001; Dakanalis et al., 2015). Therefore, it is hypothesized that higher USCF will lead to more episodes of body shame.

How Does Body Shame Relate to Weight-loss Dieting?

Previous studies indicate that body shame plays a significant role in motivating women to engage in compensatory behavior, such as WLD, to reduce the feelings of body

shame (Bradford & Petrie, 2008). These women engage in WLD because they are driven to shift the negative feelings of body shame into more positive emotions, such as pride or happiness (Troop et al., 2006). Body shame serves not only as an internal form of punishment but functions also as a driving force for women to conform more closely to societal standards (Keltner & Haidt, 1999). When women perceive that their social status is lowered due to the discrepancy of the body ideal, shame corrects women's behavior by motivating them to engage in behavioral adjustment to restore their social standing. To come closer to this cultural body standard, WLD is found to be the preferred strategy to achieve the thin ideal (Paxton et al., 1999). Additionally, these theories are in line with growing evidence that body shame plays a significant role in clinical and non-clinical samples of WLD (Doran & Lewis, 2012; Ferreira et al., 2015; Gee & Troop, 2003). For this reason, body shame is included in the present prediction model to analyze whether body shame mediates the relationship between USCF and WLD. It is hypothesized that with increasing USCF, the more episodes of shame women will be experiencing, and following on from this, the more likely women would be to engage in WLD. However, not every woman seems to be affected by exposure to thin media ideals, suggesting that individual differences may impact the vulnerability to body dissatisfaction (Jones & Buckingham, 2005; Dalley et al., 2019). Currently, researchers are turning to the attachment theory to fill in the gap of developing eating disorders (Tasca, 2019).

Attachment Style

How Attachment Anxiety Might Exacerbate the Relationship Between USCF and Body Shame?

According to the attachment theory, the emotional availability of parental relationships tends to affect the self-concept and may lead to attachment insecurity in the child (Bowlby,

1973; Hazan & Shaver, 1987). Attachment style forms an internalized working model (Bowlby, 1988), which functions as a relatively stable personality trait (Eggert et al., 2007) and influences psychological behavior and affect later in life (Mikulincer & Shaver, 2012). In this framework, it is suggested that attachment style plays a role in disordered eating behavior, due to these internalized working models. Additionally, previous research is showing evidence for a relationship between attachment insecurity and disordered eating behavior dissatisfaction (Bamford & Halliwell, 2009; Ty & Francis, 2009; Krause et al., 2000; Han, 2011). Most of the studies measure insecure attachment in two dimensions; anxious and avoidant attachment (Mikulincer and Shaver, 2007).

Attachment anxiety is likely to develop after being frequently exposed to inconsistent or unpredictable caregiver in responding to the child's needs (Tasca et al., 2009). The child internalizes this disappointment and continues to strive for qualities to gain the caregiver's love and approval again (Flett et al., 2002). Within this framework, it is proposed that women who engage more in USCF and are high in attachment anxiety, will experience higher episodes of body shame. Previous research found that women who were high in attachment anxiety, also experience increased episodes of body shame (DeVille & Ellmo, 2015). These findings can be attributed to an increased internalization of the thin body ideal and a difficulty regulating emotions that arise from this process (Chen et al., 2015; Cheng & Mallinckrodt, 2009). To be more specific, women with attachment anxiety are often characterized by self-criticism, perfectionism, low self-esteem, a high need for validation, and belonging to others (Ty & Francis, 2013). Given their perfectionistic and self-critical character, these women are particularly susceptible to conform to societal norms as they also want to conform to the social standard in order to gain validation and a sense of belonging (Faber et al., 2018). To perfectly follow societal beauty norms, women with high attachment anxiety create a greater internalization of the thin body ideal (Cheng & Mallinckrodt, 2009). However, this increased

internalization makes them indirectly more aware of how discrepant their body is from the societal standard and body shame is thought to arise. These women experience body shame not only because they feel less attractive than others, but also feel fear of not receiving validation from others. Besides, it is found that highly anxious attached women have greater difficulty regulating their emotions (Chen et al., 2015). Thus, when these women are experiencing body shame, they experience body shame in more intense and prolonged episodes compared to securely attached individuals. As mentioned earlier, women who engage more in USCF already experience body shame because they feel too discrepant from others and the societal standard. Furthermore, the episodes of shame are particularly expected to be higher for those who are high in attachment anxiety because they have an increased internalization of the thin ideal and have a difficulty regulating emotions. With this in mind, a moderated role of attachment anxiety is hypothesized on the mediation between upward social comparison frequency and WLD through body shame.

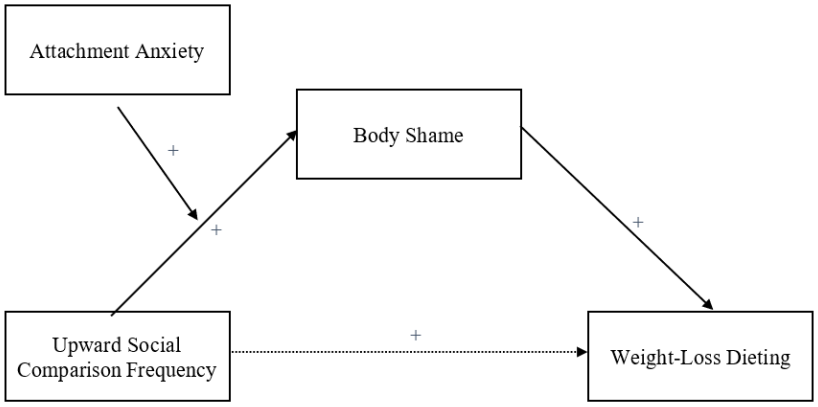
On the other aspect of the dimension of attachment anxiety is attachment avoidance. Avoidant attachment styles are likely to develop after exposure to a rejecting or unavailable caregiver in order to child's emotional needs, including abuse or neglect (Bakerman-Kranenburg & Ijzendoorn, 2009). This negative working model provides one not to trust others to as a self-protecting mechanism and indirectly develops a fear of intimacy in close relationships (Tasca et al., 2009). Avoidant attachment styles are previously found to have a direct effect on disordered eating but were unrelated to social comparison and body dissatisfaction (Bamford & Halliwell, 2009; Ty & Francis, 2009). These individuals are less likely to be concerned and engaged in cultural ideas of beauty and less likely to make social comparisons (Bamford & Halliwell, 2009). However, to differentiate the types of attachment styles, attachment avoidance will be included in the prediction model as a control variable.

Present Study

With previous research in mind, the present study aims to disentangle the relationship between upward social comparison, attachment anxiety, body shame, and weight-loss dieting within a moderated mediation model. In the present study, the data of female university students will be analyzed and interpreted. Based on previous research, the following model is hypothesized: with increasing USCF and increasing attachment anxiety, the more episodes of body shame women would experience, this will in turn lead to a greater frequency of WLD (see Figure 1). Finally, the present prediction model is controlling for body dissatisfaction and attachment avoidance. The inclusion of attachment avoidance as a control variable aims to distinguish between different dimensions of attachment style. Additionally, body dissatisfaction is characterized by the negative evaluation of one's own body, regarding their figure, weight, and most often specific body parts (Stice & Shaw, 2002). However, feelings of body dissatisfaction go beyond a simple desire to appear as the ideal because it involves emotional and psychological processes as well (Mills et al., 2022; Festinger, 1954). Body dissatisfaction serves as a comprehensive term for multiple negative emotions related to body dissatisfaction, including body shame. The present study will specifically examine the contributing role of body shame because shame gives more insight into the specific cause and experience. This provides more information to the therapist to treat eating disorders (Lazarus & Lazarus, 1994). Therefore, body dissatisfaction will be included as a control variable to ensure that its effects are distinct from the variances explained by general body dissatisfaction.

Figure 1

Prediction Model of the Moderated Mediation



Note. While controlling for body dissatisfaction and attachment avoidance.

Methods

Participants

A total of 347 female university students from the University of Groningen volunteered to participate in this study. The participants were recruited through convenience sampling, by a distribution of an online questionnaire through social media and within the university faculties. However, one hundred thirty-nine participants were excluded from this study because they did not completely fill out the questionnaires, had missing data, or did not correctly answer the validating questions (i.e. the option *'Always'* was not selected). Additionally, two participants were indicated as outliers, as their responses were found to be three standard deviations from the mean. Therefore, these two participants were intentionally excluded from the data and the remaining 206 participants were used for statistical analyses. The age of the present sample ranged from 18 to 30 years, with a mean age of 22.12 (SD=2.221). Further descriptive statistics are presented in Table 1.

Table 1
Descriptive Statistics

	N	Mean	SD
Age	206	22,12	2,221
Weight	206	62,90	10,351
Height	206	168,80	6,782

Measures

Upward Social Comparison Frequency

The Upward Appearance Comparison Scale (UPACS) (O'Brien et al., 2009) was used to operationalize upward social comparison frequency. This scale has been used to measure the frequency of upward social body comparisons (i.e., *"I tend to compare myself to people I think look better than me."*). Participants rate their scores on a 5-point Likert scale (ranging from 1 = *Strongly disagree,* to 5 = *Strongly Agree*). Participants responded to a total of 10 questions and higher total scores indicate greater engagement in upward social body comparison. The internal reliability of the UPACS has previously been reported as .93 (O'Brien et al., 2009). In the present study a reliability of Cronbach's alpha of 0.91 ($\alpha = .910$) was found which indicates that the scale contains good reliability.

Body Shame

The Body Image Shame Scale (BISS) (Duarte et al., 2015) was utilized to assess the frequency of the emotion of shame toward one's body. This scale was developed to measure the experience and phenomenology of body image shame. The scale includes externalized body image shame (i.e., negative perceptions that one's body image may be an object of criticism by others, following defensive responses such as avoidance of social contexts) and internalized body image shame (i.e., self-focused negative self-evaluations, following

controlling exposure responses such as concealment). Participants were instructed to respond to 14 items (i.e., *"I feel uncomfortable in social situations because I feel that people may criticize me because of my body shape."*) on a 5-point Likert scale (ranging from 1 = *'Never'*, to 5 = *'Always'*). Higher total scores indicate that the individual experiences more frequent episodes of body shame. The internal consistency of the IBSS has been found to have a Cronbach's alpha of 0.92. In the present study, the calculated Cronbach's alpha was found to be the same value (a = 0.924), indicating good internal consistency.

Weight-loss Dieting

The tendency to diet was operationalized using the Dietary Intent Scale (DIS) (Stice, 1998). The DIS consists of 9 items that aim to measure weight-loss dietary behavior, including three subscales measuring the reduced intake of food, abstaining from eating, and consumption of low-caloric foods (i.e., *"I take small portions of food in an effort to control my weight."*). Participants responded to the items on a 5-point Likert scale (ranging from 1 = *"Never*" to 5 = "*Always"*). The internal reliability of the DIS has previously been reported as .94 (Stice, 1998). The present study reported an internal reliability of .93 (a = .926), indicating good internal consistency and reliability.

Attachment Style

The Experiences in Close Relationship Scale – Short (ECR-S) was utilized to assess three different dimensions of attachment style; secure, avoidant, and anxious attachment (Wei et al., 2007). The ECR-S consists of 12 items, divided into two subscales: attachment avoidance and anxiety. The six items of the avoidant attachment subscale measure avoidant attachment frequency (i.e., *"I am nervous when my partner gets too close to me."*). Higher scores on these questions indicate higher attachment avoidance, while lower scores reflect secure attachment. The remaining six items in the subscale attachment anxiety evaluate the

frequency of attachment anxiety experiences (i.e. *"My desire to be very close sometimes scares people away.*"). Higher scores on these questions indicate higher attachment anxiety, while lower scores indicate secure attachment. All items are scored on a 7-point Likert scale, ranging from 1 (= '*Strongly disagree'*) to 7 (= '*Strongly agree'*). For the prediction model of this study, only attachment anxiety and avoidance are measured but are calculated as two different variables by using their means. Attachment anxiety was analyzed for the moderated mediation model while controlling for attachment avoidance. The ECR-S is a short form of the Experiences in Close Relationship Scale (ECR) with equivalent validity (α= .78 for the Anxiety subscale and from .84 for the Avoidance subscale) of the original ECR. In the present study, Cronbach's alpha was 0.75 for attachment anxiety and .80 for attachment avoidance, indicating a satisfactory internal reliability.

Body Dissatisfaction

Body Dissatisfaction was assessed using the Body Dissatisfaction subscale of the Eating Disorder Inventory (EDI) (Garner et al., 1983). The 9 items asked questions about the one's satisfaction with particular body parts (e.g. *I think that my stomach is too big*.). Answers were assessed on a 6-point Likert Scale ranging from 1 (= '*Never'*) to 7 (= '*Always').* Higher scores indicate body dissatisfaction. Internal consistency was previously found to be high, with a Cronbach's alpha of α = 0.91. In the present study Cronbach's alpha was α = 0.88, indicating high reliability.

Procedure

The study was approved by The Ethics Committee of the Department of Psychology at the University of Groningen. For this study, a set of psychological self-report measures were combined into the online test questionnaire "Social Comparisons and Dieting Behaviour" via Qualtrics. Qualtrics is a digital platform that enables researches to conduct surveys to collect and analyze data (Cushman et al., 2021). Only participants who identified themselves as

female, did not have a previous history of eating disorders and had at least level B2 of English or were enrolled in an English university program could take part in the questionnaire. Participants were excluded from the analyses if, they did not give permission of their informed consent or answered the validity questions (i.e., "*Please select Agree*.") incorrectly.

Statistical Analyses

The Hayes Process Macro was used in SPSS (v29) to analyze the predicted moderated mediation model. Instead of relying on theoretical assumptions of the sampling distributions of our estimates using the central limit theorem, the bootstrapping technique was used to empirically generate the sampling distributions. This was done by resampling with replacement 5000 times from our sample with the same initial sample size, in order to derive a bootstrap distribution which we used to calculate standard errors for the confidence intervals and hypothesis testing. The bootstrapping technique has been shown to be robust against possible non-normality of the residuals and better accounts for irregularities of the sampling distributions than a normal theory approach (Hayes, 2013; Jose, 2013; Wright et al., 2011; MacKinnon et al., 2004). Subsequently, this results in more accurate estimates of the standard error and therefore the inference done by the confidence intervals and hypothesis testing of simulations studies with bootstrapping tends to be more accurate and have higher power than the normal theory approach (Hayes, 2013; Jose, 2013; Wright et al., 2011; MacKinnon et al., 2004). The moderated mediation was measured using model 7, including upward social comparison tendency as a predictor for dieting, body image shame as a mediating variable, and attachment anxiety as a moderator. Body dissatisfaction and attachment avoidance were included as a control variables. This analysis provides the index of moderated mediation, which represents the strength of the relationship between the moderator and the indirect effects. Bootstrapping was used to determine significance based on 95% bias-corrected confidence intervals to ensure the robustness of the results.

Results

Assumption Check

Before analyzing and interpreting the data, several assumption checks were conducted to ensure the data is valid for its interpretations. The data of 208 participants who completed the questionnaire were analyzed at first to check for outliers. Two participants were indicated as outliers, as their responses were found to be higher than +/- three standard deviations from the mean. Therefore, these two participants were intentionally excluded from the data. The data of the remaining 206 participants were checked for linearity. The residuals were analyzed against the predicted graph and showed an equal spread around the horizontal line, so no irregularities or shape were found. Thus, the assumption of linearity has been met. The normality distribution was analyzed by using the P-plots of the residuals. The data points showed that the data was normally distributed, so this assumption was met. Moreover, a single linear regression of the predictors was conducted against the dependent variable to analyze homoscedasticity. The scatterplots showed slight violations of the homoscedasticity assumption was found, but the heteroscedasticity-consistent standard error HC4 (Cribari-Neto and Lima, 2014) was used to counter to heteroscedasticity and multicollinearity. However, the Variance Inflation Factor (VIF) for every predictor variable was calculated to check for normality. No multicollinearity was found, given that all values were between 1 VIF < 5 (Shrestha, 2020).

Correlation analysis

The zero-order correlations are calculated and presented in table 2.

Table 2

Pearson's Correlations, Means, and Standard Deviation of the Measured Variables

Variable	*M*	*SD*	1	2	3	4	5	6
1.WLD	2.16	0.90	—					
2. USCF	3.68	0.82	.468**	—				
3. Shame	2.43	0.76	.571**	.598**	—			
4. Anxiety	3.96	1.14	.283**	.324**	.377**	—		
5. BD	2.70	0.80	.577**	.522**	.776**	.365**	—	
6. Avoidant	3.07	1.13	.260**	.243**	.401**	.231**	.358**	__

** indicate correlation is significant at the 0.01 level (2-tailed); WLD = weight-loss dieting; *USCF:* upward social comparison frequency; *Anxiety*: attachment anxiety; *BD*: body dissatisfaction; *Avoidant* = attachment avoidance

Moderated-mediation analysis

Does Attachment Anxiety Moderate the Relationship Between USCF and Body Shame?

To investigate whether attachment anxiety moderated the mediation between UCSF and WLD through body shame, the PROCESS macro-model 7 was used (Hayes, 2013). This was analyzed by checking the moderated mediation, which represents the slope and strength between attachment anxiety on the relationship between USCF and body shame. However, the moderated mediation index did not show a significant association (β= 0.011, SE = 0.012, 95% CI [-0.006, 0.038]), suggesting that the indirect effect of upward social comparison frequency on WLD through body shame was not significantly influenced by the frequency of attachment anxiety.

Exploratory analysis

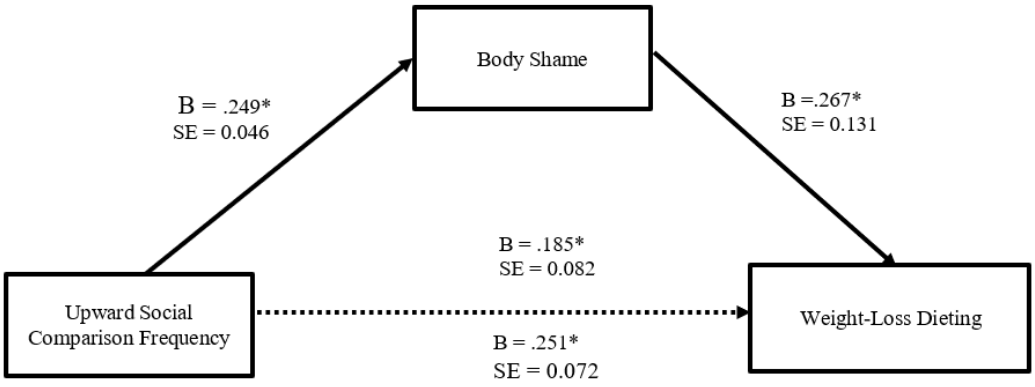
The zero-order correlations (see Table 2) suggests that the predictors may have independent impact on the dependent variable. Thus, two exploratory mediation analyses were conducted to investigate further relationships.

Does Body Shame Mediate the Relationship Between USCF and Weight-loss Dieting?

The first mediation analysis contains the mediated effect of body shame on the relationship between USCF on WLD. This was investigated by using the PROCESS macro-model 4 (Hayes, 2013). The results showed that there was an overall significant effect [F(3, 202)=73,916, p<0.001]), in which 37.1% of the variance in dieting was explained by the predicted variables. Moreover, the total effect of upward social comparison frequency on WLD was significant (β= 0.251, SE = 0.072, 95% CI [0.110, 0.393], p<0.001). Furthermore, the analysis found significant effects over the levels of body dissatisfaction by using the bootstrapping analysis (see Figure 2). The direct effect of USCF on WLD was also significant (β= 0.185, SE = 0.082, 95% CI [0.025, 0.346]), as well as the indirect effect of (β= 0.066, SE = 0.036, 95% CI [0.002, 0.142]) through body shame. Within the indirect effect, significant effects were found using the bootstrap method in the relationship between upward social comparison frequency on body shame (β= 0.249, SE = 0.046, 95% CI [0.158, 0.338]), as well as the relationship between body shame and WLD (β= 0.267, SE = 0.131, 95% CI [0.008, 0.520]). The results show that body shame functions as a mediator in the relationship between USCF and WLD. Body dissatisfaction had also a significant direct effect on WLD (β=0.354, SE=0.113, 95% CI [0.133, 0.580]), indicating that the mediation was found to be significant over and above the levels of body dissatisfaction.

Figure 2

Mediation Model of the Relationship of USCF and WLD Through Body Shame



Note. N = 206; While controlling for body dissatisfaction; * p < .05*

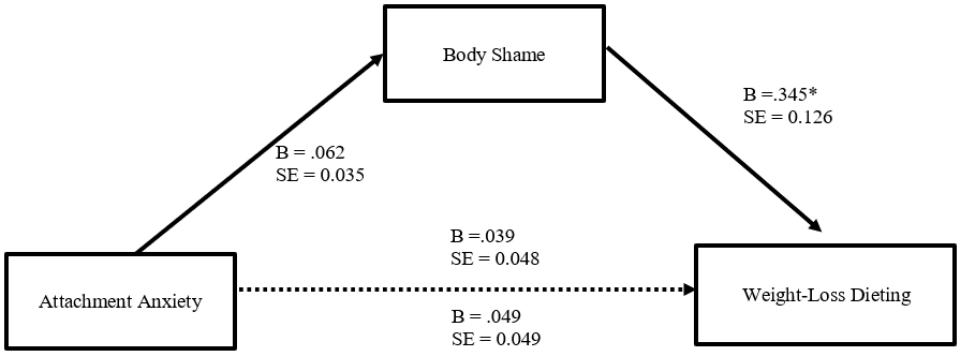
Does Body Shame Mediate the Relationship Between Attachment Anxiety and WLD?

The next analysis examined whether body shame mediates the relationship between attachment anxiety frequency on WLD while controlling for body dissatisfaction and attachment avoidance. Following Hayes (2013), using macro-model 4, the overall model was found to be statistically significant [$F(4, 201)= 34.917$, $p<0.001$]), explaining 34.2% of the variance in WLD. However, the total effect was not found to be significant ($\beta= 0.061$, SE = 0.049, 95% CI [-0.035, 0.157]). Moreover, neither the direct effect ($\beta= 0.039$, SE = 0.048, 95% CI [-0.056, 0.134]), nor the indirect effects ($\beta= 0.021$, SE = 0.016, 95% CI [-0.001, 0.060]) of attachment anxiety on WLD were found to be significant. Within the indirect effect, the relationship between attachment anxiety and body shame was also not found to be significant ($\beta= 0.062$, SE = 0.035, 95% CI [-0.006, 0.130]). However, the relationship between body shame and WLD was found to be significant ($\beta= 0.345$, SE = 0.126, 95% CI [0.093, 0.588]). In terms of other variables, body dissatisfaction showed a significant effect on WLD ($\beta= 0.369$, SE = 0.112, 95% CI [0.152, 0.594]), and on the other hand, avoidant

attachment frequency did not have a significant effect on WLD (β= 0.0109, SE = 0.053, 95% CI [-0.093, 0.116]).

Figure 3

The Mediation Model of the Relationship between Attachment Anxiety and WLD through Body Shame



Note. N = 206; While controlling for body dissatisfaction and attachment avoidance;

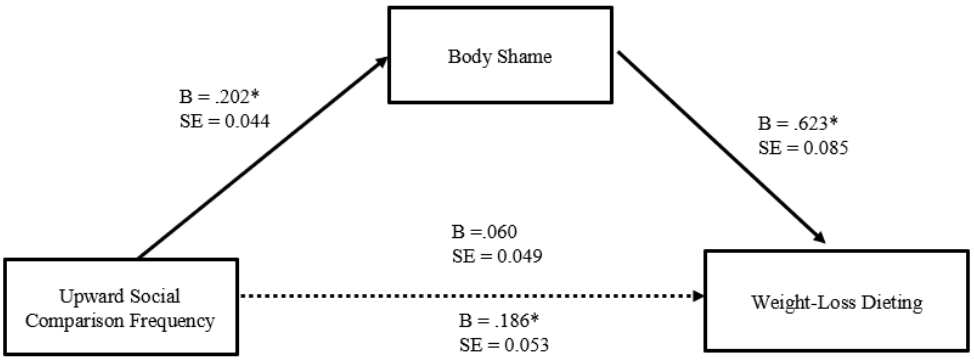
* p < .05*

However, when excluding body dissatisfaction from the mediation model, the indirect effect turned out to be significant (β= 0.126, SE = 0.033, 95% CI [0.065, 0.193]). Within the indirect effect, the relationship between attachment anxiety and body shame was found to be significant (β= 0.202, SE = 0.044, 95% CI [0.115, 0.285]), as well as the relationship between body shame and WLD (β= 0.623, SE = 0.085, 95% CI [0,452, 0.786]). Nonetheless, the direct effect between attachment anxiety and WLD remained non-significant (β= 0.060, SE = 0.049, 95% CI [-0.037, 0.157]). The total effect of the whole model explained 34.6% of the variance and was found to be significant [F(3,202)= 13.811, p<0.001]), as well as the total direct effect between attachment anxiety and WLD (β= 0.186, SE = 0.053, 95% CI [0.080, 0.291]). Without body dissatisfaction, the total effect was also significant (β= 0.186, SE = 0.053, 95% CI [0.802, 0.291]). During the analysis, there was still controlled for attachment avoidance,

but the effects on WLD remained non-significant (β= 0.024, SE = 0.054, 95% CI [-0.083, 0.128]).

Figure 4

The Mediation Model of the Relationship between Attachment Anxiety and WLD through Body Shame without controlling for Body Dissatisfaction



Note. N =206; While controlling for attachment avoidance; * p < .05*

Discussion

The present study predicted that body shame would mediate the relationship between USCF and WLD. Additionally, it was predicted that attachment anxiety would moderate this mediation pathway. Thus, with increasing USCF and increasing attachment anxiety, the more episodes of body shame women would experience, and in turn, this will lead to a greater frequency of WLD. Finally, it was predicted that the moderated-mediation relationship would occur over levels of body dissatisfaction and attachment avoidance. However, the results did not support the predicted moderated mediation model. This suggests that attachment anxiety did not influence the strength of the indirect effect. In other words, being high in attachment anxiety did not significantly influence the relationship between USCF and body shame.

The non-significant effect might be attributed to the characteristics of the present study population. The sample consisted of a non-clinical sample, including female university

students who did not have a previous history of an eating disorder. This non-clinical population may not fully capture the comprehensive impact the relationship between the variables might have as it would have in a clinical sample. After analyzing 70 studies, including clinical and non-clinical samples of disordered eating behavior, researchers observed that participants in clinical samples showed more attachment anxiety compared to controls recruited from the general population (Faber et al., 2018). This was in line with previous studies as well (Kuipers & Bekker, 2012; O'Kearney, 1996; O'Shaughnessy & Dallos, 2009). Given that attachment anxiety is higher in clinical samples, it is therefore plausible that women in clinical samples would also experience more frequent episodes of shame. This suggests that the moderated mediation potentially could turn significant in clinical samples. Thus, it is recommended to replicate the predicted moderated mediation model in a clinical sample.

Furthermore, the first exploratory analysis found a significant mediation of body shame in the relationship between USCF and WLD over the levels of body dissatisfaction. Thus, women who had a higher USCF experienced more frequent episodes of body shame, which in turn, resulted in a greater tendency in WLD. This confirms the hypothesis that women are high at USCF are more likely to experience more frequent body shame as they perceive their body as too discrepant from others and the cultural body ideal (Lazarus, 1991; Dalley et al., 2019; Thomson & Stice, 2001; Dakanalis et al., 2015). Additionally, shame's evolutionary function is to avoid social rejection (Troop et al., 2006; Gilbert, 2011). Therefore, women experience an internal punishment of an unpleasant feeling of body shame because one is not as thin as others and risk to fail societal norms. This unpleasant feeling of body shame motivates women to engage in WLD, to reduce the feeling of shame and conform closer to others (Bradford & Petrie, 2008; Troop et al., 2006). Moreover, the direct relations between the variables were also found to be significant. The significant relationship between

body shame and WLD is in line with previous research, indicating that women engage in WLD to achieve their body ideal as well as to conform to societal expectations (Doran & Lewis, 2012; Ferreira et al., 2015; Gee & Troop, 2003). Furthermore, the direct effect between USCF and WLD was found to be significant. These significant effects were found after controlling for body dissatisfaction, suggesting there is a unique variance explained in WLD by the mediation model with USCF and body shame. As previously mentioned, body dissatisfaction is a comprehensive term for different negative emotions and thoughts one could experience toward their bodies (Mills et al., 2022; Festinger, 1954). Controlling for body dissatisfaction helps to ensure that the effects of USCF and body shame are not simply explained by variance of general body dissatisfaction. Therefore, the findings suggest that body shame has an independent influence on WLD behavior. Thus, beyond the influence of body dissatisfaction, women who experienced a higher USCF, experienced more body shame after feeling that their bodies are too distant from others. Additionally, they developed a greater tendency to engage in WLD to reduce the unpleasant feeling of body shame and to become more like others. However, previous studies show that body shame functions not only punishing but also as prohibiting (Lim & Yang, 2015). The anticipation of body shame modifies behavior as well by using compensatory strategies, such as WLD, to prevent the unpleasant feeling of body shame (Troop et al., 2006; Miller, 1997). Therefore, it is recommended that future research should examine the specific role of the anticipation of body shame on WLD.

The second mediation analysis was conducted to analyze whether body shame mediated the relationship between attachment anxiety and WLD, while controlling for body dissatisfaction and attachment avoidance. Interestingly, when body dissatisfaction was excluded from the model, the indirect effect became significant. However, the relationship between attachment anxiety and WLD can only be explained in this study through the

presence of body shame, as the direct effect remained non-significant. The findings indicate that women who are high in attachment anxiety experience more episodes of body shame which, in turn, leads to a greater tendency to WLD.

The significant findings are consistent with previous research, indicating that women who are high in attachment anxiety experience increased episodes of body shame (DeVille & Ellmo, 2015; Chen et al., 2015). This can be attributed to a greater internalization of the thin body ideal and a difficulty regulating the emotions that arise from this (Cheng & Mallinckrodt, 2009; DeVille & Ellmo, 2015). Women with high attachment anxiety are characterized by self-criticism, perfectionism, low self-esteem, a high need for validation, and belonging to others (Ty & Francis, 2013). These personality traits are previously found to be associated with an increased susceptibility to create an internalized thin body ideal (Cheng & Mallinckrodt, 2009; DeVille & Ellmo, 2015). Given that this thin body ideal is hard to achieve, body shame might arise as a feeling of failure. Additionally, highly anxious attached women have more difficulty regulating emotions, therefore, they might experience body shame in more intense and prolonged episodes (Cheng & Mallinckrodt, 2009). In turn, the unpleasant feeling of shame motivates women to get rid of this emotion and motivates them to achieve the internalized thin ideal, which manifests in a greater tendency to WLD (Bradford & Petrie, 2008; Troop et al., 2006). Moreover, previous research showed evidence for the associations between attachment anxiety and disordered eating pathologies by explaining this through a mediation of emotion dysregulation (Ty & Francis, 2013; Garcia et al., 2019). Additionally, the present study contributes to the existing literature by demonstrating that specifically high episodes of the emotion body shame are associated with disordered eating behavior. To summarize the present findings, being high in attachment anxiety predicted higher more episodes of body shame, which in turn, resulted in a greater tendency of WLD.

However, the model was not significant when body dissatisfaction was included as a

control variable. Body dissatisfaction represents a comprehensive term including multiple negative emotions, such as sadness or anxiety, one can experience toward their own body (Stice & Shaw, 2002). This indicates that other negative emotions that arise from body dissatisfaction could also function as a mediator in the relationship between attachment anxiety and WLD. Therefore, future research should explore which specific emotions of body dissatisfaction are the most salient in explaining the variances in WLD.

Implications

The present study adds a contribution to the existing literature by expanding the current knowledge on the relationship between USCF, attachment anxiety, body shame, and WLD. Higher USCF and higher attachment anxiety predicted independently more frequent episodes of body shame. This resulted, consequenlty, in a greater engagement in WLD. Given that WLD is found to be an important predictor of eating pathologies (Johnson & Wardle, 2005; Neumark-Sztainer et al., 2006), tackling specifically body shame could have some clinical potential implications in treating eating disorders. College women who have a greater USCF or are high in attachment anxiety should specifically be targeted, given that the present findings showed that these characteristics predicted higher episodes of body shame. Compared to body dissatisfaction, tackling body shame gives more insight into the specific cause and experiences of women, and therefore, provides more information to the practitioners to treat eating pathologies (Lazarus & Lazarus, 1994). Tackling body shame, rather than focusing on body dissatisfaction, could generally have more clinical potential in treating eating disorders and may reduce drop-out rates. For example, self-compassion interventions are previously found to reduce body shame (Albertson et al., 2015; Carter et al., 2022; Forbes et al., 2020). This therapy aims to shift women from social mentalities that lead to body shame, such as internalized body ideals, to a state of self-compassion. In these treatments, clients are learning tools to regulate their emotions and tolerate stress (di Bello et

al., 2021; Mather & Thayer, 2018). These tools could buffer against a WLD tendency to regulate the emotions of shame, specifically when college women are high in USCF.

Limitations

The significant findings have several noteworthy limitations. Firstly, the utilization of a cross-sectional design and self-report measures presents a few limitations. A cross-sectional design collected data at one single time point. Consequently, this restricts the ability to conclude over a longer time period. Besides, these designs are often associated with biased results due to the violation of the assumption about stationarity, stability, and equibilirity (Cole & Maxwell, 2003). Consequently, current findings can only be interpreted as associations, rather than causal relationships. Furthermore, the collected data via self-report measures relies on the accuracy and subjectivity of the students. The researchers received feedback from the participants, indicating that some experienced the questionnaire as too long. This potentially suggests that at the end of the survey, the data can be less accurately reported, due to reduced motivation of the students. However, the current findings still provide valuable insights into the relationship between the predictors and WLD. Secondly, the present study did not analyze ethnicity as a control variable. However, ethnicity could function as a buffer against eating pathologies because the cultural body ideal is different among certain ethnicities (Warren et al., 2005). Especially, in other non-Western countries where the socioeconomic status is low, there is a greater positive association with heavier bodies as they are associated with food, celebrations, and power (Swami et al., 2007). Therefore, future research should collect a more diverse sample, as different ethnic groups might exhibit different extents of the moderated-mediation model of the present study.

Conclusion

To sum up the findings, in a sample of college women at the University of Groningen the present study examined the relationship between upward social comparison frequency (USCF), attachment anxiety, body shame, and weight-loss dieting (WLD). A moderated mediation was predicted, such that with increasing USCF and increasing attachment anxiety, the more episode of shame women would experience, resulting in a greater frequency of WLD. However, the findings did not support this predicted moderated mediation model. After an exploratory analysis, the mediation model of the body shame on the relationship between USCF and WLD was found to be significant over and above body dissatisfaction. This suggests that women who are high in USCF feel more body shame after feeling failed to the body ideal. Consequently, to reduce the unpleasant feeling of shame and conform more to others, they engage in WLD. Furthermore, the second mediation pathway of the relationship between attachment anxiety and WLD through body shame, turned out to be significant after excluding body dissatisfaction as a control variable. This indicates that women who are high in attachment anxiety, experience more episodes of body shame, compared to securely attached women. This can be attributed to a greater internalization of the thin ideal and a difficulty regulating emotions that arise from this. As a consequence, the unpleasant feeling of shame motivates women to get rid of this emotion and to conform more closely to others. Therefore, women are more likely to engage in WLD. However, the model was not found to be significant when body dissatisfaction was included as a control variable. This indicates that other negative emotions of body dissatisfaction could also function as a mediator in the relationship between attachment anxiety and WLD. Therefore, future research should explore which specific emotions of body dissatisfaction are the most salient in explaining the variances in WLD. The present findings are making contributions to the field of eating pathologies, suggesting a role of body shame in WLD. Future research should examine this

relationship to a greater extent, especially in clinical samples. Practitioners should keep the findings in mind that, as WLD is a predictor for eating pathologies, tackling body shame in treatment could be beneficial to treat disordered eating behavior. Specifically, women who are high in USCFor women who are high in attachment anxiety could benefit from this treatment.

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Appendix

Following are the self-report scales used to measure the study variables, as displayed in the online questionnaire.

Upward Social Appearance Comparison Scale

1. I compare myself to those who are better looking than me rather than those who are not.
2. I tend to compare my own physical attractiveness to that of magazine models.
3. I find myself thinking about whether my own appearance compares well with models and movie stars.
4. At the beach or athletic events (sports, gym, etc.) I wonder if my body is as attractive as the people I see there with very attractive bodies.
5. I tend to compare myself to people I think look better than me.
6. When I see a person with a great body, I tend to wonder how I ′match up ′with them.
7. When I see good-looking people I wonder how I compare to them.
8. At parties or other social events, I compare my physical appearance to the physical appearance of the very attractive people.
9. I find myself comparing my appearance with people who are better looking than me.
10. I compare my body to people who have a better body than me.

Body Image Shame Scale

1. I feel uncomfortable in social situations, because I feel that people may criticize me because of my body shape.
2. I avoid social situations (e.g., going out, parties) because of my physical appearance.
3. The relationship I have with my body prevents me from having an intimate relationship with someone.

4. I do not like to exercise in front of others because I am afraid of how they might evaluate me.
5. My physical appearance makes me feel inferior in relation to others.
6. The relationship I have with my physical appearance makes it difficult for me to feel comfortable in social situations
7. I avoid moving my body (for example, dancing) in public places because I feel I am exposing my physical appearance to the criticism of others.
8. I chose clothes to hide parts of my body that I feel are ugly or disproportional.
9. There are parts of my body that I prefer to hide.
10. I feel bad about myself when I use clothes that reveal my body shape.
11. I avoid wearing tight clothes that reveal my body shape.
12. I pay close attention to the movements and posture of my body to hide parts that I do not like.
13. It bothers me to see my body undressed.
14. When I see my body in the mirror I feel I am a defective person.

Dietary Intent Scale

1. I take small portions of food in an effort to control my weight.
2. I hold back at meals in an attempt to avoid weight gain.
3. I limit the amount of food I eat in an effort to control my weight.
4. I sometimes avoid eating in an attempt to control my weight.
5. I skip meals in an effort to control my weight.
6. I sometimes eat only one or two meals a day to try to limit my weight.
7. I eat diet foods in an effort to control my weight.
8. I count calories to try to prevent weight gain.

9. I eat low-calorie foods in an effort to avoid weight gain.

Eating Disorder Inventory (Body Dissatisfaction Subscale)

1. I think that my stomach is too big.

2. I think that my thighs are too large.

3. I think that my stomach is just the right size.

4. I feel satisfied with the shape of my body.

5. I like the shape of my buttocks.

6. I think that my hips are too big.

7. I think that my thighs are just the right size.

8. I think that my buttocks are too large.

9. I think that my hips are just the right size.

Experiences in Close Relationship Scale-Short Form (ECR-S)

1. It helps to turn to my romantic partner in times of need.

2. I need a lot of reassurance that I am loved by my partner.

3. I want to get close to my partner, but I keep pulling back.

4. I find that my partner(s) don't want to get as close as I would like.

5. I turn to my partner for many things, including comfort and reassurance.

6. My desire to be very close sometimes scares people away.

7. I try to avoid getting too close to my partner.

8. I do not often worry about being abandoned.

9. I usually discuss my problems and concerns with my partner.

10. I get frustrated if romantic partners are not available when I need them.

11. I am nervous when partners get too close to me.

12. I worry that romantic partners won't care about me as much as I care about them.