

The Dutch Eating Behavior Questionnaire (DEBQ) for Assessment of Restrained, Emotional, and External Eating Behavior

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The development of the Dutch Eating Behaviour Questionnaire (DEBQ) with scales for restrained, emotional, and external eating is described. Factor analyses have shown that all items on restrained and external eating each have high loadings on one factor, but items on emotional eating have two dimensions, one dealing with eating in response to diffuse emotions, and the other with eating in response to clearly labelled emotions. The pattern of corrected item-total correlation coefficients and of the factors was very similar for various subsamples, which indicates a high degree of stability of dimensions on the eating behavior scales. The norms and Cronbach's alpha coefficients of the scales and also the Pearson's correlation coefficients to assess interrelationships between scales indicate that the scales have a high internal consistency and factorial validity. However, their external validity has yet to be investigated.

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According to both psychosomatic theory and externality theory, the development and maintenance of human obesity is attributed to overeating. *Psychosomatic* theory (e.g., Kaplan & Kaplan, 1957) focuses on the phenomenon of emotional eating. While a normal response to arousal states, such as, anger, fear, or anxiety, is loss of appetite (Carlson, 1916; Cannon, 1915), some individuals respond by excessive eating. Bruch (1961, 1964), the main advocate of this theory, attributes excessive eating to confusion between internal arousal states and hunger, probably because of early learning experiences. *Externality* theory concentrates on the phenomenon of "external eating" which is eating in response to food-related stimuli, regardless of the internal state of hunger or satiety (e.g., Schachter, Goldman & Gordon, 1968). Schachter and Rodin (1974) view externally regulated eating behavior as a personality disposition.

In both psychosomatic and externality theory, an individual's misperception of his internal state prior to eating is considered to be a causal factor in the development of obesity (Robbins & Fray, 1980). However, a high degree of externality or a strong tendency to emotional eating does not necessarily lead to an overweight physique. Individuals may react to being overweight by consciously restricting food intake irrespective of whether they are emotional or external eaters (Rodin, 1975; Rodin & Slochower, 1976; Rodin, 1978). Dieting can be used to correct body weight. Therefore, a high degree of emotional and external eating can be found in all weight categories, and thus not only in the "obese."

However, according to Herman, Polivy, and coworkers (e.g., Herman & Polivy, 1980) each individual has his own range of body weight, which is homeostatically regulated (Polivy & Herman, 1983). Some individuals with a weight range at a high level (a high "natural weight" range according to Polivy & Herman, 1983) are under strong social pressure to lose weight and therefore may diet, but intense dieting in these individuals may result in persistent hunger. When self-control processes which monitor dieting behavior are undermined by, for example, consumption of alcohol or high caloric food, or anxiety or depression, "counterregulation" may occur. This is the breakdown of restrictive control so that suppressed eating behavior is disinhibited, and excessive food intake occurs. A further consequence of the continuous struggle against hunger sensations may also be loss of contact with internal feelings of hunger and satiety. Thus, in this theory of Restrained Eating, both "external" and "emotional eating" are considered to be consequences of intense dieting (Herman & Mack, 1975; Herman & Polivy, 1975; Polivy & Herman, 1976a, 1976b).

All three theories, Externality theory, Psychosomatic theory, and Restrained Eating theory, have been tested in laboratory studies, but the hypotheses derived from each have not always been confirmed. The main problem in testing the Psychosomatic theory and the Externality theory is the classification of individuals in weight groups on the basis of mea-

sured body weight. As body weight can be controlled to some extent by dieting, measured body weight does not necessarily represent the body weight of an individual on the basis of his emotional or external tendency. In an endeavor to overcome this problem, Pudel, Metzдорff, and Oetting (1975) constructed the *Fragenbogen für Latente Adipositas* (FLA) to identify those individuals having obese eating patterns but being of normal body weight due to conscious restriction of food intake. This group, referred to as the "latent obese," were individuals of normal weight who had similar satiety curves as obese individuals for the consumption of liquid formula diets in the laboratory (Meyer & Pudel, 1977; Pudel, 1978). Although this questionnaire represents a major improvement, inspection of it reveals that it is a heterogeneous set of items containing questions on, for example, weight history, weight consciousness, dieting, hunger and satiety, and external eating. Principal component analysis (Varimax) of the FLA in a sample of 108 subjects has revealed no less than 10 factors when using the Eigenvalue one criterion for factor extraction.¹ Even though this multifactorial questionnaire has proved to be suitable for identification of the "latent obese," it precludes examination of the relative importance of each factor associated with overweight.

The theory of restrained eating has also been confronted with conflicting results. Findings for restrained nonobese subjects were consistent, in that after a preload, nonrestrained eaters consumed less and restrained eaters consumed more. But these results could not be replicated in studies on restrained obese subjects (e.g., Ruderman & Wilson, 1979; Ruderman & Christensen, 1983). This inconsistency in findings may result from the Restraint Scale not being a valid operationalization of the concept of restrained eating. As the FLA, the Restraint Scale used by Herman, Polivy, and co-workers also has been found to be multifactorial. In addition to the factor reflecting concern about dieting, another factor reflecting fluctuations in body weight has been distinguished (Drewnowski, Risky & Desor, 1982; Ruderman, 1983; Blanchard & Frost, 1983; Johnson, Lake & Mahan, 1983). This multifactoriality may lead to erroneous classification of the obese, especially. Even when not restricting food intake, obese individuals may obtain higher scores on the Restraint Scale, because they have greater fluctuation in body weight. Consequently, numerically equivalent scores can indicate less genuine restraint in overweight than in normal weight individuals and this may explain why results of restrained nonobese subjects could not be replicated in populations of restrained obese subjects.

It seems that the recently published (1981) Three Factor Eating Questionnaire developed by Stunkard and Messick to measure restrained eating represents a major improvement of both Herman's Restraint Scale and Pudel's FLA. However, this questionnaire was not yet available

¹Unpublished data set.

when the present study started (May, 1980). Thus, at the time of the present study, no homogeneous scale on restrained eating was available to test these theories.

Not only a scale of restrained eating but also scales for emotional eating and external eating are required to improve understanding of obese eating patterns. Therefore, the main purpose of this study was to develop a questionnaire containing three scales, the questionnaire developed is referred to as the Dutch Eating Behaviour Questionnaire (DEBQ).

PRELIMINARY STUDIES*

Aim and Method

The main aim of the preliminary studies was to select items for scales on restrained, emotional, and external eating. Questions on the three types of eating patterns were administered to populations of normal weight and overweight subjects, data were factor analyzed, and the resulting factor structure was used as the basis for revision of the questionnaire. This process was then repeated and items achieving stability were retained for the final questionnaire.

Study One

The initial item pool consisted of 100 items, derived from three existing questionnaires translated into Dutch by Frijters and Roosen:² the Eating Patterns Questionnaire (EPQ) (Wollersheim, 1970); The Fragenbogen für Latente Adipositas (FLA) (Pudel, Metzдорff & Oetting, 1975); and the Eating Behavior Inventory (EBI) (O'Neil, Currey, Hirsch, Malcolm, Sexauer, Riddle & Tailor, 1979). The EPQ was selected because, at first sight, it contains items related to emotional eating; the FLA, because it contains items related to restrained eating and external eating; and the EBI because it contains a series of statements on behavior related to the assessment of external stimulus control. Items in the EPQ and the EBI have a five-point response format (1-5), and those in the FLA a two-point response format (Yes and No).

The item pool was administered to a total of 120 subjects, 40 men and 80 women, all inhabitants of Wageningen. They were selected by their

*A more detailed description of the Preliminary Studies is given in Van Strien, T., Frijters, J.E.R., Bergers, G.P.A., and Defares, P.B., *The Dutch Eating Behaviour Questionnaire (DEBQ). Assessment of Restrained Eating, Emotional Eating and External Eating*. Internal publication, rapport nr. 0-1185, Department of Human Nutrition, Agricultural University, Wageningen, 1984.

²Frijters, J.E.R., and Roosen, R.G.F.M. Translation of three eating behavior questionnaires. Internal publication, Department of Human Nutrition, Agricultural University, Wageningen, 1980.

general practitioners so that the sample contained both normal weight and overweight subjects. The mean body mass index (BMI; weight/height²) of the men was 26.2 ($s = 5.4$) and their mean age 30.8 years ($s = 5.2$); and the mean BMI of the women was 25.2 ($s = 4.8$), and their mean age, 31.1 years ($s = 8.4$).

After eliminating those items endorsed in one direction by more than 85% of the sample, the remaining 72 items were factor analyzed using Varimax rotation. A minimum Eigenvalue of 1.0 was used for factor extraction. A large proportion of the variance (44.7%) was accounted for in the first three factors that emerged: the remaining 20 factors contained only a few items each and were uninterpretable. The first factor contained items on emotional eating; the second, items on restrained eating; and the third, items on external eating and perceived hunger.

Study Two

The results obtained in Study One were used to revise items and to develop new items. All items dealing with perceived hunger and satiety were deleted because they were considered to represent the internal component of both emotional and external eating. Since the main aim was to devise distinctive scales for emotional and external eating, only those items referring to the external as opposed to the internal component of eating behavior were included in the external eating scale.

The item pool used in Study Two consisted of 21 items on restrained eating, 15 on emotional eating, and 15 on external eating. All items had the five-point response format; never (1); seldom (2); sometimes (3); often (4); and very often (5). The 51 items were administered to a second sample consisting of two subsamples. One subsample was drawn randomly from men and women aged between 34 and 36 years living in four villages in the municipality of Ede and is referred to as the Ede Sample. The mean BMI and mean age of the 161 women in this sample were 22.9 ($s = 4.1$) and 29.9 years ($s = 4.7$) respectively, and the mean BMI and mean age of the 103 men participants were 23.6 ($s = 2.8$) and 26.8 ($s = 4.5$), respectively. Participants for the second subsample were obtained with the cooperation of dieticians who had invited their clients to complete the questionnaire on their first visit. This subsample referred to as Dietician Sample consisted of 75 women with a mean BMI of 32.8 ($s = 6.2$) and a mean age of 31.1 years ($s = 8.6$) and of 18 men with a mean BMI of 31.1 ($s = 2.9$), and a mean age of 31 ($s = 8.3$).

An orthogonal (Varimax) factor analysis was carried out for subjects of the Ede Sample. The Eigenvalue one criterion revealed an orthogonal structure of ten factors. Factor one contained items on restrained eating, factors two and three, items on emotional eating; and factors four and five, items on external eating. Together, these five factors explained 88% of the total variance. Each of the 51 items was then reviewed to ascertain

the degree of correspondence with the five factors. Twelve items were deleted which had either a low factor loading, or as decided by the investigators, an item content which did not correspond closely with the particular type of eating behavior. The reduced item pool was again subjected to an orthogonal (Varimax) factor analysis. A factor analysis was also undertaken for subjects of the Dietician Sample. In both samples, the pattern of factor loadings seemed to be very similar for items on emotional and restrained eating, but quite different for items on external eating. Also, in both samples, items on emotional eating were represented by two factors, one containing those referring to clearly labelled emotions (e.g., eating in response to anger or irritation), and the other items referring to eating in response to diffuse emotions (e.g., eating when feeling lonely, idle, or bored (items 1, 2, and 7)). Further, in both samples, items on restrained eating loaded high on one factor, although item loadings were in general higher in the Ede Sample than in the Dietician Sample. Items on external eating had high loadings on one factor in the Dietician Sample, but were spread over three factors in the Ede Sample. Evidently, eating in response to external food cues is conceived as a more homogeneous type of eating behavior by obese subjects than by normal weight subjects.

FINAL STUDY

Aim

The Final Study aimed to develop a final item pool and also to assess the dimensional stability of this item pool in subsamples of obese and nonobese subjects, and men and women, and then to replicate the factor structures obtained in the preliminary studies. Consistency of the factor structures in the various studies, and also stability of dimensions in various subsamples would warrant the construction of scales on eating behavior, and also assessment of the reliability, means, standard deviations, and intercorrelations of these scales.

Subjects and Procedure

At the time of the sixth of seven assessments of a longitudinal study being carried out in the municipality of Ede, the revised questionnaire from the preliminary Study Two was administered to 653 women and 517 men. Details of the study population and procedure have already been described elsewhere (Baecke, Burema, Frijters, Hautvast & van der Wiel-Wetzels, 1983).³

³In preparation.

Item Pool

On the basis of the results of preliminary Study Two, items were revised and new items developed. Eight items were added to the items on emotional eating, because the latter only referred to having a desire to eat when experiencing a particular emotion, and it was not clear whether they distinguished between desire for food and the act of eating.

The item pool of the final study consisted of 48 items. All items had the same response format—never (1), seldom (2), sometimes (3), often (4), and very often (5). A not relevant response category was added to all items which were cast in a conditional format. For example: Do you have a desire to eat when you feel bored or restless; when you have eaten too much, do you eat less than usual the following day; and when you have put on weight, do you eat less than usual. This was done because some subjects never experience a particular emotion, never eat too much, or never become heavier.

Results

Development of the final item pool:

Except for those items given a not relevant response, each item was subjected to an orthogonal (Varimax) factor analysis for all subjects, thus in total 616 subjects. The Eigenvalue one criterion revealed an orthogonal structure of seven factors. As in Study Two, items on emotional eating were represented by two factors, one containing items referring to clearly labelled emotions, and the other to items referring to diffuse emotions. In addition, those items referring to the act of eating were found to have high loadings on the same factors as those items referring to the desire to eat. Thus, it may be tentatively concluded, that the two domains of items refer to the same concept. All items on restrained eating loaded on one factor and three of these items had high loadings on a separate factor. Items on external eating loaded on two factors.

Further inspection of the factor loadings and the items content, led to seven items being deleted from the item pool on restrained eating and external eating. All eight items on actual emotional eating were deleted, because they were found to load on the same factors as the original items on emotional eating and therefore were considered to refer to the same type of eating behavior as the original items. In addition, when scale scores were obtained the “actual emotional eating scale” correlated highly with the three other scales on emotional eating in all populations ($r = .80$).

Factor structures of subsamples and total sample of the final item pool:

All 33 items in the final item pool were subjected to various orthogonal (Varimax) factor analyses for subsamples from the longitudinal study as described in the final study. The Eigenvalue one criterion revealed five

factors for both the obese (men: BMI ≥ 27 ; women: BMI ≥ 26 ; in analysis $n = 91$), and nonobese subjects (men: BMI < 27 ; women: BMI < 26 ; in the analysis: $n = 566$). In both subsamples, all items on restrained eating had high loadings on one factor. In both subsamples, all items on restrained eating had high loadings on one factor. As previously, items on emotional eating had high loadings on two factors, one containing the four items on diffuse emotions, and the other the remaining items on clearly labelled emotions. Items on external eating had high loadings on two factors.

Three- and four-factor solutions were also carried out for the subsamples of obese and nonobese subjects. The four-factor solution appeared to be the best interpretable solution in both subsamples and was very similar to the five factor "Eigenvalue one" solution for items on restrained eating and emotional eating, but most items on external eating loaded on one instead of two factors. At face value, the four-factor solution seemed to be similar for both obese and nonobese subjects.

To substantiate this, the goodness of fit of results of the factor-analysis for both subsamples was assessed by an orthogonal congruence rotation towards the best least-squares fit (ROTA 01; Borgers & Roskam, 1967; Roskam & Borgers, 1969). In the first solution, the correlation matrix of obese subjects was rotated to the criterion factor pattern of the normal weight subjects. This result was checked in the second solution, in which the correlation matrix of the normal weight subjects was rotated to the criterion factor pattern of the obese subjects. Table 1 shows that the percent lost variance, the total stress, and the stress values of the individual factors is low in both solutions, which is an indication of a close similarity of factor structures of obese and normal weight subjects.

In orthogonal (Varimax) four-factor solutions obtained for the subsamples of men (in analysis: $n = 237$) and women (in analysis: $n = 348$), all

Table 1. Values of total stress, percent lost variance and stress values of individual factors when the correlation matrices of obese individuals and women respectively are rotated to the criterion factor patterns of normal weight and men respectively (first solution) and also those obtained when the correlation matrices of the normal weight and men respectively are rotated to the criterion factor pattern of obese and women respectively (second solution).

	Total stress	Percent lost variance	Stress values of individual factors			
			Restrained eating	Emotional eating clearly labelled	External eating	Emotional eating diffuse
Obese and non-obese subjects						
First solution	0.0315	0.0346	0.0281	0.0185	0.0378	0.0377
Second solution	0.0246	0.0326	0.0148	0.0156	0.0267	0.0352
Men and women						
First solution	0.0319	0.0677	0.0234	0.0201	0.0358	0.0430
Second solution	0.0307	0.0677	0.0279	0.0172	0.0352	0.0382

items on restrained eating and external eating also had high loadings on one factor, and items on emotional eating had loadings on two factors. At face value, the four-factor solution was very similar for men and women. Again, the goodness of fit for the results of the factor analysis was assessed by a least-squares orthogonal rotation. In the first solution, the correlation matrix of the women was rotated to the criterion factor pattern of the men. In the second solution, the correlation matrix of the men was rotated to the criterion factor pattern of the women. As can also be inferred from Table 1, the percent lost variance, the total stress value, and the stress values of the individual factors were in both solutions very low, which is an indication for a close similarity of factor structures of men and women.

As the structure for the subsamples is similar, the results of factor analysis of the Varimax four-factor solution are reported for the sample of all subjects combined (in analysis, $n = 657$). Table 2 shows that all items have loadings above 0.45 on the appropriate factor.

Construction of the Final Scales

Both Study Two and the Final Study have shown that emotional eating comprised two dimensions, one dealing with eating in response to diffuse emotions and the other with eating in response to clearly labelled emotions. Therefore, separate scales were constructed for each dimension containing four and nine items, respectively, and also an additional scale combining the two dimensions containing all 13 items. The final scales on Restrained eating and External eating contained ten items each. Scores on each of the five scales, were obtained by dividing the sum of items scored by the total number of items on that scale.

Statistics and Subscale Correlations

Means, standard deviations (*sd*), standard error (*se*), and maximum and minimum value for each scale are presented separately for the samples of all subjects combined, the subsamples of obese and nonobese subjects; men and women; obese men and women; and nonobese men and women (Table 3).

Subscale correlations for the various subsamples of subjects of the Final Study are presented in Table 4. All correlation coefficients were significant, only the Pearson correlation coefficient assessing the relationship between Restrained eating and External eating was much lower.

Reliability

Table 5 contains the item-total correlation coefficients for each of the items of the five scales, in the sample of all subjects combined, and the subsamples of obese and nonobese subjects, and of men and women.

Table 2. Varimax Rotated Factor Matrix (four factor solution) on the 33 items in the Dutch Eating Behaviour Questionnaire for the sample of all subjects combined (in analysis $n = 657$)**.

		Eigenvalue PCT or Var Cum PCT	Factor 1 10.847 459.7 59.7	Factor 2 4.447 24.5 84.1	Factor 3 2.078 11.4 95.6	Factor 4 0.803 4.4 100.0
R	1. If you have put on weight, do you eat less than you usually do?*	R 1	<u>0.795</u>	0.042	0.118	0.075
	2. Do you try to eat less at mealtimes than you would like to eat?	2	<u>0.710</u>	0.210	0.124	0.086
	3. How often do you refuse food or drink offered because you are concerned about your weight?	3	<u>0.809</u>	0.118	0.001	0.058
	4. Do you watch exactly what you eat?	4	<u>0.741</u>	0.142	0.024	0.006
	5. Do you deliberately eat foods that are slimming?	5	<u>0.752</u>	0.198	0.002	0.068
	6. When you have eaten too much, do you eat less than usual the following days?*	6	<u>0.711</u>	0.105	0.170	0.044
	7. Do you deliberately eat less in order not to become heavier?	7	<u>0.895</u>	0.113	0.025	0.031
	8. How often do you try not to eat between meals because you are watching your weight?	8	<u>0.823</u>	0.172	0.094	0.083
	9. How often in the evening do you try not to eat because you are watching your weight?	9	<u>0.823</u>	0.215	0.099	0.091
	10. Do you take into account your weight with what you eat?	10	<u>0.883</u>	0.145	0.010	0.055
E	11. Do you have the desire to eat when you are irritated?*	E 1	0.233	<u>0.628</u>	0.172	0.275
	12. Do you have a desire to eat when you have nothing to do?*	2	0.140	0.332	0.385	<u>0.559</u>
	13. Do you have a desire to eat when you are depressed or discouraged?*	3	0.252	<u>0.711</u>	0.185	0.220
	14. Do you have a desire to eat when you are feeling lonely?*	4	0.151	<u>0.467</u>	0.255	0.588
	15. Do you have a desire to eat when somebody lets you down?*	5	0.217	<u>0.682</u>	0.118	<u>0.340</u>
	16. Do you have a desire to eat when you are cross?*	6	0.161	<u>0.736</u>	0.166	0.174
	17. Do you have a desire to eat when you are approaching something unpleasant to happen?	7	0.090	<u>0.775</u>	0.218	0.103
	18. Do you get the desire to eat when you are anxious, worried or tense?	8	0.121	<u>0.791</u>	0.14g	0.050
	19. Do you have a desire to eat when things are going against you or when things have gone wrong?	9	0.146	<u>0.821</u>	0.197	0.003
	20. Do you have a desire to eat when you are frightened?*	10	0.132	<u>0.736</u>	0.147	0.026
	21. Do you have a desire to eat when you are disappointed?*	11	0.210	<u>0.800</u>	0.142	0.142
	22. Do you have a desire to eat when you are emotionally upset?*	12	0.095	<u>0.677</u>	0.239	0.127
	23. Do you have a desire to eat when you are bored or restless?*	13	0.142	<u>0.563</u>	0.241	<u>0.482</u>
Ext.	24. If food tastes good to you, do you eat more than usual?	Ext. 1	0.039	0.077	<u>0.575</u>	0.087
	25. If food smells and looks good, do you eat more than usual?	2	0.087	0.144	<u>0.599</u>	0.021
	26. If you see or smell something delicious, do you have a desire to eat it?	3	0.118	0.073	<u>0.583</u>	0.088

Table 2. (cont.)

	Eigenvalue PCT or Var Cum PCT	Factor 1 10.847 59.7	Factor 2 4.447 24.5 84.1	Factor 3 2.078 11.4 95.6	Factor 4 0.803 4.4 100.0
27. If you have something delicious to eat, do you eat it straight away?	4	0.054	0.131	<u>0.451</u>	0.034
28. If you walk past the baker do you have the desire to buy something delicious?	5	0.114	0.185	<u>0.465</u>	0.143
29. If you walk past a snackbar or a cafe, do you have the desire to buy something delicious?	6	0.059	0.004	<u>0.516</u>	0.057
30. If you see others eating, do you also have the desire to eat?	7	0.126	0.151	<u>0.551</u>	0.163
31. Can you resist eating delicious foods?***	8	0.015	0.164	<u>0.516</u>	0.210
32. Do you eat more than usual, when you see others eating?	9	0.177	0.255	<u>0.468</u>	0.069
33. When preparing a meal are you inclined to eat something?	10	0.040	0.168	<u>0.496</u>	0.000

R = Restrained Eating

E = Emotional Eating

Ext = External Eating

* Items with a non-relevant response category in addition to the categories never (1), seldom (2), sometimes (3), often (4), and very often (5).

** Dutch version of the scales may be obtained from the first author.

*** For this item scoring has to be reversed.

Cronbach's alpha coefficients for each of these populations, and also for obese men and women, and nonobese men and women reflected adequate internal consistency in all subsamples (Table 3). The item-total correlation coefficients were high in all five scales and in all subsamples. In addition, the item uniformity was very high for all groups of subjects.

SUMMARY AND DISCUSSION

In the Dutch Eating Behaviour Questionnaire (DEBQ) constructed, emotional eating was shown to comprise two dimensions, one dealing with eating in response to diffuse emotions and the other with eating in response to clearly labelled emotions. The three scales in the questionnaire (Restrained eating, Emotional eating, and External eating) have a high internal consistency and also a high factorial validity. The similarity of the pattern of corrected item-total correlation coefficients and of the factor pattern in all subsamples also indicates a high dimensional stability of the eating behavior scales.

In recent studies reported by Stunkard and Messick (1981, 1985), also three eating behavior dimensions were obtained, i.e., (1) "cognitive restraint of eating," (2) "disinhibition" and (3) "hunger." Our Restrained Eating Scale is highly similar to the Stunkard and Messick Cognitive Restraint factor. This is not surprising, because both had items from Pudel's Fragenbogen für Latente Adipositas (Pudel *et al.*, 1975) in the initial item-

Table 3. Statistics and Cronbach's alpha coefficients of the scales for Restrained Eating, Emotional Eating (the three versions), and External Eating as obtained in the samples of all subjects combined and the subsamples of obese and non-obese subjects; men and women; obese men and women; and non-obese men and women.

	All subjects				Cronbach's alpha			
	<i>n</i>	mean	sd	se	range			
Restrained Eating	1169	2.21	0.92	.03	1 - 5	.95		
Emotional Eating (13-items)	1051	1.92	0.68	.02	1 - 4.7	.94		
Emotional Eating (9-items)	1131	1.76	0.68	.02	1 - 4.7	.93		
Emotional Eating (4 items)	763	2.28	0.82	.03	1 - 4.8	.86		
External Eating	1163	2.66	0.54	.02	1.2-4.8	.80		
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	obese				non-obese			
	<i>n</i>	mean	sd	se	range	*	<i>n</i>	Cronbach's alpha
Restrained Eating	114	2.66	.86	.07	1 - 4.7	.94	996	.95
Emotional Eating (13-items)	131	2.11	.73	.06	1 - 4.2	.95	920	.94
Emotional Eating (9-items)	137	1.97	.76	.07	1 - 4.4	.93	994	.93
Emotional Eating (4 items)	99	2.42	.85	.09	1 - 4.5	.85	664	.86
External Eating	143	2.71	.58	.05	1.6-4.8	.83	1020	.80
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	men				women			
	<i>n</i>	mean	sd	se	range	*	<i>n</i>	Cronbach's alpha
Restrained Eating	498	1.84	.77	.03	1 - 4.4	.93	642	.95
Emotional Eating (13-items)	449	1.72	.57	.03	1 - 3.5	.92	602	.95
Emotional Eating (9 items)	494	1.58	.57	.03	1 - 3.6	.91	637	.93
Emotional Eating (4 items)	323	2.01	.70	.04	1 - 4.0	.82	440	.86
External Eating	513	2.64	.53	.02	1.2-4.5	.80	650	.81

	obese men				*	non-obese men				Cronbach's alpha			
	n	mean	sd	se		n	mean	sd	se	range	se	range	
Restrained Eating	71	2.35	.83	.10	.93	427	1.76	.72	.04	1 -4.4		1 -4.4	.92
Emotional Eating (13-items)	65	1.90	.60	.08	.93	384	1.69	.56	.03	1 -3.4		1 -3.4	.92
Emotional Eating (9-items)	67	1.79	.62	.08	.90	427	1.55	.56	.03	1 -3.2		1 -3.2	.91
Emotional Eating (4-items)	50	2.16	.51	.06	.82	273	1.99	.69	.04	1 -4.0		1 -4.0	.82
External Eating	71	2.73	.56	.07	.82	442	2.63	.53	.03	1.2-4.2		1.2-4.2	.79
	obese women				*	non-obese women				Cronbach's alpha			
	n	mean	sd	se		n	mean	sd	se	range	se	range	
Restrained Eating	73	2.97	.77	.09	.93	569	2.43	.09	.04	1 -5		1 -5	.95
Emotional Eating (13-items)	66	2.31	.79	.10	.95	536	2.03	.70	.03	1 -4.7		1 -4.7	.95
Emotional Eating (9-items)	70	2.14	.85	.10	.95	567	1.86	.71	.03	1 -4.7		1 -4.7	.93
Emotional Eating (9-items)	49	2.69	.88	.13	.85	391	2.46	.83	.04	1 -4.8		1 -4.8	.86
External Eating	72	2.69	.60	.07	.85	578	2.68	.54	.02	1.2-4.2		1.2-4.2	.81

*Cronbach's alpha

Table 4. Pearson correlation coefficients assessing the relationship between the various eating behaviour scales for all subjects combined, obese (), non-obese, [], men, and women []

	Restrained Eating	Emotional Eating13	Emotional Eating9	Emotional Eating4	External Eating
Restrained Eating	1.00	0.37(.32) [.36] {.25} [.33]	.34(.31) [.33] {.23} [.31]	.35 (.33) [.35] {.25} [.30]	.16 (.18) [.16] {.18} [.18]
Emotional Eating (13 items)		1.00	.97 (.97) [.97] {.96} [.97]	.89 (.89) [.88] {.87} [.88]	.48 (.54) [.47] {.50} [.50]
Emotional Eating (9 items)			1.00	.75 (.76) [.74] {.70} [.75]	.44 (.52) [.42] {.46} [.46]
Emotional Eating (4 items)				1.00	.49 (.51) [.48] {.50} [.50]
External Eating					1.00

Table 5. Corrected item-total correlation coefficients of the items of the scales for Restrained Eating, Emotional Eating (the three versions), and External Eating.

	all subjects	obese	non-obese	men	women
Restrained Eating	n = 978	n = 140	n = 838	n = 562	n = 562
1. When you have put on weight, do you eat less than you usually do?	0.77	.73	.76	.73	.74
2. Do you try to eat less at mealtimes than you would like to eat?	0.72	.72	.71	.66	.71
3. How often do you refuse food or drink offered because you are concerned about your weight?	0.78	.77	.78	.71	.78
4. Do you watch exactly what you eat?	0.74	.76	.73	.67	.72
5. Do you deliberately eat foods that are slimming?	0.74	.75	.74	.66	.73
6. When you have eaten too much, do you eat less than usual the following day?	0.68	.68	.68	.55	.74
7. Do you deliberately eat less in order not to become heavier?	0.87	.82	.88	.85	.87
8. How often do you try not to eat between meals because you are watching your weight?	0.82	.78	.82	.77	.81
9. How often in the evenings do you try not to eat because you are watching your weight?	0.81	.77	.81	.76	.79
10. Do you take into account your weight with what you eat?	0.86	.84	.86	.82	.86
Emotional Eating (13-item version)	n = 729	n = 92	n = 637	n = 303	n = 426
11. Do you have the desire to eat when you are irritated?	0.73	.67	.74	.62	.75
12. Do you have a desire to eat when you have nothing to do?	0.57	.54	.58	.54	.56
13. Do you have a desire to eat when you are depressed or discouraged?	0.79	.81	.79	.72	.80
14. Do you have a desire to eat when you are feeling lonely?	0.67	.69	.67	.61	.68
15. Do you have a desire to eat when somebody lets you down?	0.78	.79	.77	.68	.79
16. Do you have a desire to eat you are cross?	0.77	.70	.78	.70	.79

Table 5. (cont.)

	all subjects	obese	non- obese	men	women
17. Do you have a desire to eat when you are approaching something unpleasant to happen?	0.71	.76	.70	.65	.74
18. Do you get the desire to eat when you are anxious, worried or tense?	0.74	.80	.73	.75	.74
19. Do you have a desire to eat when things are going against you or when things have gone wrong?	0.79	.80	.79	.73	.81
20. Do you have a desire to eat when you are frightened?	0.72	.74	.71	.65	.74
21. Do you have a desire to eat when you are disappointed?	0.81	.82	.81	.74	.83
22. Do you have a desire to eat when you are emotionally upset?	0.71	.74	.71	.70	.72
23. Do you have a desire to eat when you are bored or restless?	0.72	.75	.72	.71	.70
Emotional Eating (9-item version: clearly labeled emotions)	n = 1012	n = 120	n = 892	n = 417	n = 595
24. Do you have a desire to eat when you are irritated?	0.70	.68	.70	.59	.72
25. Do you have a desire to eat when you are depressed or discouraged?	0.76	.74	.76	.70	.76
26. Do you have a desire to eat when you are cross?	0.75	.72	.75	.70	.75
27. Do you have a desire to eat when you are approaching something unpleasant to happen?	0.74	.76	.73	.66	.76
28. Do you get the desire to eat when you are anxious, worried or tense?	0.76	.78	.76	.77	.76
29. Do you have a desire to eat when things are going against you or when things have gone wrong?	0.81	.80	.81	.76	.83
30. Do you have a desire to eat when you are frightened?	0.72	.77	.71	.67	.74
31. Do you have a desire to eat when you are disappointed?	0.81	.83	.80	.77	.81

Table 5. (cont.)

	all subjects	obese	non-obese	men	women
32. Do you have a desire to eat when you are emotionally upset?	0.69	.74	.68	.68	.68
Emotional Eating (4-item-version: diffuse emotions)	n = 763	n = 99	n = 664	n = 323	n = 440
33. Do you have a desire to eat when you have nothing to do?	0.67	.64	.68	.63	.68
34. Do you have a desire to eat when you are feeling lonely?	0.75	.73	.75	.71	.75
35. Do you have a desire to eat when somebody lets you down?	0.65	.69	.64	.60	.65
36. Do you have a desire to eat when you are bored or restless?	0.75	.72	.75	.69	.75
External Eating	n = 1163	n = 143	n = 1020	n = 513	n = 650
37. If food tastes good to you, do you eat more than usual?	0.49	.56	.48	.53	.49
38. If food smells and looks good, do you eat more than usual?	0.53	.58	.53	.50	.57
39. If you see or smell something delicious, do you have a desire to eat it?	0.53	.55	.53	.52	.54
40. If you have something delicious to eat, do you eat it straight away?	0.42	.41	.42	.37	.47
41. If you walk past the baker do you have the desire to buy something delicious?	0.47	.52	.46	.46	.49
42. If you walk past a snack-bar or a cafe, do you have the desire to buy something delicious?	0.45	.50	.44	.49	.42
43. If you see others eating, do you also have the desire to eat?	0.54	.61	.52	.52	.55
44. Can you resist eating delicious foods?	0.49	.46	.50	.46	.52
45. Do you eat more than usual, when you see others eating?	0.46	.56	.45	.46	.48
46. When preparing a meal are you inclined to eat something?	0.43	.47	.43	.44	.43

pool. The precise relation between the Stunkard and Messick Disinhibition and Hunger scales and our Emotional eating and External eating scales remains to be assessed, however.

The two dimensionality of items on emotional eating is in accordance with the observation of Slochower (1983) that various types of emotional states produce different types of eating response: only diffuse emotional states trigger the overeating response, and clearly labelled emotions do not affect eating behavior. However, there are indications that obese individuals perceive those emotions which are clearly labelled in most normal weight individuals as diffuse. In a pilot study, Slochower (1983) found that overweight subjects had more difficulty than normal weight subjects in describing or labelling emotional experiences. The present data may be considered to substantiate this finding on the basis of the following line of thought. Although the factor structures of the items on emotional eating were very similar in all subsamples of obese and normal weight subjects, in that these items were divided into two dimensions in both the samples, *post hoc* inspection of the item loadings showed that the difference between these two dimensions was less distinct in the obese subsamples. In the obese, three of the four items dealing with the diffuse emotions seemed to have higher loadings on the dimension dealing with clearly labelled emotions, indicating that these emotions are also experienced as diffuse by the obese.

To investigate this in future studies, three scales for emotional eating have been constructed: one is a two-dimensional scale recommended for general assessment; and two are homogeneous scales dealing separately with "clearly labelled" and "diffuse" emotions to be used for more specific hypotheses.

The positive relationship between the Emotional eating scales and the External eating scale is in line with the theory that emotionality and food cues can operate together to elicit eating behavior: a state of high uncontrollable anxiety may enhance the reactions of the overweight to external cues (Slochower, 1983). However, the same observations can also be explained in terms of Externality theory, in which a high degree of emotionality is considered to be a manifestation of the general trait of externality, postulated as being characteristic of obese individuals (Schachter & Rodin, 1974).

The significant relationship between the Emotional eating scales and the Restrained eating scale may be due to the side effects of intense dieting, which generate stress, and may result in emotional instability and hyperemotionality (Hibbscher & Herman, 1977; Herman, Polivy, Pliner, Threlkeld & Munic, 1978; Polivy, Herman & Warsch, 1978).

However, the observed relationship between emotional eating and restrained eating in this longitudinal study should be interpreted with caution, because in two earlier cross-sectional studies no relationship was

found between these two types of eating behavior (Van Strien, Frijters, Roosen, Knuiman-Hijl & Defares, *in press*).⁴ Although as yet there is no clear explanation for this discrepancy, it may be explained by response sets which may have been more prevalent in the longitudinal study due to prolonged contact with the investigators (Van Strien, 1984).

Close agreement of responses to items on the emotional eating and external eating scales is probably less socially desirable for obese than for normal-weight individuals. But, in contrast, the reverse is probably the case for close agreement of responses to items on the restrained eating scale. This can be derived from the fact that scores on the Herman and Polivy Restraint Scale were found by Ruderman (1983) to be negatively related to scores on the Eysenck Lie scale in the normal weight but, in the obese, no relationship was found between these two scales. This suggests that obese individuals consider endorsement of restraint scores not to be negative, which is consistent with the observation in this study, that the obese had significantly higher scores on restrained eating than normal weight subjects. In contrast, however, Johnson, Lake, and Mahan (1983) found significant negative relationships between restrained eating and the MMPI Lie scale, and the Crowne and Marlowe Social Desirability scale in a sample of obese dieters, and no such relationship in samples of normal weight and obese nondieters.

In a mixed sample of obese and normal weight subjects (Van Strien, Frijters, Roosen, Knuiman-Hijl & Defares, *in press*), a significant negative relationship was found between the Dutch version of the Crowne and Marlowe Social Desirability scale and a short version of the present Emotional eating scale, but no relationships were found between social desirability and earlier versions of the present scales for restrained eating and external eating. No data were available on the relationships between social desirability and the present eating behavior scales in subsamples of obese and normal weight subjects.

The extent to which social desirability tendencies affect scores on the eating behavior scales, and the consequence for construct validity is not known and the degree of external validity of the eating behavior scales has yet to be investigated. Nevertheless, the three eating behavior scales, constructed in this study, permit exploration of the validity of the main theories on the development and maintenance of human obesity.

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⁴Van Strien, T. Weight-related susceptibility to demand characteristics in a longitudinal study on eating behavior. Internal publication, Department of Human Nutrition, Agricultural University, Wageningen, 1984.

REFERENCES

- Baecke, J. A. H., Burema, J., Frijters, J. E.R., Hautvast, J. G. A. J., and van der Wiel-Wetzels, W. A. M. (1983). Obesity in young Dutch adults I, sociodemographic variables and body mass index. *International Journal of Obesity*, 7, 1-12.
- Blanchard, F. A., and Frost, R. O. (1983). Two factors of restraint: concern for dieting and weight fluctuation. *Behavior Research and Therapy*, 21, 259-267.
- Borgers, H., and Roskam, E. *Factor rotation to criterion pattern (ROTA 01)*, A program developed at the Department of Mathematical and Statistical Psychology, Nijmegen, University Nijmegen, 1967.
- Bruch, H. (1961). Psychological aspects in overeating and obesity. *Psychosomatics*, 5, 269-274.
- Cannon, W. B. (1915). *Bodily Changes in Pain, Hunger, Fear and Rage* (2 nd ed.) New York: Appleton.
- Carlson, A. J. (1916). *The Control of Hunger in Health and Disease*. Chicago: University of Chicago Press.
- Drewnowski, A., Risky, D., and Desor, J. A. (1982). Feeling fat yet unconcerned: Self-reported overweight and the restraint scale. *Appetite*, 3, 273-279.
- Herman, C. P., and Mack, D. (1975). Restrained and unrestrained eating. *Journal of Personality*, 43, 647-660.
- Herman, C. P., and Polivy, J. (1975). Anxiety, restraint and eating behavior. *Journal of Abnormal Psychology*, 84, 666-672.
- Herman, C. P., and Polivy, J. (1980). Restrained eating in: Stunkard, A. J. (Ed.): *Obesity*. Philadelphia, London, Toronto: Saunders, 208-225.
- Herman, C. P., Polivy, J., Pliner, P., Threlkeld, J., and Munic, D. (1978). Distractability in dieters and nondieters. An alternative view of "externality." *Journal of Personality and Social Psychology*, 36, 536-548.
- Hibsch, J., and Herman, C. P. (1977). Obesity, dieting and the expression of "obese" characteristics. *Journal of Comparative and Physiological Psychology*, 91, 374-380.
- Johnson, W. G., Lake, L., and Mahan, M. (1983). Restrained Eating: Measuring an elusive construct. *Addictive Behaviors*, 8, 413-418.
- Kaplan, H. I., and Kaplan, H. S. (1957). The psychosomatic concept of obesity. *Journal of Nervous and Mental Disease*, 125, 181-201.
- Meyer, J. E., and Pudel, V. (1977). Experimental feeding in man. A behavioral approach to obesity. *Psychosomatic Medicine*, 39, 153-157.
- O'Neil, P. H., Currey, H. S., Hirsch, A. A., Malcolm, R. J., Sexauer, J. D., Riddle, F. E., and Taylor, C. I. (1979). Development and validation of the eating behavior inventory. *Journal of Behavioral Assessment*, 1, 123-132.
- Polivy, J., and Herman, C. P. (1976a). The effects of alcohol on eating behavior: Disinhibition or sedation? *Addictive Behaviors*, 1, 121-126.
- Polivy, J., and Herman, C. P. (1976b). Clinical depression and weight change: A complex relation. *Journal of Abnormal Psychology*, 85, 338-340.
- Polivy, J., and Herman, C. P. (1983). *Breaking the Diet Habit: The Natural Weight Alternative*, Basic Books, New York.
- Polivy, J., Herman, C. P., and Warsh, S. (1978). Internal and external components of emotionality in restrained and unrestrained eaters. *Journal of Abnormal Psychology*, 87, 497-504.
- Pudel, V., Metzendorff, M., and Oetting, M. (1975). Zur Persönlichkeit Adipöser in psychologischen Tests unter Berücksichtigung latent Fettsüchtiger, *Zeitschrift für Psychosomatische Medizin und Psychoanalyse*, 21, 345-361.
- Pudel, V. (1978). *Zur Psychogenese und Therapie der Adipositas*. Berlin: Springer-Verlag.
- Robbins, T. W., and Fray, P. J. (1980). Stress-induced eating. Fact, fiction or misunderstanding. *Appetite* 1, 103-133.
- Rodin, J. (1975). Causes and consequences of time perception differences in overweight and normal weight people. *Journal of Personality and Social Psychology*, 31, 898-904.
- Rodin, J., and Slochower, J. (1976). Externality in the non-obese: The effects of environmental responsiveness on weight. *Journal of Personality and Social Psychology*, 33, 338-344.

- Rodin, J. (1978). Has the distinction between internal versus external control of feeding outlived its usefulness? In: Bray, G. A. *Recent advances in obesity Research: II*, Proceedings of the 2nd International Congress on Obesity, London: John Libbey, 75-85.
- Roskam, E., and Borgers, H. (1969). *Programma-Bulletin o. 14: ROTA 01, ROTA 03*, publications of the Department of Mathematical and Statistical Psychology, University Nijmegen, Nijmegen.
- Ruderman, A. J., and Wilson, G. T. (1979). Weight, restraint, cognitions and counterregulation. *Behavior Research and Therapy*, 17, 581-590.
- Ruderman, A. J., and Christensen, H. (1983). Restraint theory and its applicability to overweight individuals. *Journal of Abnormal Psychology*, 92, 210-215.
- Ruderman, A. J. (1983). The restraint scale: A psychometric investigation. *Behavior Research and Therapy*, 21, 253-258.
- Schachter, S., Goldman, R., and Gordon, A. (1968). Effects of fear, food deprivation and obesity on eating. *Journal of Personality and Social Psychology*, 10, 91-97.
- Schachter, S., and Rodin, J. (Ed.). (1974). *Obese Humans and Rats*, Washington, D.C.: Erlbaum/Wiley.
- Slochow, J. A. (1983). *Excessive Eating*. New York: Human Sciences Press, Inc.
- Stunkard, A. J. (1981). "Restrained Eating": What it is and a new scale to measure it. In: L. A. Cioffi (Ed.). *The Bodyweight Regulatory System: Normal and Disturbed Mechanisms*. New York: Raven Press, 243-251.
- Stunkard, A. J., and Messick, S. (1985). The Three-Factor Eating Questionnaire to measure Dietary Restraint, Disinhibition and Hunger. *Journal of Psychosomatic Research*, 29, 71-81.
- Van Strien, T., Frijters, J. E. R., Roosen, R. G. F. M., Knuiman-Hijl, W. J. H., and Defares, P. B. Eating behaviour, personality traits and body mass in women. *Addictive Behaviors*, in press.
- Van Strien, T. (1984). De dunne huid van dikke mensen. Verwachtingskenmerken bij onderzoek naar overgewicht. *De Psycholoog*, 19, 157-166.
- Wollersheim, J. P. (1970). Effectiveness of group therapy based upon learning principles in the treatment of overweight women. *Journal of Abnormal Psychology*, 76, 462-474.