The Predictive Validity of the Dutch Restrained Eating Scale

Tatjana van Strien, M.Sc.
Jan E. R. Frijters, Ph.D.
Wija A. van Staveren, M.Sc.
Peter B. Defares, Ph.D.
Paul Deurenberg, Ph.D.

The present study aims to determine the predictive validity of the 10-item Dutch Restrained Eating Scale. The ultimate criterion of restrained eating is the degree to which an individual eats less than he or she actually would like to eat. Since a study on both actual food consumption and restriction of food intake is very complicated, if not impossible, the difference between actual and desired intake of energy was studied indirectly, that is, from estimates of deviations from the required energy intake. The relationships were studied between restrained eating scores and the magnitude of the deviation from energy requirement, and between restrained eating scores and intake of fat and sugar, because restriction in intake of these may also reflect dietary restraint. About 20% of the variance of scores on the Restrained Eating Scale could be explained from these measures of food intake, which suggests that the Dutch Restrained Eating Scale has moderate to good predictive validity.

Herman and Polivy constructed a Restraint Scale (e.g., Herman, Polivy, Pliner, Threlkeld, & Munic, 1978), which in our view has two
main problems. Firstly, the scale does not seem to be unidimensional, and secondly, it probably does not measure cognitive control of food intake.

Drewnowski, Riskey, and Desor (1982) and Blanchard and Frost (1983) have shown that this scale measures two underlying factors that reflect fluctuations in body weight and concern about dieting, respectively. Lowe (1984) found a third factor containing items on splurging and thoughts about food. In separate analyses of data from normal weight and overweight subjects, Ruderman (1983) obtained the same two-dimensional solution in the normal weight as in the studies mentioned previously, but a four-dimensional solution in the obese. The first factor in this four-dimensional solution reflects weight fluctuation, the second, bingeing, the third, a tendency to diet, and the fourth, overconcern with dieting. Finally, Johnson, Lake, and Mahan (1983) found three factors within the Restraint Scale in groups of obese dieters, obese nondieters, and normal weight subjects. The first factor was heterogeneous in content, and the second and third factors referred to preoccupations with eating and weight fluctuations, respectively.

The fact that the Restraint Scale can be reduced to at least the two factors, fluctuations in body weight and actual concern with dieting, may have the consequence that individuals score high on the Restraint Scale simply on the basis of large weight fluctuations in the past, without currently watching their weight or consciously restraining their eating.

Other indications have been found that the Restraint Scale may not measure cognitive restriction of food intake. Wardle (1980) found no relationship between the Restraint Scale and the intake of energy. In addition, both Wardle (1980) and Hawkins and Clement (1980) found a close relationship between the Restraint Scale and measures of binge eating. These observations suggest that the Restraint Scale does not predict the degree of restriction of food intake, but disinhibition of restraint to some degree. It may be argued that this observation is in line with that of Herman and Polivy (1980), that the essential feature of Restrained Eating theory is not the relationship between the Restraint Scale and food intake, but the inability to maintain cognitive control over food intake (i.e., susceptibility to disinhibition). According to this interpretation, intense dieting results in counterregulatory eating behavior or excessive food intake when self-control is undermined by disinhibitors, such as alcohol, anxiety, or depression (Herman & Mack, 1975; Herman & Polivy, 1975; Polivy & Herman, 1976a,b). However, more recently counterregulatory eating behavior has been shown to be not necessarily the consequence of dieting per se (Stunkard & Messick, 1985). This finding was obtained with a questionnaire to assess restrained eating, the Three Factor Eating Questionnaire (TFEQ), which measures separately cognitive restraint of food intake (Factor I), disin-
hribution of cognitive restraint (Factor II), and hunger (Factor III). Results of a laboratory study on food intake, obtained by Shrager, Wadden, Miller, Stunkard, and Stellar (1983) showed that Factor II, not Factor I, was closely associated with overeating. The significance of these findings becomes clear from the fact that the correlation between the Herman and Polivy Restraint Scale and the restraint subscale of scores on the TFEQ (Factor I) were not statistically significant \( r = .168 \), whereas the correlation between scores on this scale and the disinhibition subscale (Factor II) of the TFEQ were highly significant \( r = .840 \) (Stunkard & Messick, 1985; Weissenburger, Rush, Giles, & Stunkard, submitted). Thus, it can be tentatively concluded that the counterregulatory eating behavior of the Herman and Polivy “restrained eaters” is related to disinhibition of restraint and not to restraint per se, and also that the Restraint Scale is not a measure of restriction of food intake but of disinhibition of cognitive restraint.

**PURPOSE OF THE PRESENT STUDY**

The Stunkard and Messick scale with three dimensions of restrained eating is a major improvement but was not available when the present study was initiated. Hence, the Dutch Eating Behaviour Questionnaire (DEBQ) with scales on emotional eating, external eating, and restrained eating was developed independently (Van Strien, Frijters, Bergers, & Defares, in press). The focus of the present study is the Restrained Eating Scale of the DEBQ. This scale has been shown to have high internal consistency and factor validity (Van Strien et al., in press). However, the decisive factor determining its usefulness is its degree of predictive validity. Since the scale is very similar to the cognitive restraint subscale (Factor I) of the Stunkard and Messick TFEQ (Van Strien et al., in press), it has a high predictive validity if it predicts adequately the restriction of food intake. However, in general, the determination of the relationship between a score on a particular restrained eating scale and food intake (Wardle, 1980) does not seem to be the best way to establish the predictive validity of the scale. In our view, a restrained eating scale is only valid if a score reflects the degree to which an individual eats less than he or she actually would like to eat, because eating less than desired is the very nature of restrained eating behavior. The absolute intake of energy does not measure the degree to which an individual eats less than desired. However, it is very complicated, if not impossible, to conduct an eating behavior study to investigate simultaneously the actual food consumption and the restriction of food intake. This results from the practical difficulty of determining the quantity of energy, or food, not eaten by the individual but which the individual would have eaten without cognitive
One derivative, and therefore an indirect way to assess the difference between actual intake of energy and desired intake of energy, is as follows. The energy required by an individual depends largely on body weight, body composition, and physical activity. In most people, physical activity does not influence to a large extent the energy required, and also the energy required for activities depends on body weight. From this postulate it follows that under the stated conditions the necessity to eat a certain quantity of food is mainly controlled by the individual's body weight. Heavy individuals need more energy than lean individuals in order to maintain a constant body weight and to be able to perform the same physical activity. Therefore when an individual is in energy balance, the energy requirement is an indirect estimate of the energy content of the food desired. Thus, if this assumption is correct, the difference between energy requirement estimated from body weight and activity pattern, and energy intake as assessed in a food consumption study can be taken as an indirect measure of the degree of restraint. If the Dutch Restrained Eating Scale has a high predictive validity, there should be a high correlation between the scores on the scale and the estimated deviation in energy required. If this is correct, then a high negative correlation may also be expected between scores on the scale and intake of fat and sugars (mono- and disaccharides), because these energy sources are perceived as being fattening by many dieters.

**METHOD**

**Overview**

Estimates of values of actual intake of energy, fat, and sugar were obtained from those participating in an ongoing study on seasonal variations in energy intake in women (Van Staveren, Deurenberg, Bur- ema, De Groot, & Hautvast, submitted). From this study, three 24-hour food intake recalls taken at three-month intervals were undertaken to assess various measures of energy. The DEBQ was administered to the subjects during the second assessment date.

These data were examined to determine whether there were relationships between restrained eating scores and the magnitude of the deviation from the energy requirement, and also between restrained scores and the intake of fat and sugar (mono- and disaccharides).

**Subjects and Procedure**

Three 24-hour food recalls were obtained for 110 women participating in a longitudinal study on seasonal variation in energy intake car-
ried out in Renkum, The Netherlands. All women were in the age group 31–34 years as of 1 January 1983. No one was on a diet prescribed by a doctor or was pregnant. At June 1983, the mean body mass index (BMI; weight/height$^2$) was 22.3 kg/m$^2$ ($s = 2.7$). The 24-hour food recalls had been obtained on different days in the months of April, June, and September 1983 by trained dieticians on unannounced home visits. To ensure that the records were as accurate as possible, they weighed the portions of food most frequently consumed (other portions were estimated in terms of household measures), and the reported food intake of the previous day was recorded. The following day, after rising and urinating, the women themselves measured their body weight on calibrated scales to the nearest 0.5 kg.$^1$ On the first visit, body height was measured by the dietician to the nearest 0.1 cm. On the home visit in June, the Restrained Eating Scale was administered by the dieticians.

**Measures**

**Restrained Eating Scale**

The Restrained Eating Scale consists of 10 items having a Likert response format: never, seldom, sometimes, often, and very often. Two items (see Table 1) have an additional category, "not relevant," to indicate that a respondent has never eaten too much, or never gained weight in adult life. A score for this scale is obtained by dividing the sum of item scores by the total number of items; thus, a high score indicates a high degree of restrained eating. Those ($n = 6$) who gave a not relevant response were excluded from analysis. Table 1 shows the items and their item-rest correlation coefficients of the Dutch Restrained Eating Scale.

**Conversion into Nutrients**

Intake of daily energy, fat, and sugar (mono- and disaccharides) was calculated by multiplying the estimated amounts of foods consumed by the appropriate values obtained from a computerized food composition table (Hautvast, 1975).

**Mean One-day Intake**

For each subject, the mean one-day intake of energy and nutrients was obtained from the mean intake of energy and nutrient intake of the three 24-hour recall periods.

**Deviation from the Required Energy Intake**

A total of 2200 Kcal is the average daily requirement for women in the age group 20–35 years and of 60 kg body weight having moderately
Table 1. Ten-item Dutch Restrained Eating Scale (with five-point response category) and item-rest correlation coefficients for the whole sample$^a$ for subsamples.$^b$

<table>
<thead>
<tr>
<th>Item</th>
<th>All Subjects ($n = 978$)</th>
<th>Obese ($n = 140$)</th>
<th>Nonobese ($n = 838$)</th>
<th>Men ($n = 416$)</th>
<th>Women ($n = 562$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When you have put on weight, do you eat less than you usually do?</td>
<td>.77</td>
<td>.73</td>
<td>.76</td>
<td>.73</td>
<td>.74</td>
</tr>
<tr>
<td>2. Do you try to eat less at meal times than you would like to eat?</td>
<td>.72</td>
<td>.72</td>
<td>.71</td>
<td>.66</td>
<td>.71</td>
</tr>
<tr>
<td>3. How often do you refuse food or drink offered because you are concerned about your weight?</td>
<td>.78</td>
<td>.77</td>
<td>.78</td>
<td>.71</td>
<td>.78</td>
</tr>
<tr>
<td>4. Do you watch exactly what you eat?</td>
<td>.74</td>
<td>.76</td>
<td>.73</td>
<td>.67</td>
<td>.72</td>
</tr>
<tr>
<td>5. Do you deliberately eat foods that are slimming?</td>
<td>.74</td>
<td>.75</td>
<td>.74</td>
<td>.66</td>
<td>.73</td>
</tr>
<tr>
<td>6. When you have eaten too much, do you eat less than usual the following day?</td>
<td>.68</td>
<td>.68</td>
<td>.68</td>
<td>.55</td>
<td>.74</td>
</tr>
<tr>
<td>7. Do you deliberately eat less in order not to become heavier?</td>
<td>.87</td>
<td>.82</td>
<td>.88</td>
<td>.85</td>
<td>.87</td>
</tr>
<tr>
<td>8. How often do you try not to eat between meals because you are watching your weight?</td>
<td>.82</td>
<td>.78</td>
<td>.82</td>
<td>.77</td>
<td>.81</td>
</tr>
<tr>
<td>9. How often in the evenings do you try not to eat because you are watching your weight?</td>
<td>.81</td>
<td>.77</td>
<td>.81</td>
<td>.76</td>
<td>.79</td>
</tr>
<tr>
<td>10. Do you take into account your weight with what you eat?</td>
<td>.86</td>
<td>.84</td>
<td>.86</td>
<td>.82</td>
<td>.86</td>
</tr>
</tbody>
</table>

$^a$Obtained from a longitudinal study on the overweight.
$^b$Dutch version of the scale may be obtained from the first author.
$^c$Not relevant response category included.

strenuous habitual activity levels (Committee on Caloric Requirements, 1950).$^2$ Correction for body weight was made by either decreasing or increasing the required 2200 Kcal by 150 Kcal for every 5 kg below or above 60 kg, respectively (Dutch Expert Committee on Energy and Nutrient Requirements, 1983). Deviation of an individual's mean one-day caloric intake from the required caloric intake was obtained as follows:

$$\text{Caloric intake} \frac{n \text{ days}}{n} = \left[ \frac{2200 \text{ Kcal}}{n} \right] - \left( \frac{60 \text{ kg} - \text{body weight}}{5} \times 150 \text{ Kcal} \right)$$
RESULTS

The mean score on the Restrained Eating Scale was 2.52 (s = .89). This value is similar to that found in an earlier study (Van Strien et al., in press). The mean deviation of energy intake from energy requirement was \(-278\) Kcal (s = 641). From the negative sign of this value it can be concluded that the mean intake of energy was less than the calculated mean energy requirement. The mean intake of fat and sugar was 85 g (s = 28) and 114 g (s = 39), respectively.

The correlation coefficient showing the relationship between restrained eating and deviation of energy intake from energy requirement was \(-.37\) (p < .01). After correction for attenuation, this correlation increased to \(-.45\). This means that a subject ate less than required the higher she scored on the Restrained Eating Scale. The correlation coefficient between restrained eating and intake of fat was \(-.28\) (p < .01), and this correlation increased to \(-.38\) after correction for attenuation. The correlation between restrained eating and intake of sugar was \(-.38\) (p < .01), and this correlation increased to \(-.46\) after correction for attenuation. Thus, all correlations between restraint scores and the measures of food intake were significant and in the direction predicted.

CONCLUSION

About 20% of the variance in the scores on the Dutch Restrained Eating Scale was explained by most measures of food intake. These results should be considered from the perspective that the present measures may be contaminated by a number of unwanted sources of errors. Firstly, the measures of food intake are only estimates of the actual food intake (Block, 1982). Secondly, the derived estimate of the stability of the mean over-three-day food intake may not have been the best possible. Thirdly, the estimate of the required intake of energy is only an approximation of the actual energy requirement, which for an individual could be biased by many factors. Finally, the deviation from energy requirement is only a derivative of the discrepancy between an individual's actual food intake and his or her desired food intake.

Another source of error may be that food intakes assessed in the months of April and September may not have been accurate estimates of the degree of restrained eating assessed in the month of June. An individual's degree of restriction of food intake may have changed in the period between April and June or between June and September. It would have been preferable to have obtained all food recalls within a time span close to the assessment of restrained eating.

Taking these factors into consideration, it can be concluded that the
results of the present study suggest that the Dutch Restrained Eating Scale has moderate to good predictive validity but that the effects of possible sources of error should be investigated further.

We thank our subjects for their invaluable cooperation, the dieticians N. van Kaathoven, I. Merckx, and S. Westenbrink for conducting the interviews, and G. P. A. Bergers for his assistance with the analysis. This work was supported by a grant from the Praeventiefonds, Franckenstraat 3, 2582 SC 's-Gravenhage, The Netherlands.

NOTES

1. Weight was reported by the women themselves because it was not possible for the dieticians to measure the women's body weight without clothes, before breakfast, and with empty bladder. Although relying on self-reporting may have introduced a degree of unreliability to weight measurements, a recent study by Stunkard and Albaum (1981) suggests that this error may have been minimal.

2. These conditions hold for the group under study (Van Staveren et al., submitted).

3. Correction for attenuation was obtained by application of the equation

\[ r_{\text{corr.att.}} = \frac{r_{xy}}{\sqrt{r_{\text{rel.x}} \cdot r_{3s}}} \]

in which,

- \( r_{xy} \) = the correlation coefficient between the Restrained Eating Scale and a measure of food intake
- \( r_{\text{rel.x}} \) = the reliability coefficient of the Restrained Eating Scale (.94)
- \( r_{3s} \) = the reliability coefficient of a measure for food intake (deviation from required intake = .73; intake of fat = .58; intake of sugar = .72)

The reliability coefficient of a measure for food intake \( (r_{3s}) \) was obtained by application of the Spearman-Brown equation as follows:

\[ r_{3s} = \frac{3(r_s)}{1 + 2r_s} \]

in which

- \( r_s \) = the stability coefficient for one-day intake
- \( r_{3s} \) = the stability coefficient for the mean over-three-days food intake.

The stability coefficient for one-day intake \( (r_s) \) was obtained as follows:

\[ r_s = \sqrt{\frac{r_{1.2}^2 + r_{1.3}^2 + r_{2.3}^2}{3}} \]

in which

- \( r_s \) = the stability coefficient for one-day's intake
- \( r_{1.2} \) = the correlation coefficient between the quantity consumed on day 1 and on day 2
- \( r_{1.3} \) = the correlation coefficient between the quantity consumed on day 1 and on day 3
- \( r_{2.3} \) = the correlation coefficient between the quantity consumed on day 2 and on day 3
REFERENCES


Committee on Caloric Requirements (1950). *Caloric Requirements*, FAO Nutritional Studies No. 5, June.


