

**A Diary Study of Appearance Social Comparisons and Need Frustration in Young
Women**

Abstract

The purpose of the study was to examine the effects of state upward appearance comparisons and psychological need frustration on appearance self-conscious emotions, and compensatory dieting and exercise thoughts and behaviours. An Ecological Momentary Assessment design was employed with young women ($n = 126$; $M_{age} = 21.26$; $SD = 2.76$) who responded to surveys 3 times daily every other day for 1 week. Outcome measures included body and appearance self-conscious emotions (shame, guilt, and authentic and hubristic pride) and (thoughts of) dietary restriction and exercise. Mixed linear modelling showed that upward appearance comparisons and psychological need frustration independently predicted several maladaptive appearance-based emotions and behaviours. For thoughts of dietary restriction, an interaction emerged, whereby thoughts of dietary restriction were intensified in situations when participants engaged in upward appearance comparisons and reported high levels of need frustration. The findings suggest that not only upward appearance comparisons but also high levels of state need frustration can make women more vulnerable to self-conscious emotions and compensatory dieting and exercise thoughts and behaviours.

Keywords: social comparisons, Self-Determination Theory, Ecological Momentary Assessment, dietary restriction

1. Introduction

Festinger's (1954) Social Comparison Theory (SCT) has been used as a framework to understand how individuals form judgments about their appearance (Corning, Krumm, & Smitham, 2006). According to Festinger, in judging the adequacy of their own pertinent attributes, individuals may engage in three different types of comparisons. Upward social comparisons refer to individuals comparing themselves to someone who they perceive to be superior on a specific attribute. Downward comparisons refer to situations in which individuals perceive themselves to be superior to the comparison target. Finally, lateral comparisons refer to situations in which the individual judges herself to be similar to the target person.

In the appearance domain, results of empirical studies have shown that upward appearance comparisons are consistently associated with negative body image outcomes, including body dissatisfaction, because engaging in such comparisons highlights perceived physical appearance inadequacies (Leahey, Crowther, & Mickelson, 2007). SCT asserts that if an individual is dissatisfied with their appearance, behaviour will be directed at minimising existing discrepancies (Corning et al., 2006). This may entail adopting health-threatening compensatory weight control behaviours. Indeed, the tendency to engage in upward comparisons has been found to predict eating pathology in college-aged females (e.g., Arigo, Schumacher, & Martin, 2014).

1.1 Self-Conscious Emotions

Research on appearance comparisons to date has mainly focused on its consequences for body dissatisfaction and compensatory behaviours, while far less attention has been afforded to pertinent emotional body-image outcomes. The self-conscious emotions of shame, guilt, and pride are important in the regulation of cognitions, feelings and behaviours,

and are relevant to the appearance domain (e.g., Sabiston & Castonguay, 2014; Tangney & Tracy, 2012). Body shame has been associated with social physique anxiety (Thompson, Dinnel, & Dill, 2003), disordered eating (Gupta, Rosenthal, Mancini, Cheavens, & Lynch, 2008) and other negative outcomes (e.g., Lamont, 2015). Guilt can be evoked through negative behaviours, such as overeating or not exercising. While it is a negative emotional response, if it is not accompanied by shame, it can lead to 'reparative' behaviours (e.g., engaging in healthy behaviours following lapses; Tangney, Miller, Flicker, & Barlow, 1996). Finally, appearance-related pride can arise as a result of feeling that one exhibits positive appearance characteristics, such as a lean fit body (Tracy & Robins, 2007). Pride may be authentic or hubristic in orientation. Authentic pride may emanate from engagement in specific behavioural acts, such as eating healthily. In contrast, hubristic pride denotes feelings of superiority over others, such as having a more attractive body compared to peers (Castonguay, Gilchrist, Mack, & Sabiston, 2013). Both types of pride have been associated with positive outcomes including self-esteem, low levels of depressive symptoms, and high positive/low negative affect (Castonguay, Sabiston, Crocker, & Mack, 2014).

As all these emotions are socially motivated (Tangney & Salovey, 2010), they are highly relevant outcomes to examine when studying appearance comparisons. Hence, in the present study, we contributed to the appearance comparisons literature by considering not only compensatory weight control behaviours and cognitions, but also emotional consequences of upward appearance comparisons.

1.2 Ecological Momentary Assessment

Most studies to date on social comparisons and body image outcomes have used cross-sectional survey (e.g., Lindner et al., 2012), or laboratory methods (e.g., Homan, McHugh, Wells, Watson, & King, 2012). In cross-sectional survey studies, researchers

typically examine associations between *tendencies* of individuals to compare themselves with others and body image outcomes measured once. This approach fails to consider appearance comparisons as a *state* that fluctuates over time. In laboratory settings the comparison target is chosen by the researchers and hence ecological validity can be compromised. However, in real world settings, individuals ‘choose’ their own comparison targets, and the same individual may vary in the extent to which she engages in upward appearance comparisons across different situations. Ecological Momentary Assessment (EMA) techniques can address this limitation because they enable an exploration of changes in momentary states and behaviours as a result of engaging in self-chosen appearance comparisons. They also allow for a naturalistic unobtrusive assessment of experiences assessed in daily life and reduce reliance on retrospective memory recall (Shiffman, Stone, & Hufford, 2008).

Leahey, Crowther, and Ciesla (2011) are among the few researchers to date who have explored associations between appearance comparisons and body image related outcomes using EMA. Specifically, these authors examined how naturally occurring upward appearance comparisons predicted negative cognitions and emotions in three groups of young women ($n = 160$): participants with eating pathology and high body dissatisfaction (EPHBD), a group exhibiting high body dissatisfaction (HBD), and participants with low body dissatisfaction (LBD). All groups engaged in upward appearance comparisons, although EPHBD and HBD did so to the greatest extent. The EPHBD group experienced the most intense negative emotions, more frequent thoughts of dieting and exercising, and engaged in more disordered eating behaviour following upward comparisons compared to the other groups. Further, the HBD group was more negatively affected than the LBD group. However, when participants engaged in upward appearance comparisons, *all* groups experienced increases in levels of guilt and thoughts of dieting, and decreases in body satisfaction and social esteem levels.

Nevertheless, upward appearance comparisons are not equally detrimental to all people, and they are also likely to differ across situations within the same individual (Myers & Crowther, 2009). A key aim of the present study was, therefore, to examine one such situational characteristic, namely psychological need frustration, which may partly explain variations in emotional and behavioural vulnerability to upward appearance comparisons.

1.3 The potential role of psychological need frustration

Thøgersen-Ntoumani, Ntoumanis, and Nikitaras (2010) called for an integration of Self-Determination Theory (SDT; Deci & Ryan, 2000) and SCT factors to facilitate understanding of body image concerns. SDT is a macro-motivational theory which proposes that the satisfaction or frustration of three basic psychological needs, the needs for autonomy, competence and relatedness, have important repercussions for affective, cognitive and behavioural outcomes. Thøgersen-Ntoumani et al. asserted that while SCT deals with *proximal* predictors of body image relevant outcomes, concepts from SDT can be used to enhance understanding of the “deeper psychological mechanisms that foster versus undermine personal growth and development and can lead to unhealthy behaviours” (p. 536). According to SDT, the psychological needs of autonomy, competence and relatedness constitute the psychological nutrients which, when satisfied, allow people to grow, thrive and experience psychological well-being (Deci & Ryan, 2000). When these needs are not satisfied, individuals are likely to suffer psychologically.

More recently, researchers using SDT have shown that need frustration is a stronger predictor of ill-being than low need satisfaction (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). For example, with respect to body image-related outcomes, Bartholomew et al. demonstrated that general need frustration was a stronger predictor of disordered eating in athletes compared to need satisfaction. When individuals' needs for

autonomy, competence and relatedness are frustrated, they develop coping resources in the form of need substitutes and/or compensatory behaviours (Deci & Ryan, 2000). Need substitutes can be manifested through the endorsement of the thin-ideal, body image concerns, and compensatory behaviours such as rigid and restrictive eating patterns (Deci & Ryan, 2000).

One important limitation of the work on psychological needs to date is the tendency to assess psychological needs at the trait level. To our knowledge, only one published study has examined the role of daily need frustration in predicting body-image relevant outcomes. Specifically, Verstuyf, Vansteenkiste, Soenens, Boone, and Mouratidis (2013) looked at daily experiences of need frustration and their associations with binge eating in female adolescents ($n = 302$). They found that on days when the participants reported that their needs were frustrated, they were more likely to engage in binge eating behaviour. However, the Verstuyf et al. study did not consider how state experiences of need frustration interact with upward appearance comparisons in the prediction of body image outcomes. Given research demonstrates that psychological need frustration can place individuals at risk of experiencing body image concerns and disordered eating (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011), we expect that psychological need frustration is likely to exacerbate any negative impacts of upward appearance comparisons.

1.4 Study Aims

This study represents the first attempt to integrate key constructs from both SCT and SDT in the prediction of body-image related outcomes employing an EMA design. It is proposed that daily experiences of need frustration will magnify the negative associations between upward appearance comparisons and a range of emotional, cognitive and behavioural body image outcomes. Specifically, first, we hypothesise that in situations when

participants engage in upward appearance comparisons, they will report greater levels of body-related shame and guilt, lower levels of pride, and will be more likely to think about and engage in compensatory behaviours (dietary restriction and exercise for weight control) than when they do not engage in upward appearance comparisons (H1). Second, when participants experience high levels of psychological need frustration, they will experience similar outcomes as those outlined for H1 compared to situations in which they report low levels of need frustration (H2). Finally, when individuals experience high levels of psychological need frustration and upward appearance comparisons, they will yield the highest levels of negative outcomes including shame, guilt, disordered eating cognitions and behaviours and the lowest levels of pride (H3). At an operational level, H3 is confirmed if effects of upward comparisons and need frustration are either additive or interactive.

We also extend previous research by adjusting the analyses for the tendency to engage in appearance comparisons and general levels of need frustration. This provides a more stringent test of the unique effects of state levels of the predictors on the outcomes above and beyond individual tendencies. In line with previous research in this area (e.g., Leahey et al., 2011), we also controlled for Body Mass Index (BMI), however we used objective measures of height and weight, while in previous studies researchers relied on self-reports.

2. Method

2.1 Participants

Participants ($N = 126$) were women based in Western Australia aged between 18-30 years ($M_{\text{age}} = 21.26$; $SD = 2.76$). The Optimal Design Software (version 3.0) was used to estimate sample size for a frequency of 3 daily assessments over 4 days, to detect a medium effect size ($d = .62$) based on a correlation of $r = .30$; 88 participants were needed to achieve a power of .80 at $\alpha = .05$. We oversampled by about 40% to account for missing values.

Exclusion criteria were current or previous eating disorder (ED) diagnosis, individuals who reported clinical behaviour features of EDs, or who had an Eating Disorder Examination-Questionnaire (EDE-Q) score in the clinical range (Luce, Crowther, & Pole, 2008).

Participants identified as primarily Caucasian (65.00%). Most participants were university students (73.50%) and single (80.30%). Mean Body Mass Index (BMI) was 22.58 ($SD = 4.38$; range = 15.40 - 46.60).

2.2 Measures

The measures used were a mix of full length scales to measure traits, and shorter versions of (some of) these scales to assess states in the diary phase. It is common in diary research, in which participants are asked to respond to the same questions on multiple occasions per day over several days, to use a reduced number of items per scale (if these items come from a larger scale) in order to minimise participant fatigue (Fisher & To, 2012). Fisher and To showed that often 1-item measures are used in EMA research which perform as well as full item scales. Fisher and To also suggested that if the single item has face and content validity and correlates with other variables as it should, suggesting construct validity, it probably should be considered acceptable. This is the case in our study where our state predictor variables predict outcome variables in the expected direction.

2.2.1 Upward Appearance Comparisons. The 10-item Upward Appearance Comparison Scale (UPACS; O'Brien, Caputi, Minto, Peoples, Hooper, Kell, & Sawley, 2009) was used to measure the participants' tendency to make upward appearance-focused social comparisons (e.g., "I tend to compare myself to people who look better than me"), and a scale ranging from 1 (*low tendency*) to 5 (*high tendency*). O'Brien et al. reported sound test-retest reliability ($r = .79$) and internal consistency ($\alpha = .94$). In our study, $\alpha = .92$.

To examine state appearance comparisons, participants were asked whether they had engaged in appearance-related comparisons since their last diary entry. If answering yes, participants were then asked whether they thought their weight/shape was “*much worse, worse, same, better or much better*” than the comparison target. Upward comparisons were indicated using a binary variable, as per the diary study by Rancourt, Leahey, LaRose, and Crowther (2015). Responses of either ‘worse’ or ‘much worse’ were considered upward comparisons and given a score of 1. All other responses were given a score of 0, indicating a downward or neutral comparison.

2.2.2 Psychological Need Frustration. We used 12 items adapted by Costa, Ntoumanis, and Bartholomew (2015) from the Psychological Need Thwarting Scale (PNTS; Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). The scale has subscales measuring feelings of frustration in one’s life related to the needs for autonomy (4 items), competence (4 items) and relatedness (4 items). A Confirmatory Factor Analysis conducted by Costa et al. on the adapted measure revealed good model fit, with all items demonstrating satisfactory factor loadings. The scale was internally consistent in the present study ($\alpha = .93$). To assess state feelings of need frustration, we chose one item from each subscale: “I have felt prevented from making choices” (autonomy), “I have been made to feel inadequate” (competence), and “I have felt rejected by those around me” (relatedness). Each of these items referred to ‘since my last diary entry’ and were measured on a scale ranging from 1 (*not true at all*) to 7 (*very true*), with higher scores indicating higher levels of need frustration. These items were chosen because pilot work showed that they were most likely to fluctuate on a daily level. The stem used to precede the items was the same as for state upward appearance comparisons.

2.2.3 Body and Appearance Self-Conscious Emotions. Items measuring appearance self-conscious emotions were taken from the 24-item Body and Appearance Self-conscious

Emotions Scale (BASES; Castonguay et al., 2014), which consists of four sub-scales: appearance-related shame, guilt, authentic pride and hubristic pride, with each sub-scale including six items. Responses are given on a 5-point scale ranging from 1 (*never*) to 5 (*always*). BASES exhibits high levels of reliability, convergent and discriminant validity, and sound two week test-retest reliability with correlation coefficients ranging from $r = .75$ to $r = .88$ (Castonguay et al., 2014).

One item from each of the subscale was used to assess state emotions: “I have felt ashamed of the way I look” (shame), “I have felt guilty that I do not do enough for my appearance” (guilt), “I have felt proud about my effort to improve the way I look” (authentic pride), and “I have felt proud of myself when I compare my appearance to others” (hubristic pride). As per the trait items, the items were measured on a 5-point scale, but with anchors slightly adapted to *None of the time*, *A little of the time*, *Some of the time*, *Quite a lot of the time*, and *All of the time*. Again, when the participants were asked this question, they were requested to think about the time since their last diary entry. The items were chosen on the same basis as those for daily need frustration.

2.2.4 Compensatory dietary and exercise thoughts and behaviours. Four items, previously used by Leahey et al (2011) and adapted from the Eating Disorder Examination Questionnaire (EDEQ; Fairburn & Beglin, 1994), were used to measure state compensatory thoughts and behaviours related to diet and exercise. Depending on the timing of the prompt, the participants were asked the time they got up that morning or since the previous diary entry. The items for compensatory thoughts included: “have you thought about trying to restrict the amount of food you eat in order to influence your shape or weight?”, “have you thought about exercising as a means of controlling your weight, altering your shape or amount of fat, or burning off calories?”. The 2 items relating to compensatory behaviours were: “have you actually restricted the amount of food you eat in order to influence your

shape or weight?”, and “have you actually exercised as a means of controlling your weight, altering your shape or amount of fat, or burning off calories?”. The items were rated on a scale ranging from 1 (*not at all*) to 6 (*very much*).

2.2.5 *BMI*. Participant height (using a SECA stadiometer) and weight (using a TANITA weighing scale) were taken to calculate BMI for each participant.

2.3 *Procedures*

Following approval granted by a university ethics review panel, participants were recruited from a university student participation course credit pool and via social media. The participants were told that people can have different thoughts and feelings about their appearance. Further, it was stated that research has not looked at how such thoughts and feelings can vary on a daily basis, and factors that affect these changes. Such knowledge can increase our understanding of how to help individuals understand better their appearance-related thoughts and feelings. Participants completed online a questionnaire containing the trait measures and socio-demographic questions. In the following week, participants received message alerts every other day of the week. Participants were asked to complete three electronic diary entries per day consisting of the question pertaining to whether they had engaged in social comparisons and the comparison to the target, and selected items from PTNS, BASES, and the 4 said items from EDEQ. These questions were sent to their mobile phones via a message containing a web-link at three set times: 11am, 3pm and 7pm. The order of questions in the diary was randomized to minimize ordering effects.

2.4 *Data Analyses*

Data were analysed using SPSS Version 22. Mixed linear modelling was used to test the hypotheses, because observations (level 1) were nested within individuals (level 2). Four multivariate models were conducted where outcome variables were considered *a priori* to be

related (shame and guilt; authentic and hubristic pride; thoughts about and actual dietary restriction; and thoughts about and actual exercise). Analyses were carried out using restricted maximum likelihood estimation. Level 1 variables were group-mean centred. For each dependent variable, a pseudo- R^2 value was calculated, by comparing the variance of the model without predictors against the variance of the model with predictors.

3. Results

3.1 Preliminary Analyses

No data was excluded. Useable daily diary entries ($n= 1245$) were gathered in total from the participants providing a mean entry response of 9.96 per participant (overall response rate = 83%). Intraclass correlation coefficients showed that between-participant differences accounted for approximately half or more of the variance in most of the outcomes with the exception of exercise to control weight (21.17%). These results suggest that the outcomes fluctuated substantially within individuals.

We examined whether there were systematic changes in the diary variables over time. Trend analysis indicated significant linear and/or curvilinear changes in some of the study variables across the diary period (see Table 1).

Out of a total 1236 social comparisons, 943 (i.e., 76.30%) were upward social comparisons, with the remaining being either lateral or downward social comparisons. A range of 1-11 upward social comparisons were made by the participants. Social comparisons (whether upward, lateral or downward) were made 37.43% of the time that participants were asked to respond to the surveys.

Zero-order correlations between predictor variables showed that BMI and trait need frustration were correlated with both state and trait upward comparisons (Table 2). **The correlation between state and trait upward comparisons was somewhat small.** Trait need frustration was also associated with state need frustration.

Significant correlations in the expected direction were also observed between the appearance-related self-conscious emotions of shame, guilt, and authentic and hubristic pride. Thoughts about dietary restriction and exercise were related to the actual behaviours as well as to shame and guilt.

3.2 Main Analyses

BMI significantly predicted the appearance-related self-conscious emotions of shame, guilt, authentic and hubristic pride in the expected direction (Table 4). On the whole, the trait variables more consistently predicted the outcomes in the expected direction, particularly the tendency to engage in upward appearance comparisons, with the exception of hubristic pride and exercise to control weight. Indeed, none of the entered variables significantly predicted exercise to control weight.

In line with H1, state upward appearance comparisons predicted the outcome variables in the expected direction, with the exception of dietary restriction and exercise to control weight (Table 4). State need frustration predicted feelings of body-related shame and guilt but no other outcome variables, partially supporting H2. Accordingly, both state upward appearance comparisons and need frustration significantly predicted feelings of body-related shame and guilt. In addition, the interaction between state upward appearance comparisons and state need frustration significantly predicted thoughts about dietary restriction to control weight. Subsequent simple slopes analyses indicated that need frustration did not significantly predict thoughts of dietary restriction when no upward appearance comparisons were made ($\beta = .21$; $p = .099$; Figure 1). However, when upward appearance comparisons were made, thoughts of dietary restriction to control weight were more intense if levels of state need frustration were also high ($\beta = .50$; $p < .001$).

4. Discussion

The present study is the first study to integrate concepts from Social Comparison Theory and Self-Determination Theory in the prediction of body-image related outcomes using an EMA design.

The results showed broad support for Hypothesis 1, except for compensatory dieting and exercise. In other words, in situations when individuals engaged in upward appearance comparisons, they reported greater levels of shame, guilt, lower levels of pride, and were more likely to think about restricting their diet and exercise than when they did not engage in upward appearance comparisons. These findings were obtained while controlling for typical/dispositional tendencies to engage in upward appearance comparisons. Our results support previous research showing that engaging in upward appearance comparisons is associated with negative body-image related outcomes (e.g., Fitzsimmons et al., 2016; Leahey et al., 2011), and add to that literature by incorporating a broader set of outcomes.

Both types of pride showed an inverse association with upward appearance comparison, which is consistent with prior research indicating the adaptive properties of these emotions (Castonguay et al., 2014). However, in contrast to authentic pride, hubristic pride is reflective of pride emanating from feelings of superiority over others and can be reflective of narcissism (Castonguay et al., 2013), rather than pride coming from specific actions the individual has taken to improve appearance. Thus, using an SDT lens, it can be argued that hubristic pride may be less psychologically adaptive than authentic pride over the longer-term as it is based on external contingencies. However, judging both types of pride by the main results and given the large positive correlation between them, our results suggest that the two types of pride operated in similar ways. This may be reflective of the fact that pride in itself is a positively valenced emotion regardless of its origin or underlying motivation.

The only exceptions to our results pertaining to the predictive effects of state upward appearance comparisons were dietary restriction and exercise. While the tendency to engage in trait upward appearance comparisons was a significant predictor of dietary restriction (as was also the case in Arigo et al., 2014), state upward appearance comparisons did not add to the prediction. Perhaps the effects of state upward appearance comparisons become apparent only after an extended period of time in which successive daily upward comparisons are made. Social comparisons (trait or state) did not predict exercise behaviours, but both traits and state predicted *thoughts* of exercise in the multivariate analysis. It is possible that this divergence in findings between thoughts of exercise and exercise behaviours is due to the well-documented intention-behaviour gap (Rhodes & de Bruijn, 2013). Exercise behaviour is a complex behaviour predicted by many different factors such as motivation regulations (Teixeira, Carraça, Markland, Silva, & Ryan, 2012) and habits (Phillips & Gardner, 2016).

Hypothesis 2 was partly supported. While daily psychological need frustration did not significantly predict compensatory behaviours, pride, and thoughts of diet and exercise, it predicted greater levels of shame and guilt. This finding adds important new knowledge about the role of daily need frustration to body image outcomes. It is important to note here that in our study, these daily effects were independent of trait levels of need frustration. Need frustration is a better predictor of ill-being and behavioural avoidance (Bartholomew et al., 2011) than well-being and engagement, which might explain why need frustration did not predict pride and thoughts of dieting and exercise.

Hypothesis 3, which was exploratory in nature, **had very little support, as only one interaction was significant.** For shame and guilt, there were additive effects from state upward appearance comparisons and state need frustration. Thus, experiencing high levels of both variables produced the highest levels of daily shame and guilt. For thoughts of dietary restriction, there was an interactive effect which showed that experiencing high levels of

psychological need frustration can exacerbate the impact of upward appearance comparisons on thoughts of dietary restriction. However, for other outcome variables (authentic and hubristic pride, thoughts of exercise) the detrimental effects of upward appearance comparisons were evident even in situations in which one's needs were not frustrated. It is possible that it could be partly explained by the perceived similarity to the comparison target. As argued by Collins (1996), the effects of upward social comparisons may depend on the extent to which the comparison other is perceived to be similar or dissimilar to the target individual. Furthermore, a recent study with female college students which used a diary methodology found that the medium through which upward appearance comparisons were made was important, insofar as upward comparisons via social media were more damaging to appearance satisfaction and mood compared to those made face-to-face or via traditional media (Fardouly, Pinkus, & Vartanian, 2017). Further, as explained above, need frustration may not be a good predictor of eudaimonic well-being and behavioural engagement. To predict such outcomes, future research testing the interface of SCT and SDT should incorporate from the SDT literature a measure of introjected form of behavioural regulation. This regulation taps behavioural engagement associated with contingent pride and self-esteem (Deci & Ryan, 2000).

4.1 Study Limitations, Strengths, and Practical Implications

We did not assess socio-contextual predictors (e.g., controlling communication style by significant others) of state upward appearance comparisons and need frustration. Also, our sample included only females; research indicates that many young males are becoming insecure about their body appearance (Mitchison & Mond, 2015), hence future studies in this area should also recruit male participants. Further, we did not assess perceived similarity to the comparison target. Studies have found that upward social comparisons may lead to positive or negative effects depending on whether the comparison target is perceived to be

relatively similar or dissimilar, respectively, to the individual engaging in the comparison (see Collins, 1996, for assimilation vs contrast effects). There was some systematic effect of time on some of the dependent and independent variables included in the diary study, perhaps suggesting that repeatedly asking questions about their thoughts and behaviours may have increased the reports of these over time. This is a wider phenomenon in the psychology literature, as reported in a meta-analysis by Wood, Conner, Miles, Sandberg, Taylor, Godin, and Sheeran (2016).

Notwithstanding these limitations, there were a number of strengths in this study. This was the first attempt to integrate key constructs from both SCT and SDT in the prediction of body-image related outcomes employing an EMA design. This design reduces reliance on memory, thus minimising recall bias in participants. Further, we used a stringent analysis whereby we controlled for dispositional equivalents of state levels of upward appearance comparisons and psychological need frustration, thus allowing for an examination of the unique prediction of the state levels of those variables. Further, the objective assessment of BMI was a strength of our study compared to previous similar studies which have generally relied on self-reported assessments (e.g., Leahey et al., 2011).

The results may bear some future practical implications. For example, given the pervasive societal messages about the importance of appearance in combination with the vast amount of opportunities to engage in social comparisons, it may be unrealistic to prevent upward appearance comparisons. In contrast, reducing the intensity of feelings of psychological need frustration might be more achievable. This observation is supported by research on SDT showing that agents in the social environment (e.g., partners, friends) can be educated to refrain from the use of controlling interpersonal behaviours which can lead to psychological need frustration and introjected forms of behavioural engagement

(Bartholomew et al., 2011). It would be useful in future research to test the effects of such interventions on the outcomes examined in this study.

4.2 Conclusion

The findings of the present study suggest that not only upward appearance comparisons but also high levels of state need frustration can make women more vulnerable to self-conscious emotions and compensatory dieting and exercise thoughts and dieting behaviours.

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| | Intercept (SE) | Linear change (SE) | Curvilinear change |
|----------------------------------|----------------|--------------------|--------------------|
| Number of appearance comparisons | .51 (.11)** | .09 (.05)* | .000 (.004) |
| State need frustration | 1.79 (.09)** | -.02 (.02) | .01 (.002)* |
| Shame | 1.24 (.05)** | .03 (.02)* | .01 (.002)** |
| Guilt | 1.36 (.07)** | .12 (.02)** | .003 (.002) |
| Authentic pride | 1.95 (.09)** | .18 (.02)** | -.01 (.002)** |
| Hubristic pride | 1.82 (.09)** | .19 (.02)** | -.02 (.002)** |
| Thoughts of dietary restriction | 1.01 (.13)** | .04 (.04) | .004 (.003) |
| Thoughts of exercise | 1.57 (.16)** | .07 (.04) | .002 (.004) |
| Actual dietary restriction | .64 (.12)** | .07 (.03)* | -.002 (.003) |
| Actual exercise | .54 (.11)** | .07 (.04) | -.01 (.004) |

* $p < .05$; ** $p < .01$

Table 1. *Trend Analysis for All Diary Variables*

| | 1 | 2 | 3 | 4 |
|-----------------------------|-------|-------|-------|-------|
| 1. BMI | - | | | |
| 2. State upward comparisons | .11** | - | | |
| 3. Trait upward comparisons | -.08* | .24** | - | |
| 4. State need frustration | .01 | .15* | .21** | - |
| 5. Trait need frustration | -.02 | .22** | .43** | .43** |

* $p < .05$, ** $p < .01$

Table 2. *Zero-Order Correlations Between State and Trait Upward Appearance Comparisons and Need Frustration and BMI*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------------------------|--------|--------|--------|--------|-------|-------|-------|
| 1. Shame | - | | | | | | |
| 2. Guilt | .71** | - | | | | | |
| 3. Authentic pride | -.26** | -.30** | - | | | | |
| 4. Hubristic pride | - | -.25** | .77** | - | | | |
| | .270** | | | | | | |
| 5. Thoughts of dietary restriction | .45** | .51** | -.14** | -.09** | - | | |
| 6. Thoughts of exercise | .44** | .48** | -.07** | -.07* | .65** | - | |
| 7. Actual dietary restriction | .35** | .41** | -.05 | -.03 | .74** | .52** | - |
| 8. Actual exercise | .13** | .10** | .11** | .07* | .32** | .42** | .31** |

* $p < .05$, ** $p < .01$

Table 3. *Zero-Order Correlations Between Appearance-Related Self-Conscious Emotions, Thoughts About, and Dietary Restriction and Exercise Behaviours*

| | Estimate | SE | 95% CI | <i>P</i> |
|--|----------|-----|------------|----------|
| <i>Shame</i> | | | | |
| BMI | .03 | .01 | .01, .05 | .005 |
| Trait upward appearance comparisons | .24 | .07 | .11, .37 | .000 |
| Trait need frustration | .19 | .04 | .12, .27 | .000 |
| State upward appearance comparisons | .46 | .05 | .36, .56 | .000 |
| State need frustration | .27 | .07 | .12, .42 | .000 |
| State upward appearance comparisons × State need frustration | -.07 | .08 | -.23, .10 | .434 |
| <i>Guilt</i> | | | | |
| BMI | .03 | .01 | .00, .05 | .019 |
| Trait upward comparisons | .31 | .07 | .18, .44 | .000 |
| Trait need frustration | .24 | .04 | .17, .32 | .000 |
| State upward comparisons | .55 | .05 | .45, .66 | .000 |
| State need frustration | .29 | .07 | .15, .44 | .000 |
| State upward comparisons × Daily need frustration | .00 | .08 | -.16, .17 | .986 |
| <i>Authentic pride</i> | | | | |
| BMI | -.04 | .01 | -.06, -.01 | .003 |
| Trait upward comparisons | -.17 | .08 | -.33, -.01 | .036 |
| Trait need frustration | -.06 | .05 | -.15, .04 | .240 |
| State upward comparisons | -.30 | .06 | -.42, -.17 | .000 |
| State need frustration | -.03 | .09 | -.20, .15 | .759 |
| State upward comparisons × State need frustration | -.15 | .10 | -.34, .04 | .126 |
| <i>Hubristic pride</i> | | | | |
| BMI | -.04 | .01 | -.06, -.01 | .005 |
| Trait upward comparisons | -.12 | .08 | -.28, .04 | .153 |
| Trait need frustration | -.07 | .05 | -.16, .03 | .169 |
| State upward comparisons | -.37 | .06 | -.49, -.25 | .000 |

| | | | | |
|--|------|-----|-----------|------|
| State need frustration | -.17 | .09 | -.35, .00 | .055 |
| State upward comparisons × State need frustration | -.18 | .10 | -.02, .37 | .076 |

*Thoughts of dietary
restriction*

| | | | | |
|--|------|-----|-----------|------|
| BMI | -.01 | .02 | -.04, .03 | .698 |
| Trait upward comparisons | .50 | .12 | .27, .74 | .000 |
| Trait need frustration | .02 | .07 | -.11, .15 | .772 |
| State upward comparisons | .58 | .09 | .41, .75 | .000 |
| State need frustration | .21 | .13 | -.04, .47 | .100 |
| State upward comparisons × State need frustration | .28 | .14 | .01, .55 | .041 |

Dietary restriction

| | | | | |
|--|------|-----|-----------|------|
| BMI | .00 | .02 | -.04, .03 | .866 |
| Trait upward comparisons | .48 | .12 | .24, .71 | .000 |
| Trait need frustration | -.02 | .07 | -.15, .11 | .769 |
| State upward comparisons | .01 | .09 | -.16, .18 | .879 |
| State need frustration | .13 | .13 | -.13, .38 | .327 |
| State upward comparisons × State need frustration | .23 | .14 | -.04, .50 | .099 |

Thoughts of exercise

| | | | | |
|---|------|-----|-----------|------|
| BMI | .02 | .02 | -.01, .06 | .213 |
| Trait upward comparisons | .73 | .12 | .50, .96 | .000 |
| Trait need frustration | -.03 | .07 | -.17, .11 | .663 |
| State upward comparisons | .97 | .11 | .75, 1.18 | .000 |
| State need frustration | .18 | .14 | -.08, .45 | .179 |
| State upward comparisons ×State need frustration | -.13 | .17 | -.46, .21 | .450 |

Exercise

| | | | | |
|--------------------------|------|-----|-----------|------|
| BMI | -.01 | .02 | -.04, .03 | .786 |
| Trait upward comparisons | .07 | .12 | -.16, .30 | .539 |
| Trait need frustration | -.09 | .07 | -.22, .05 | .219 |
| State upward comparisons | .11 | .11 | -.11, .32 | .334 |

| | | | | |
|--|------|-----|-----------|------|
| State need frustration | -.08 | .14 | -.34, .19 | .577 |
| State upward comparisons × State need frustration | -.05 | .17 | -.39, .28 | .759 |

Table 4. *Effects of Upward Appearance Comparisons and Need Frustration on Appearance-Related Self-Conscious Emotions, Thoughts About, and Dietary Restriction and Exercise Behaviours*

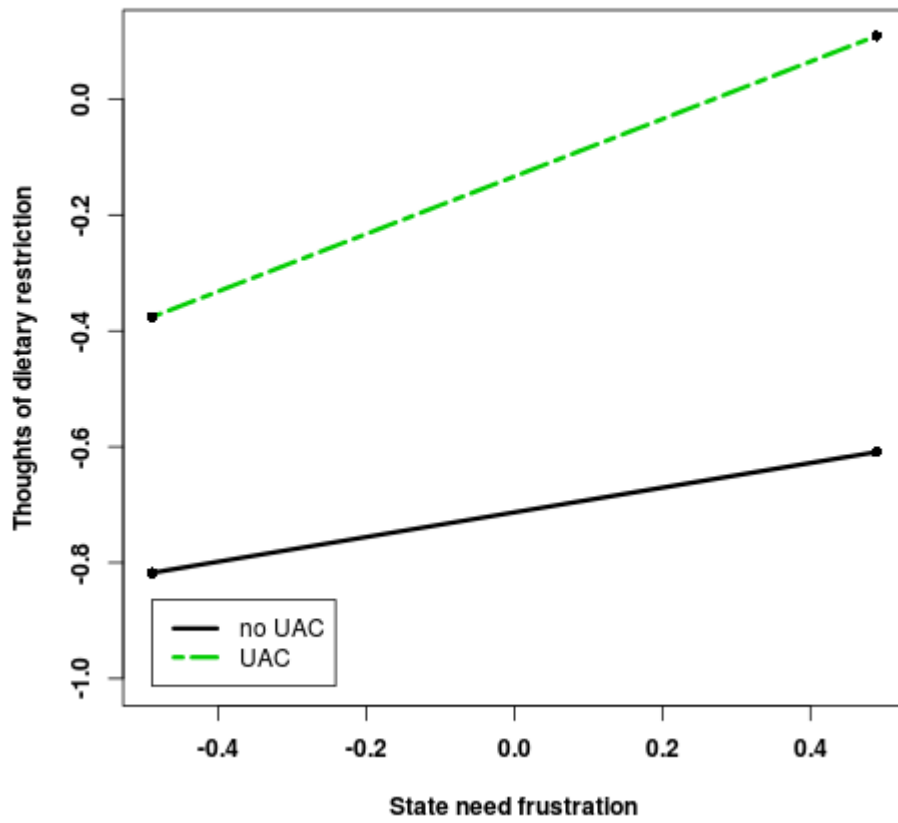


Fig.1. Interaction Between State Upward Appearance Comparisons and State Need Frustration on Thoughts of Dietary Restriction.