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Short communication

The dual pathway model of overeating. Replication and extension with actual food consumption

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ABSTRACT

van Strien et al. [van Strien, T., Engels, R. C. M. E., van Leeuwe, J., Snoek, H. M. (2005). The Stice model of overeating: tests in clinical and non-clinical samples. *Appetite, 45*, 205–213] extended the negative affect pathway of Stice's dual pathway model of overeating Stice [Stice, E. (1994). Review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. *Clinical Psychology Review, 14*(7), 633–661] successfully with the variables lack of interoceptive awareness and emotional eating. This study aimed to replicate these findings in a sample of female college students with food consumption as the measure for overeating. Structural equation modeling was used to test the original and the extended model and both models fitted. In the extended model, the relation between negative affect and consumption seemed to run only via lack of interoceptive awareness and emotional eating.

Stice developed a sociocultural model of the development of bulimic behaviour (1994), the dual pathway model. In this model internalisation of sociocultural pressure to be thin, as expressed by family, peers and the media, is thought to lead to body dissatisfaction. Body dissatisfaction is thought to lead to bulimia nervosa via two different mediators, the two pathways. The first pathway is the pathway of restrained eating, because body dissatisfaction may result in restrained eating, which in its turn is considered an important risk factor for binge eating/overeating and the onset of bulimia. The second pathway is the pathway of negative affect, especially depression. It was proposed that bulimics used bingeing and purging as a means of regulating negative mood states.

In several longitudinal studies support was found for the restrained pathway in samples of female high school students and female college students (Stice, 2001; Stice & Agras, 1998; Stice, Akutagawa, Gaggar, & Agras, 2000; Stice, Pressnell, & Sprangler, 2002; Stice, Shaw, & Nemeroff, 1998). Two longitudinal studies did not support the pathway of restrained eating (Spoor et al., 2006; Stice, 1998). Also in cross-sectional studies in samples of female high school students and female college students support was found for the pathway of restrained eating (Ricciardelli & McCabe, 2001; Shepherd & Ricciardelli, 1998; Stice, Nemeroff, & Shaw, 1996; Stice, Ziemba, Margolis, & Flick, 1996). One cross-sectional study did not find support for the pathway of restrained eating (van Strien, Engels, van Leeuwe, & Snoek, 2005).

For the pathway of negative affect, especially depression, support was found in longitudinal studies in samples of female high school students and female college students (Spoor et al., 2006; Stice, 2001; Stice & Agras, 1998; Stice et al., 2000; Stice et al., 2002; Stice et al., 1998). One longitudinal study did not support the pathway of negative affect (Stice, 1998). Also in cross-sectional studies in samples of female high school students and female college students support was found for the pathway of negative affect (Ricciardelli & McCabe, 2001; Shepherd & Ricciardelli, 1998; Stice et al., 2000; Stice, Nemeroff, et al., 1996; Stice, Ziemba, et al., 1996; van Strien et al., 2005).

Stice and Shaw (2002) concluded in their literature-review that there is prospective and experimental support for the assumption that perceived pressure to be thin, thin-ideal internalization and elevated body mass increase the risk for subsequent body dissatisfaction. They concluded that body dissatisfaction increases the risk for subsequent eating pathology and that dieting and negative affect mediate this relation. They also concluded that in some studies no support is found for the restraint pathway.

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van Strien et al. (2005) also tested the model in a sample of female eating disordered patients and the dual pathway model did not fit the data. van Strien et al. argue that eating in response to psychological distress may occur in some people who, as a result of learning experiences early in life, confuse emotional distress with hunger, due to lack of interoceptive awareness. This line of reasoning fits with the individual difference model of eating in response to emotional states (Greeno & Wing, 1994) which states that eating in response to negative affect is an abnormal response. See for empirical support of this individual difference model the outcome of the study of van Strien and Ouwens (2007). So, van Strien et al. also tested a second, extended model in which, in the negative affect pathway, the relation between negative affect and overeating is mediated by lack of interoceptive awareness and emotional eating. This extended model fitted the data well in the sample of female adolescents. Negative affect was strongly related to lack of interoceptive awareness, moderately to emotional eating and also directly to overeating, but lack of interoceptive awareness was not associated with emotional eating. Again no support was found for the pathway of restrained eating. In the clinical sample of female eating disordered patients this extended model did appear to fit. Restrained eating again did not relate to overeating. Negative affect related to overeating only via lack of interoceptive awareness and emotional eating. van Strien et al. argue that the difference in the fit of the models between the non-clinical adolescents and the clinical females can be a qualitative difference between the samples or can be explained by the difference in age between the samples.

Stice's model has always been tested with self-report measures for binge eating or overeating, and has never been tested with actual food intake as the outcome measure. We would like to find out if the model can be replicated with actual food intake, measured by a commonly used method in experimental research, the alleged taste-test paradigm. The present study aims to test Stice's original dual pathway model and the extended model of van Strien et al. (2005) in a sample of non-clinical female students, with actual food intake as a measure of overeating.

Method

Both the original and extended model are tested within the data of an earlier eating behavior study (Ouwens, van Strien, & van der Staak, 2003). In that study 116 female college students filled in the DEBQ, EDI-2, BDI, and participated in an alleged taste-test with savoury crackers.

Measurements

The Dutch Eating Behavior Questionnaire (DEBQ) is a self-report measure that contains scales assessing restraint, emotional and external eating (van Strien, 2002; van Strien, Frijters, Bergers, & Defares, 1986). The Eating Disorder Inventory-2, EDI-2, is a self-report measure of attitudes and behaviors concerning weight, shape and eating, as well as psychological traits clinically related to disturbed eating (Garner, 1991). The EDI-2 subscales drive for thinness, body dissatisfaction and lack of interoceptive awareness were used. Negative affect was measured with the Beck Depression Inventory (Beck, Steer, &, Brown, 2002). This is a 21-item scale that measures depressive symptoms. As a measure for overeating the amount of savoury crackers participants ate during the taste-test is used. Participants were presented three bowls of savoury crackers, were given the instruction to rate the taste and were given permission to eat as much as they liked after they finished their taste-ratings. They were left alone with the food for 15 min. This measure has been considered a measure for food intake in numerous experiments on eating behaviour.

Statistical analysis

Confirmatory factor analysis was performed by AMOS 5.0 (Arbuckle & Wothke, 1999). Fit of the factor model was judged by using the Chi-square test, the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the normed fit index (NFI) and the root mean square error of approximation (RMSEA). Following Hu and Bentler (1999) and Jaccard and Wan (1996) a model fits reasonably well if the Chi-square value does not exceed a limited multiple (3) of its degrees of freedom, GFI, AGFI and NFI are large (greater than .90) and RMSEA is small (less than .08).

Results

Descriptive analysis

The data were complete and therefore data of all 116 participants have been used in the analysis. Means and standard deviations were computed for all model variables (Table 1).

Correlations between the model variables

Body dissatisfaction and drive for thinness were highly correlated (see Table 1). These constructs were used in the structural equation modeling analysis to form the latent construct low body esteem. Most variables were highly correlated, except for emotional eating and BDI. Another exception is consumption, this variable was only significantly correlated to DEBQ emotional eating.

The original model

The original model of Stice was tested with the amount of food eaten during the taste-test as the measure for overeating. The Chi-square value was 3.11, d.f. = 3, $p < .375$. This model showed a good fit, GFI = .989, AGFI = .947, and NFI = .985 and RMSEA = .018. The model explained 10.0% of the variance in the consumption and is shown in Fig. 1. The pathway through restrained eating as well as the pathway through negative affect did not show to relate significantly to the measure of overeating.

The extended model

The extended version of the model of van Strien et al. (2005), was also tested with amount of food eaten during the taste-test as the measure for overeating. The Chi-square value was 9.51, d.f. = 7, $p < .218$. This model showed a good fit, GFI = .977, AGFI = .907, and

Table 1
Descriptive statistics of and correlations between the model variables

	1	2	3	4	5	6	7
1 DEBQ restraint							
2 DEBQ emotional eating	0.18*						
3 EDI body dissatisfaction	0.63**	0.21*					
4 EDI drive for thinness	0.76**	0.31**	0.75**				
5 EDI lack of interoceptive awareness	0.26**	0.31**	0.43**	0.41**			
6 BDI	0.23*	0.14	0.35**	0.29**	0.51**		
7 Consumption	−0.08	0.22*	−0.06	−0.04	0.02	0.04	
Mean	2.62	2.67	3.44	2.41	2.21	0.24	39.51
S.D.	0.76	0.57	1.08	1.07	0.53	0.23	20.17

* $p < 0.05$.
** $p < 0.01$.