

Basic Need Satisfaction, Emotional Eating, and Dietary Restraint as Risk Factors for Recurrent Overeating in a Community Sample

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Abstract

This study examined potential risk factors of recurrent overeating by investigating relationships between basic need satisfaction, emotional eating, dietary restraint, body mass index and recurrent overeating. University students and women who accessed overeating related websites ($N = 321$) completed the Basic Need Satisfaction Inventory, the emotional and restraint subscales of the Dutch Eating Behaviour Questionnaire, the oversnacking and binging subscales of the Yale Eating Patterns Questionnaire; and provided demographic information. The study supported Modeling and Role-Modeling theory, as basic need satisfaction negatively correlated with emotional eating, and self-esteem and self-actualisation significantly predicted emotional eating. Analysis of an adaptation of the cognitive-behavioural model of bulimia nervosa showed that emotional eating mediated the relationship between both self-esteem and self-actualisation and recurrent overeating, and interestingly, dietary restraint was not related to other variables. It was concluded that intervention for binge eating should reflect the importance of psychological triggers rather than only behavioural cues.

Keywords: *basic need satisfaction; dietary restraint; recurrent eating; emotional eating; self esteem*

Introduction

The cognitive-behavioural model of bulimia nervosa (Fairburn, Cooper & Cooper, 1986) was used in developing current treatments for the disorder. The model posits that there is more to the bulimic patient's eating problems than binge eating and purging, and factors that promote binge eating need to be attended to in order for long-term recovery. As dietary restraint often precedes a binge eating episode, this needs to be eliminated. To cease dietary restraint, negative affect, which might encourage emotional eating in some individuals, needs to be addressed. These negative emotions often involve concerns about body shape and weight which, in turn, unduly influences the general cognitive distortion of low self-esteem (Fairburn, Marcus & Wilson, 1993). The model has a wide applicability and subsets of the model can, and have been tested.

Byrne and McLean's (2002) study confirmed that their data was a good fit for the Fairburn et al. (1986) model, and

factors of self-esteem, drive for thinness, body dissatisfaction and dietary restraint accounted for 97% of the variance in binge eating and purging. Self-esteem was found to play a critical role in the bulimic cycle with its strong association with extreme weight and shape concern. Byrne and McLean concluded that low self-esteem combined with heightened concerns about weight and shape may promote disordered eating.

Ross and Wade (2004) tested the cognitive-behavioural model of bulimia nervosa and found that self-esteem acted as a mediator between externalised self-perception and weight and shape concern. In addition, the cognitive factor of weight and shape concern was found to mediate the relationship between self-esteem and both dietary restraint and uncontrolled eating, as it did in Wade and Lowes' (2002) study. In an investigation of the same cognitive model, restrained eaters' self-esteem was found to be directly related to their concern with body shape and weight (Meijboom, Jansen, Kampman, & Schouten, 1999).

The current study was guided by the nursing theory of Modeling and Role-Modeling (MRM; Erickson, Tomlin & Swain, 1983), a holistic stress adaptation approach to health, growth and development that was developed as a framework for nurses to use when interacting with clients. MRM theory integrates concepts from several theories including the psychosocial developmental theory of Erikson (1963), processes of stress and adaptation from Seyle (1976), the fight-flight stress response of Engel (1962), and the satisfaction of basic needs from the human needs perspective (Maslow, 1970).

MRM theory (Erickson et al., 1983) proposes that the greater one's perception is of basic need fulfilment, the more probable that one has the available self-care resources to be able to resolve circumstances adaptively by utilising internal and external coping resources when responding to stressors. Internal self-care resources involve the client's physical status and feeling state and are dependent on satisfaction of basic needs over time, such as self-esteem. When individuals do not have basic need resource assets accumulated they may respond to stressors with difficulty (Erickson et al.). Unhealthy coping behaviours including

emotional eating, binge eating and dietary restraint may arise.

Research in basic need satisfaction has predominantly concerned testing of the MRM model to determine if self-care resources mediate the effect of stress (Irvin & Acton, 1996, 1997). Self-esteem has been examined as one such self-care resource and was found to positively relate to overall need satisfaction (Irvin and Acton, 1996). High self-esteem has long been thought to protect individuals from stress (Ziller, Hagey, Smith & Long, 1960).

Only one study has used MRM theory to explore eating behaviours. Timmerman and Acton (2001) used the MRM framework to explore the relationship between basic need satisfaction, as defined by Maslow's (1970) hierarchy of needs, and emotional eating. They found that in a healthy, educated and mostly female sample, the lower the level of basic need satisfaction, the more likely one was to eat when experiencing negative emotional states. Timmerman and Acton revealed that the needs higher in Maslow's hierarchy (i.e., love/belonging, self-esteem, and self-actualisation) had moderate, negative correlations with emotional eating, and the lower needs of Maslow's hierarchy (physical and safety/security needs) had smaller, although still significant, negative correlations. The only basic need that was a significant predictor of emotional eating was self-esteem, an internal self-care resource, and it explained 27.7% of the variance in emotional eating.

In addition to the Timmerman and Acton (2001) study there is further literature to support the idea that basic needs are related to eating behaviour. Physiological deprivation of food has led to binge eating in humans (Franklin, Schiele, Brozek & Keys, 1948; Keys, Brozek, Henschel, Mickelsen & Taylor, 1950) and animals (Coscina & Dixon, 1983) once food was made available. Additionally, a lack of a sense of familial love and belongingness has been associated with bulimia (Humphrey, 1986; Strober & Humphrey, 1987), and the social support of partners (see Black, Gleser & Kooyers, 1990) and friends (Wing & Jeffery, 1999) has been found to increase the success of weight loss programs. The self-esteem need has attracted much interest in the field of eating behaviours and has been found to be related to and predict binge eating (Wolf & Crowther, 1983; Button, Sonuga-Barke, Davies, & Thompson, 1996), dietary restraint (Eldredge, Wilson & Whaley, 1990), and eating abnormalities in general (Button, Loan, Davies, & Sonuga-Barke, 1997; Dykens & Gerrard, 1986; Laessle, Tuschl, Waadt & Pirke, 1989).

As eating behaviours have been linked in the literature to basic need satisfaction, the current study will examine the relationship between basic need satisfaction and emotional eating, restrained eating and uncontrolled eating. The previously discussed cognitive-behavioural model of bulimia nervosa (Fairburn et al., 1986) emphasises the importance of self-esteem as a risk factor in eating behaviour and provides an explanation as to how these variables might be related.

The first aim of this cross-sectional study was derived from MRM theory and was based on the findings of Timmerman and Acton (2001) who found that depleted

basic need satisfaction in a nonclinical community sample would act as a stressor and would increase the likelihood that one would engage in compensatory behaviour, such as emotional eating, to alleviate the stress. It was hypothesised that there would be a negative relationship between basic need satisfaction and emotional eating. The rationale is that people with higher degrees of basic need satisfaction would acquire more self-care resources, such as self-esteem, which buffers individuals from stress. With perceived stress minimised, the desire to engage in emotional eating as a coping strategy decreases. Total basic need satisfaction should predict emotional eating, however, following the literature, self-esteem was hypothesised to be the best predictor out of the five basic needs of physiological, safety/security, love/belonging, self-esteem, and self-actualisation needs.

The second aim of the current study was to assess an adaptation of the cognitive-behavioural model of bulimia nervosa (Fairburn et al., 1986) in a nonclinical community sample. Mediation processes were explored to discover whether the self-esteem and the cognitively derived measure of emotional eating variables work together to increase the possibility of dietary restraint and recurrent overeating. Previous literature has aided the development of a working model (Figure 1.) that proposes paths to be analysed in the current study.

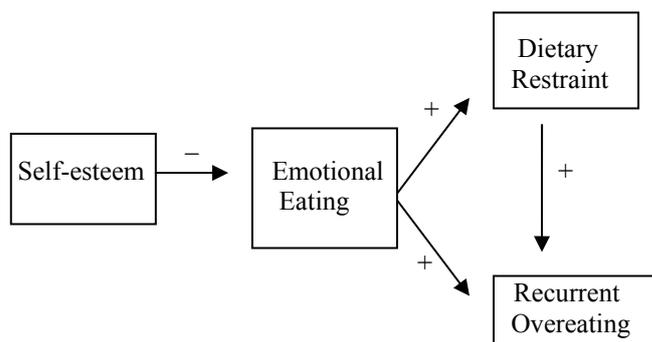


Figure 1 : Structural model of basic need satisfaction and eating behaviour

Inverse relationships were predicted between self-esteem and emotional eating, dietary restraint and recurrent overeating. Positive relationships were predicted between the three eating styles. Emotional eating was predicted to mediate the relationship between self-esteem and both dietary restraint and recurrent overeating.

Method

Participants

The study sample of 321 females consisted of first year Psychology students who received course credit for participation and women that accessed overeating related websites. Due to gender differences in the prevalence of

disordered eating patterns and the likelihood of not enough statistical power to test such differences, an exclusively female sample was selected for the study.

Participants were aged between 18 and 79 years, with a mean age of 31.80 years ($SD = 11.70$). The majority of participants resided in Australia (88.60%), and were well-educated with most (78.50%) having completed or partially completed tertiary qualification.

Materials

The questionnaire comprised of eating behaviour and basic need measures, and requested demographic information. The measures were designed for use in a non-clinical population.

Basic Need Satisfaction Inventory (BNSI) The BNSI (Leidy, 1994) measured perceived satisfaction with meeting basic needs and the 27 items were selected to form subscales analogous to Maslow's (1970) theoretical description of the basic needs categories: physical, safety/security, love/belonging, self-esteem, and self-actualisation. Participants were asked to rate how they felt about various aspects of their lives on a seven-point response scale (1 = terrible, 7 = delighted). The mean subscale value expresses the subjective evaluation of satisfaction in each need category, and the mean across subscales is designed to reflect an individual's overall perception of need satisfaction, with higher scores indicating greater basic need satisfaction.

Leidy (1994) has previously reported validity of the BNSI. Internal consistency in previous research has ranged from .90 to .94 (Timmerman & Acton, 2001; Acton & Malathum, 2000; Irvin & Acton, 1996; Leidy & Traver, 1995; Leidy, 1990, 1994). In this study, Cronbach's alpha was .95 for the total scale and the reliability coefficients were .72, .77, .83, .85, and .89 for the physical, safety/security, love/belonging, self-esteem, and self-actualisation subscales, respectively.

Dutch Eating Behaviour Questionnaire (DEBQ) Restrained and emotional eating were measured with the DEBQ (Van Strien, Frijters, Bergers & Defares, 1986). The 10 item restraint subscale (DEBQ-R) measured how often

participants use different dietary restraint behaviours (eg. "Do you try to eat less at meal times than you would like to eat?"), and the 13 item emotional eating subscale (DEBQ-E) measured eating elicited by diffuse and clear emotional stimuli (eg. "Do you have a desire to eat when you are irritated?"). All items had a six-point response format: (0 = never, 5 = always). The item scores were summated, with high scores indicating a high degree of the eating behaviour in question.

The DEBQ-R and DEBQ-E have been shown to have good internal consistency for women ($\alpha = .95$) and factorial validity (Van Strien, Frijters, Staveren, Defares, & Deurenberg, 1986; Wardle, 1987). The DEBQ-R and DEBQ-E demonstrated good internal consistency in this sample with a Cronbach alpha coefficient of .93 and .97, respectively.

Yale Eating Patterns Questionnaire (YEPQ) Recurrent overeating was measured by using the Oversnacking and Bingeing subscales of the YEPQ (Kristeller & Rodin, 1989). The 12 item Oversnacking subscale related to snacking (eg. "I snack or nibble when watching TV") and the 13 item bingeing subscale conveyed a sense of being out of control around food or with the thought of food (eg. "I eat when I'm not really hungry, just because food is available"). All items had a five-point response format (1 = never, 5 = very often) and a recurrent overeating score was achieved for each respondent by summing the item endorsements for the 25 items, with high scores indicating a high level of recurrent overeating.

The reliability and validity of the YEPQ were established at the time of development with Cronbach's alpha coefficients reported as .78 and .83 for Oversnacking and Bingeing, respectively (Kristeller & Rodin, 1989). For this sample the internal consistency was high ($\alpha = .88$) for both Oversnacking and Bingeing. The alpha for both scales combined was .93.

Body Mass Index (BMI) BMI was calculated as weight (kg)/height (m)² from the self-reported data. Self-reported heights and weights are reported to be highly correlated with measured heights and weights (Mueller, Joos & Schull, 1985; Pirie, Jacobs, Jeffrey & Hannon, 1981).

Table 1 : Descriptive Statistics for BNSI and Eating Behaviour Variables

Variable	<i>M</i>	<i>SD</i>	Range obtained	Range possible
BNSI Subscales				
Physical needs	4.49	.94	1.50 - 6.33	1 - 7
Safety/security	4.89	.82	1.83 - 6.83	1 - 7
Love/belonging	5.09	1.10	1.40 - 7.00	1 - 7
Self-esteem	4.78	1.01	1.00 - 6.75	1 - 7
Self-actualisation	4.85	1.10	1.67 - 7.00	1 - 7
BNSI total	4.81	.86	2.07 - 6.56	1 - 7
DEBQ-E	25.31	15.23	0.00 - 65.00	0 - 65
DEBQ-R	20.75	10.15	0.00 - 50.00	0 - 50
YEPQ	72.98	16.27	30 - 118	25 - 125

Note. BNSI = Basic Need Satisfaction Inventory; DEBQ-E = Dutch Eating Behaviour Questionnaire (Emotional eating); DEBQ-R = Dutch Eating Behaviour Questionnaire (Dietary restraint); YEPQ = Yale Eating Patterns Questionnaire (Recurrent overeating) $N = 321$

Table 2: Pearson Correlations Between Variables.

Variables	1	2	3	4	5	6	7	8	9	10
1. DEBQ-E	–	.25**	.78**	-.39**	-.36**	-.38**	-.47**	-.45**	-.47**	.26**
2. DEBQ-R		–	.21**	-.18**	-.26**	-.24**	-.27**	-.22**	-.26**	-.01
3. YEPQ			–	-.26**	-.20**	-.24**	-.35**	-.33**	-.31**	.25**
BNSI										
4. Physical needs				–	.58**	.63**	.67**	.73**	.83**	-.27**
5. Safety and security					–	.69**	.71**	.66**	.82**	-.13*
6. Love and belonging						–	.80**	.78**	.89**	-.20**
7. Self-esteem							–	.81**	.90**	-.25**
8. Self-actualisation								–	.92**	-.19**
9. BNSI total									–	-.24**
10. BMI										–

Note. DEBQ-E = Dutch Eating Behaviour Questionnaire (Emotional eating); DEBQ-R = Dutch Eating Behaviour Questionnaire (Dietary restraint); YEPQ = Yale Eating Patterns Questionnaire (Recurrent overeating); BNSI = Basic Need Satisfaction Inventory; BMI = Body Mass Index, * $p < .05$, ** $p < .01$., $n = 321$

Procedure

Data were collected using electronic (78.50%) and paper (21.50%) versions of an anonymous self-report questionnaire that required approximately 30 minutes to complete. Student participants were informed about the study in a lecture, and the other participants were notified by one of a number of websites that either provided a link to the online questionnaire or distributed information about the questionnaire via a newsletter or email to their subscribers.

Results

Descriptive Analyses

The responses to the five subscales of the BNSI were significantly skewed as expected, as was the DEBQ-E. These variables were therefore transformed to their square root or log value. However, as the results of analyses obtained using the transformed variables were not different to the results obtained using the untransformed variables, the untransformed variables are reported for all analyses. The data appeared both linear and homoscedastic, and multicollinearity was not detected. The small number of univariate and multivariate outliers were retained due to the relatively large sample size.

The mean body mass index (BMI) of participants was 24.98 ($SD = 6.64$), which is in the normal range (Better Health Channel, 2004). The sample represented underweight, normal weight, overweight and obese with the BMI range from 16.73 to 56.93.

The mean scores for the DEBQ-E, DEBQ-R, YEPQ and BNSI are presented in Table 1. The mean eating behaviour scores from the DEBQ-R, DEBQ-E and YEPQ indicated that, on average, respondents only sometimes restrain their diet, engage in emotional eating and partake in recurrent overeating. The average item scores for the subscales of the BNSI were consistent across subscales. The mean for the total BNSI score indicated that respondents, as a group, felt that they had mixed feelings about whether their needs were being met. This mean for BNSI total is slightly lower than that of a similar sample (Timmerman & Acton, 2001). Extreme scores were recorded on all measures.

Correlations

Table 2 displays the Pearson product-moment coefficients, r , of the variables used in the current study. It shows that self-reported BMI had small, significantly

positive relationships with emotional eating and recurrent overeating, no significant relationship with dietary restraint, and significant negative correlations to the need satisfaction measures of self-esteem, physical, safety/security, love/belonging, self-actualisation, and total BNSI. Again, these relationships were small yet it was decided that BMI was to be controlled for in any regression analysis in which one of its correlates was an outcome variable, to test if the hypothesised relationships exist regardless of body weight.

The positive relationship between the DEBQ-E and YEPQ was strong and significant. However, the positive relationship with DEBQ-R and both DEBQ-E and YEPQ, was small and despite these relationships being statistically significant, they offer little practical value.

The Relationship between Emotional Eating and Basic Need Satisfaction

Correlations between DEBQ-E and BNSI total scores and subscale scores are also present in Table 2. Total score on the DEBQ-E had a moderate, statistically significant negative correlation to total score on the BNSI. All of the subscales of the BNSI were also significantly and negatively correlated with the DEBQ-E. The needs found higher in Maslow's hierarchy (i.e., self-esteem and self-actualisation) had higher correlations with the DEBQ-E than the lower order needs of physical, safety/security, and love/belonging.

Hierarchical multiple regression analysis (MRA) was used to further investigate the relationship between the BNSI scales and the DEBQ-E. After BMI was controlled for by entering it into Step 1, all of the BNSI subscales were entered into the regression in Step 2. The ΔR^2 value was .20 which indicated that 20% of the variability in emotional eating was predicted by knowing the scores on these five independent variables ($p < .01$). The overall regression model had an R value of .52 and an R^2 value of .27 and was significantly different from zero, $F(6, 300) = 18.12, p < .01$. Table 3 displays the unstandardised regression coefficients (B), the standard error for B (SE), and the standardised regression coefficients (β) for each independent variable entered at Step 2 of the regression analysis.

Only self-esteem and self-actualisation contributed significantly to the overall regression model. Self-esteem was the strongest predictor and self-actualisation was also significant. No other subscale scores were significant predictors of emotional eating. Due to self-actualisation independently predicting emotional eating, self-actualisation will be included in the mediation model and path analysis.

Table 3: Summary of Simultaneous Regression Analysis for BNSI Scales Predicting DEBQ-E.

Variable	B	SE	β
Physical needs	-.58	1.22	-.04
Safety/Security	-.73	1.39	-.04
Love/Belonging	1.62	1.27	.12
Self-esteem	-4.46	1.50	-.30**
Self-actualisation	-3.12	1.37	-.23*

Note. DEBQ-E = Dutch Eating Behaviour Questionnaire (Emotional eating); BNSI = Basic Need Satisfaction Inventory * $p < .05$, ** $p < .01$. $n = 321$

Emotional Eating as the Mediator between Higher Order Needs and both Dietary Restraint and Recurrent Overeating

The three conditions for mediation proposed by Baron and Kenny (1986) were followed in the investigation of a mediation relationship between the higher order needs of self-esteem and self-actualisation and both dietary restraint and recurrent overeating. First, multiple regression analysis (MRA) was used to investigate whether there is a significant relationship between the independent variable and the proposed mediator. A significant relationship was demonstrated between both self-esteem and self-actualisation and emotional eating, as previously reported. Self-esteem also significantly predicted the first outcome variable of interest, recurrent overeating ($R^2 = 0.15$, $F(2, 304) = 26.70$, $p < 0.01$), as did self-actualisation ($R^2 = 0.15$, $F(2, 304) = 26.09$, $p < 0.01$). Second, the relationship of the mediator and the outcome variable was investigated, with emotional eating significantly predicting recurrent overeating ($R^2 = 0.62$, $F(2, 314) = 251.18$, $p < 0.01$). With the first two criteria satisfied, hierarchical MRA was used to examine whether the relationship between the independent and outcome variables was eliminated or substantially reduced once the mediator was controlled. Demonstration of mediation is strongest when this relationship is reduced to zero (Baron & Kenny, 1986). Table 4 displays that after controlling for emotional eating, both self-esteem and self-actualisation were no longer significant predictors of recurrent overeating. The unstandardised regression coefficients (B), the standard error for B (SE), and the standardised regression coefficients (β) for each variable entered into the MRA are displayed.

BMI, self-esteem, self-actualisation and emotional eating accounted for 61.6% of the variance in recurrent overeating. When controlling for BMI by entering it at step one, self-esteem, self-actualisation and emotional eating account for an additional 55% of the variance in recurrent overeating. Once emotional eating was also controlled, self-esteem and self-actualisation were not significant predictors of recurrent overeating. It was concluded that emotional eating fully

mediated the relationship between the higher order needs of self-esteem and self-actualisation, and recurrent overeating.

In regard to dietary restraint, the correlation matrix displayed in Table 2 demonstrates that dietary restraint does not correlate highly enough with either the higher order needs or emotional eating to be used in the mediation model. Despite, as previously discussed, the correlations all being statistically significant due to the large sample size, variables with bivariate correlations of less than .30 offer little practical value and are not recommended for use in MRA (Pallant, 2001). These relationships were therefore not compatible with Baron and Kenny's (1986) requirements for mediation.

Path Analysis

In order to outline the relationships between the variables of interest in this study, a path analysis was performed using a series of hierarchical MRAs working backwards through the model (Cohen & Cohen, 1983). For each analysis, BMI was entered at Step 1 to control for its influence. Recurrent overeating was used as the outcome variable for the first MRA, and emotional eating, self-esteem and self-actualisation were entered as independent variables.

In the next MRA emotional eating was entered as the outcome variable, with the variable to its left, self-esteem without self-actualisation, entered as an independent variable. Self-actualisation was then used in place of self-esteem to predict emotional eating. The final model, using all the significant standardised regression coefficients (β) as path coefficients, is presented in Figure 2. For the overall model with recurrent overeating as the outcome variable, $R^2 = 0.62$, $F(4, 302) = 120.94$, $p < .001$. After controlling for BMI, emotional eating and self-esteem accounted for an additional 55.10% of the variance in recurrent overeating.

Discussion

The present study investigated risk factors associated with recurrent overeating, and the influence of basic need satisfaction (BNS).

Table 4 : Summary of Hierarchical Regression Analysis for the Mediation Relationship with Recurrent Overeating as Outcome

Variable	B	$SE B$	β
Step 1			
BMI	.15	.09	.06
Step 2			
DEBQ-E	.84	.04	.79**
Step 3			
Self-esteem	.51	1.00	.03
Self-Actualisation	.21	.90	.01

Note. DEBQ-E = Dutch Eating Behaviour Questionnaire (Emotional eating); BMI = Body Mass Index; $R^2 = .07$ for Step 1 ($p < 0.01$); $\Delta R^2 = .55$ for Step 2 ($p < 0.01$); $\Delta R^2 = .00$ for Step 3 ($p > 0.05$).

** $p < .01$.

$n = 321$

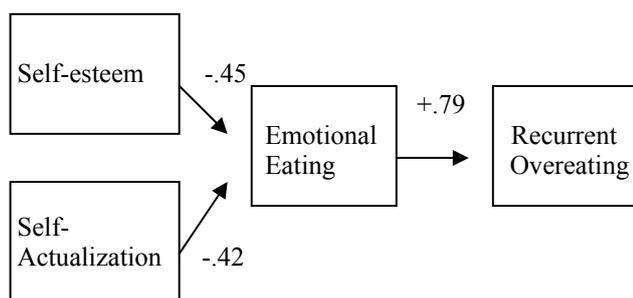


Figure 2 : Path analysis results: significant pathways (standardised regression coefficients) in the integrative model.

Basic Need Satisfaction and its Relationship with Emotional Eating

The first aim of the current study was to identify whether depleted basic need satisfaction (BNS) acts as a stressor and increases the likelihood of engaging in the compensatory behaviour of emotional eating to alleviate the stress. The hypothesis was supported as the lower one's level of BNS, the more likely one engaged in emotional eating, and vice versa; as found in previous research (Timmerman and Acton, 2001).

Women with low physiological or safety/security need satisfaction were more likely to engage in emotional eating, but not recurrent overeating. This indicates that women with low levels of physiological or safety/security need satisfaction tend to eat more when emotionally aroused, however, the eating behaviour is not necessarily excessive. While this appears to contrast the findings of Franklin et al. (1948) and Keys et al. (1950) who reported that food deprived volunteers showed a tendency to binge eat to the limit of their physical capacity, the questions from the Basic Need Satisfaction Inventory (BNSI) that pertain to physiological need satisfaction were not directly related to hunger.

Similarly, as opposed to previous research (Humphrey, 1986; Strober & Humphrey, 1987), low levels of love/belonging need satisfaction was not related to recurrent overeating or dietary restraint. However, correlation showed that women low in love/belonging need satisfaction had a tendency to eat when experiencing negative affect.

While studies indicate that eating disordered individuals have lower self-esteem than controls (Dyken & Gerrard, 1986; Laessle et al., 1989), the current findings reveal that the relationship between low self-esteem and both emotional eating and recurrent overeating also exists for women in a community sample.

Self-actualisation also correlated significantly with emotional eating and recurrent overeating, suggesting that the higher one's level of self-actualisation, the less they engaged in emotional eating and recurrent overeating, and vice versa. This finding contributes to previous research

revealing that patients with bulimia and anorexia rated their families as significantly less encouraging of personal growth than families of non-eating disordered patients (Latzer, Hochdorf, Bachar & Canetti, 2002). Future research could explore the relationship between encouragement of personal growth and the degree of self-actualisation of women with disordered eating behaviours.

Despite scores on all five BNS subscales correlating with scores on emotional eating, MRA showed that not all subscales predicted emotional eating. As hypothesised, and in support of previous research (Timmerman and Acton, 2001), self-esteem was the best predictor of emotional eating. Unlike previous research, self-actualisation also independently and significantly predicted emotional eating. This identification of self-esteem as a predictor of emotional eating is consistent with early research that high self-esteem protects individuals from stress (Ziller et al., 1960). Unexplained variance in emotional eating should be further investigated to identify other factors that may mediate this relationship.

The findings of the current study support the proposition of Modeling and Role-Modeling theory (MRM; Erickson et al., 1983) that individuals with higher levels of BNS will be better able to deal with stress and thus, engage in healthier coping behaviours. MRM theory declares that as one's perception of BNS increases, the more probable it is that one has adequate self-care resources, such as self-esteem (Erickson et al.), which helps to better handle stress, and thus increase the likelihood of the person engaging in healthier coping behaviour.

The current findings are consistent with Leidy's (1990, 1994) and Irvin and Acton's (1996) findings that low levels of BNS significantly predict perceived stress. In Irvin and Acton's sample of family caregivers, the self-care resource of self-esteem mediated the effect of stress levels, as it did in the current study.

This is the second study that has used MRM theory to examine eating behaviour. The current study was intended to support and strengthen the findings of Timmerman and Acton (2001), who tested the relationship between BNS and emotional eating in a healthy, educated adult sample. By targeting overeating support groups and university students, it was hoped that a heterogeneous sample would provide greater variability in emotional eating scores than that obtained by Timmerman and Acton. However, while mean BNS was marginally lower in the current study, emotional eating scores were comparable to that of Timmerman and Acton. The current study concludes that women with higher BNS seem to have developed sufficient self-care resources of self-esteem and self-actualisation to buffer stress, reducing the need to use emotional eating as a coping strategy, a similar conclusion to that drawn by Timmerman and Acton.

MRM theory has predominantly focused on the concepts of stress and illness, as previously discussed, and the findings of the current study provide additional empirical validation of the theoretical propositions drawn from MRM theory in a health promotion setting. Hence, the utility of

MRM theory for healthcare professionals has been strengthened.

The Mediation Model of Recurrent Overeating

The second aim of the present study was to explore mediational processes by using specific relationships from the cognitive-behavioural model of bulimia nervosa (Fairburn et al., 1986) to develop a working model to explain the relationship between variables of interest. Due to self-actualisation being a significant predictor of emotional eating it was included as part of this model.

The inverse relationships involving self-esteem and self-actualisation with emotional eating and recurrent overeating were supported by the literature (Button et al., 1997; Dykens & Gerrard, 1986; Laessle et al., 1989; Latzer et al., 2002). However, as this previous literature asserts that disordered eating behaviour, such as dietary restraint, increase the likelihood of low self-esteem and self-actualisation, it was expected that dietary restraint would also be inversely related to these two basic needs. This was not the case, as the correlation in the current study was not strong enough to support a relationship between dietary restraint and self-esteem or self-actualisation, and therefore, dietary restraint was not a significant predictor of either two needs. This supports the finding of Paa and Larson (1998) that dietary restraint is not a significant predictor of self-esteem but offers no support for Eldredge et al. (1990) who assert that dietary restraint is associated with lower self-esteem.

The positive relationships predicted between the three eating styles were also only partially satisfied. Emotional eating and recurrent overeating were positively and highly correlated. This finding is supported by Van Strien and Ouwens (2003) who suggest the tendency to eat in response to aversive emotions, rather than hunger cues, could lead to uncontrollable eating as the person loses the ability to recognise whether they are hungry or satiated. In addition, the relationship between emotional eating and recurrent overeating is supported by findings that negative affect is an antecedent to binge eating (Davis, Freeman & Garner, 1988; Greeno, Wing & Shiffman, 2000; Stice & Agras, 1998; Stice et al., 1998; Stice, Killen, Hayward & Taylor, 2002) which makes women who emotionally eat particularly susceptible to binge eating.

However, the hypothesised relationship between dietary restraint and both emotional eating and recurrent overeating was not practically significant in the current study, as previously discussed. In regards to emotional eating, this finding does not support research that identified restrained eaters eat more when distressed (Cavallo & Pinto, 2001), or the theory that emotional eating may arise since negative affect disrupts the cognitive restraint applied by dieters challenged with relentless hunger (Herman & Polivy, 1980).

As well as in the current study, the hypothesis for a relationship between dietary restraint and recurrent overeating also failed to eventuate in the first study of Fairburn's et al. (1986) cognitive-behavioural model of bulimia nervosa (Byrne & McLean, 2002). Results from this study and the current study suggest that the women sampled were successful at maintaining their dietary

restraint. In contrast, another examination of the cognitive model (Ross & Wade, 2004) found that dietary restraint and uncontrolled eating were positively and significantly correlated, but they did find that dietary restraint was not a necessary pathway to uncontrolled eating. The current research and that of Byrne and McLean (2002), however, do not support Restraint theory which asserts that overeating follows dieting (Polivy & Herman, 1985), and the current findings also contradict research that suggests dietary restraint is a risk factor for binge eating (Agras & Telch, 1998; Stice & Agras, 1998; Stice, Presnell & Spangler, 2002; Stice et al., 1998; Telch & Agras, 1996). Most of these studies, however, were prospective and since the current study was cross-sectional, findings must be interpreted with caution. Extending the current study by doing a follow-up would be interesting to see if women that currently have high dietary restraint exhibit elevated levels of recurrent overeating sometime later.

However in support of the current study, many other studies have concluded that dietary restraint is not an essential precursor to binge eating in patients with either binge eating disorder (Abbott et al., 1998; Berkowitz, Stunkard & Stallings, 1993; Grilo & Masheb, 2000; Spitzer et al., 1992; Spitzer, Stunkard et al., 1993; Spitzer, Yanovski et al., 1993; Spurrell, Wilfley, Tanofsky & Brownness, 1997; Wilson, Nonas, & Rosunblum, 1993) or bulimia nervosa (Bulik, Sullivan, Carter & Joyce, 1997; Mussell et al., 1997).

Conflicting findings regarding dietary restraint and binge eating may result from the different instruments used to measure dietary restraint. The current study used the restraint scale from the Dutch Eating Behaviour Questionnaire (DEBQ-R; Van Strien et al., 1986), a measure of intention to restrict and actual restriction of food intake. In contrast, the Restraint Scale (Herman & Polivy, 1980) measures not only dietary restraint but also disinhibited eating, which is the all-or-nothing reaction to a perceived violation of dietary restraint, and weight fluctuation (Gorman & Allison, 1995; Heatherton, Herman, Polivy, King, & McGree, 1988; Van Strien, 1999). This being the case, studies using the Restraint Scale may be biased by only classifying people that have a high tendency toward overeating as exhibiting dietary restraint. Further research is required to understand the different dietary restraint measures and how the various measures influence the relationship between dietary restraint and other variables, particularly recurrent overeating.

BMI was controlled for in all multiple regression analyses to remove any influence of body weight on the results. Multiple regression analysis showed that as hypothesised, low self-esteem predicted recurrent overeating, supporting the findings of Wolf & Crowther (1983) that low self-esteem predicted binge eating regardless of weight. Self-actualisation also predicted recurrent overeating. In addition, as hypothesised, the relationship between self-esteem and recurrent overeating was fully mediated by emotional eating, as measured by the emotional eating scale of the Dutch Eating Behaviour Questionnaire (DEBQ-E; Van Strien, Frijters, Bergers et al., 1986). The relationship

between self-actualisation and recurrent overeating was also fully mediated by emotional eating; therefore emotional eating is shown to be a critical variable within this model. The direction of the relationships between the variables cannot be inferred from the current model, but Byrne and McLean (2002) who tested Fairburn et al's. (1986) model suggested the relationships may be bi-directional.

Previous studies of Fairburn et al's. (1986) cognitive model have found body shape and weight concern mediates the relationship between self-esteem and recurrent overeating (Byrne & McLean, 2002; Ross & Wade, 2004). While not a direct test of Fairburn et al's. (1986) model, the current study supports that the relationship between self-esteem and recurrent overeating is mediated by a cognitive variable. The current model substituted the weight and shape concern for emotional eating which involves the cognitive factor of negative affect, and found it to fully mediate the relationship between both self-esteem and self-actualisation and recurrent overeating.

Dietary restraint was not included in the current model, however self-actualisation entered the model at the same level as self-esteem. The inclusion of self-actualisation into the model suggests that factors such as realisation of potentials, capacities and talents that fulfill one's intrinsic nature, in addition to self-esteem needs, predict emotional eating. In turn, emotional eating fully mediated the relationship between the higher order needs and recurrent overeating.

Limitations of the Study

To a certain extent, the current study sacrificed depth for breadth. A number of relationships between variables were examined, however the cross-sectional design of this study renders it difficult to present conclusions about causality or the direction of such relationships. A longitudinal study is required to strengthen the preliminary findings made in this study.

A second limitation involves the specific measures used in the study. As previously discussed, various measures of dietary restraint appear to measure different behaviours. While attempts have been made to clarify differences between the various scales (Allison, Kalinsky, & Gorman, 1992; Heatherton et al., 1988; Laessle, Tuschl, Kotthaus & Pirke, 1989), the best measure of dietary restraint remains a contentious issue. In addition, there is no pure instrument to measure recurrent overeating or binge eating. Further research is required to design a mutually exclusive binge eating scale and to improve measures of dietary restraint. Until this is done the conclusions drawn about the relationship between dietary restraint and binge eating will remain controversial.

A heterogeneous sample was actively recruited to obtain a variety of eating behaviours and levels of BNS among participants. However in doing so, the women in this study may not be representative of the general population, therefore the results should be interpreted with caution.

As many potential binge eating risk factors are highly intercorrelated with one another, they are difficult to assess. An apparent risk factor may not be a true risk factor but

merely have a high association with a real risk factor. The strong correlation amongst BNSI subscales was expected and consistent with Maslow's (1970) conceptualisation of a close relationship among the satisfaction of the five basic needs. Path-analysis is an attempt to partial out the relative effects of correlated variables, and self-esteem and self-actualisation were both found to individually predict emotional eating. However, due to the high correlation between self-esteem and self-actualisation, results must be interpreted with caution. Further research into self-actualisation needs and eating pathology may help clarify its role in disordered eating behaviour. Although assumed to be closely related, future study should also formally investigate the proposition that recurrent overeating is a risk factor for binge eating.

Implications and Conclusions

The current study highlights the influence of self-esteem, self-actualisation and negative affect on eating disturbances such as recurrent overeating. When designing interventions to assist women who present with eating pathology perhaps more consideration should be given to these higher order needs and emotions rather than, or in addition to, targeting the dysfunctional behaviours.

Implicitly, future research to explore the role of affective disturbances and emotional eating is warranted given the influence of emotional eating in the current study. The results highlight the importance of helping women increase their levels of self-esteem and self-actualisation so they can use these resources to buffer stress and negative emotions that may trigger binge eating.

While it is acknowledged that many binge eaters are in the cycle of poor eating habits and respond well to cognitive-behavioural therapy, for others eating is secondary to fundamental psychological problems. The cycle of strict dieting and overeating, labelled as the "spiral model" (Heatherton & Polivy, 1992), and typical behaviour of the first type of binge eater just mentioned, was not apparent in this sample. The women who engage in recurrent overeating in the current sample appear to represent the second type of binge eater who is driven, not by poor eating habits, but by psychological problems. For this group of individuals it is important that interventions address these problems for any therapy to be successful.

This study is by no means an investigation of all contributing factors of binge eating. For example, the importance of thinness in the western culture and its association with dieting has not been analysed in this study. In spite of this, dietary restraint had a minimal effect on levels of recurrent overeating. These findings lead to the conclusion that binge eating should not be addressed in isolation. Interventions for binge eating should focus on the psychological triggers such as negative affect and higher order needs, rather than only behavioural cues such as dieting and the eating behaviour itself.

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Research Profile

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Naomi Crafti is a lecturer in Psychology at Swinburne University of Technology. Naomi has professional interests in a number of areas of clinical and counselling psychology. She has been involved in a number of research projects looking at eating problems, body-image dissatisfaction and substance abuse difficulties, in both younger and older adults. Naomi helped establish the Eating Disorders Clinic at the Swinburne Psychology Centre and developed the Moderate Eating Group (MEG) program, to help people with binge eating difficulties.