

## **PSYCHOMETRIC QUALITY OF THE DUTCH VERSION OF THE CHILDREN'S EATING ATTITUDE TEST IN A COMMUNITY SAMPLE AND A SAMPLE OF OVERWEIGHT YOUNGSTERS**

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*Introduction.* Disturbed eating attitudes may be important precursors of pathological eating patterns and, therefore need to be researched adequately. The Children's Eating Attitude Test (ChEAT) is indicated for detecting at-risk attitudes and concerns in youngsters.

*Method.* The present study was designed to provide a preliminary psychometric evaluation of the Dutch version of the ChEAT, by examining reliability and validity in a sample of 166 youngsters.

*Results.* Generally the ChEAT seems to be a reliable instrument. Concurrent validity was demonstrated by positive correlations with measures assessing pathological eating behaviour and with related psychological problems. The discriminant validity was good. Based on ChEAT scores we can distinguish overweight youngsters from the community sample and "dieters" from "non dieters". Divergent validity and factor structure show still shortcomings.

*Discussion.* The Dutch version of the ChEAT seems to be a promising screening- and research instrument. Future prospective research could focus on a cut-off score for identifying at-risk youngsters.

### **Introduction**

Negative attitudes about weight, shape and eating are highly prevalent among overweight youngsters (Decaluwé & Braet, 2003). Such negative attitudes include expressing fears of eating too much and becoming fat, thinking about the calorie content of food, feeling guilty when eating, having concerns about their body image, and being unhappy with their weight (Boschi, Siervo, D'Orsi, Margiotta, Trapanese, Basile et al., 2003; Burgic-Radmanovic, Gavric, & Strkic, 2008; Gardner, Sorter, & Friedman, 1997; Guarino, Pellai, Bassoli, Cozzi, Di Sanzo, Campra et al., 2005; Roguin Maor, Sayag, Dahan, & Hermoni, 2006; Vander Wal & Thelen, 2000). However also normal weight adolescents find themselves too fat and worry about their eating pattern (Burgic-Radmanovic et al., 2008; Guarino et al., 2005; Roguin Maor et al., 2006). Even among elementary school children being thin is equal to being successful and positive attitudes towards dieting as

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well as negative attitudes towards one's body and the wish to be thinner are widespread (Flannery-Schroeder & Chrisler, 1996; Ricciardelli & McCabe, 2001; Schur, Sanders, & Steiner, 2000; Thelen, Lawrence, & Powell, 1992).

An attitude is someone's positive or negative evaluation of a certain object or behaviour and refers to someone's believe in the possible personal consequences of this behaviour (Meertens, Schaalma, Brug, & de Vries, 2007). According to the Theory of Planned Behaviour (TPB, Ajzen, 1988; 1991) attitudes play a crucial role in predicting intentional behaviour (Meertens et al., 2007). As predicted by TPB, disturbed eating and body attitudes could be early signs of later maladaptive eating- and weight related problem behaviour (Haines & Neumark-Sztainer, 2006; Neumark-Sztainer, Wall, Haines, Story, Sherwood, & van den Berg, 2007; Spremo, Loga, Burgic, & Licanin, 2008). Dieting is assumed to function as the first link in the eating disorder chain. Dieting neglects the biological processes needed to survive and causes hunger, which is hard to resist for a long time. Research indicated that dieting can collapse under certain conditions (e.g., after alcohol consumption or bad feelings or cognitive constraints) and induces overeating, which transforms into weight, shape and eating concerns and related subclinical symptoms of ED. Then, it fuels a new chain of dieting and ends in a fully developed eating disorder, such as *bulimia nervosa* or, in some cases *anorexia nervosa* (Fitzgibbon, Sánchez-Johnsen, & Martinovich, 2003; Roguin Maor et al., 2006). It must however be acknowledged that, although weight and shape concerns are extremely prevalent and commonly lead to dieting, only a minority of dieters go on to develop eating disorders (Gowers & Shore, 2001).

As such, eating- and weight related attitudes can be considered as risk factors, initiating the selection of at-risk youngsters to prevent eating- and weight disorders (Smolak & Levine, 1994b). Given the fact that disturbed eating attitudes are prevalent in both groups of overweight children and in the general population, a good screening of maladaptive attitudes seems necessary if we want to study its potential impact on later behaviour (Fitzgibbon et al., 2003; Roguin Maor et al., 2006).

Research on eating pathology among children and adolescents is affected by several challenges. The golden standard for discovering eating pathologies among children is the Children's Eating Disorder Examination (ChEDE; Bryant-Waugh, Cooper, Taylor, & Lask, 1996; Decaluwé & Braet, 1999), a semi-structured interview (Decaluwé & Braet, 2003). Clinical interviews allow a thorough explanation of important concepts, thereby ensuring the researcher that the child or adolescent understands the meaning of the concept being questioned. Because the interview method is time-consuming, expensive and requires a lot of expertise from the interviewer, large scale studies mostly administer self-report questionnaires. It has also been argued that paper-pencil assessment methods may sometimes provide more valid

data compared to clinical interviews, in particular with regard to assessment of shameful or secretive behaviours, because of its anonymous character (Fairburn & Beglin, 1994). On the other hand, the specific behaviours and emotions associated with eating and weight disorders are often difficult to identify by measures of self-report questionnaires. Moreover, the evolving cognitive development of children may cause more distortions in the test results. Therefore, the quality of the available self-report instruments for measuring eating pathology in children and adolescents needs to be evaluated carefully.

Until now, only a few Dutch self-report instruments are eligible for measuring eating pathology in children: the Children's Eating Disorder Questionnaire-Dutch version (ChEDE-Q), the Eating Disorder Inventory-Dutch version (EDI-II-NL) and the Dutch Eating Behaviour Questionnaire (DEBQ). The Dutch version of the ChEDE-Q (Decaluwé, Braet, & Goossens, 1999) can be used for children from 8 to 14 years old and focuses on dieting, concerns about food, weight and body shape during the past 28 days. The Dutch version of the EDI-II (Schoemaker, Van Strien, & Van der Staak, 1994; Van Strien 2002) examines eating disorder related symptomatology among children from 12 years. It has good psychometric properties and Dutch norm tables are available but it is not suitable as a diagnostic instrument. The DEBQ (Van Strien, Frijters, Bergers, & Defares, 1986) is a 33-item questionnaire to assess three separate aspects of eating behaviour: restrained eating, emotional and external eating. It is appropriate for children from the age of 8 and has good psychometric properties (Braet, Moens, Mels, Goossens, & Van Vlierberghe, 2007; Braet, Claus, Goossens, Moens, Soetens, & Van Vlierberghe, 2008). Although these research instruments were evaluated well, they mainly focus on pathological eating behaviour, related characteristics and related cognitions but not specific on eating attitudes (Cash & Deagle, 1997).

To the best of our knowledge there is only one questionnaire that focuses on attitudes and we will study here its potential value. The Children's Eating Attitude Test (ChEAT; Maloney, McGuire, & Daniels, 1988) for children and adolescents until 15 years old is of particular value for discovering maladaptive eating attitudes which may be risk variables for pathological eating behaviours (Smolak & Levine, 1994a). A psychometric evaluation of the English version of the ChEAT provides satisfying results (Kelly, Ricciardelli, & Clarke, 1999; Ranzenhofer, Tanofsky-Kraff, Menzie, Gustafson, Rutledge, Keil et. al, 2008; Smolak & Levine, 1994a).

The present study was designed to provide preliminary psychometric information about the Dutch version of the ChEAT (Braet, Soetens, & Theuwis, 2006) by examining its reliability and validity. We aimed to test and replicate the findings on both the internal reliability and its test-retest

reliability. Next, we will examine the factor structure, concurrent validity and discriminant validity. To examine the concurrent validity, we selected three well-validated measures: the DEBQ, the EDI and the ChEDE-Q. We hypothesise to find positive associations with most subscales. Furthermore, if the ChEAT is indeed measuring maladaptive attitudes in an at-risk group, we also hypothesise to find a positive association with measures of psychological problems, like depressive symptoms and low self-esteem. Next, we will evaluate the discriminant value by comparing the ChEAT-total scores of two at risk subsamples with controls. Based on the TPB, we hypothesise that youngsters with disturbed eating behaviour (dieters, overweight youngsters) also have disturbed eating attitudes. As such we expect higher ChEAT-total scores in a group of overweight youngsters compared with a matched control group and in dieters, compared with non-dieters. Our goal is to identify the translated ChEAT as a valid and reliable measure instrument for the screening of maladaptive eating attitudes. A positive evaluation could enhance the study on screening and prospectively following at-risk samples of children and adolescents.

## Methods

### *Subjects*

Hundred and sixty-six children and adolescents voluntary participated in this preliminary study. Of these, 65 were overweight youngsters between 8 and 15 years old ( $M = 10.92$ ;  $SD = 2.14$ ) who presented themselves for outpatient treatment at the Ghent University Children's Clinic. This group consists of 41 girls (63.1%) and 24 boys (36.9%) with a mean BMI of 29.09 ( $SD = 8.05$ ) whereby 33% of the youngsters are under 12 years and 67% are older.

At admission, the adjusted BMI for all children (Actual BMI/Percentile 50 of BMI for age and gender  $\times 100$ ) was calculated. Children's overweight status (defined as adjusted BMI between 120% - 140%) or obese status (defined as adjusted BMI  $> 140\%$ ) was identified in relation to a European body mass norm group in 0-21 year olds (Frederiks, van Buuren, Wit, & Verloove-Vanhorick, 2000). In the overweight group there was a mean adjusted BMI of 166.88% ( $SD = 40.70$ ). The control group ( $n = 101$ ;  $M = 11.90$ ;  $SD = 1.87$ ) consists of 33 children from primary school between 8 and 12 years (32.7%) and 68 adolescents from secondary school between 12 and 15 years (67.3%) of which 62 are female (61.4%) and 39 are male (38.6%). The overweight and control group were similar in age and gender.

## *Measures*

### Children's Eating Attitude Test

Children's Eating Attitude Test (ChEAT; Maloney et al., 1988; Dutch version by Braet et al., 2006). The ChEAT is a simplification in the language of the 26-item form of the Eating Attitude Test (EAT; Garner & Garfinkel, 1979). The ChEAT is designed to measure a wide range of eating attitudes among children until 15 years old. It assesses eating attitudes like feelings of guilt and loss of control, attitudes towards dieting and eating-related cognitive aspects (Childress, Jarell, & Brewerton, 1993). These cognitive aspects include concerns about eating, weight and figure and food preoccupation (Ranzenhofer et al., 2008; Sancho, Asorey, Arija, & Canals, 2005; Smolak & Levine, 1994a). Each item is rated on a Likert-scale from 1 (always) to 6 (never). For each question the most symptomatic response is recoded to a score of 3, the next most symptomatic 2, and the next 1. The remaining three choices receive a score of 0. Thus, the total ChEAT score can range from 0 to 78. Examinations of the psychometric quality of the ChEAT in previous studies indicate all a good internal consistency with Cronbach's  $\alpha$  between .71 and .87 (Maloney et al., 1988; Sancho et al., 2005; Smolak & Levine, 1994a) and a satisfying to good test-retest reliability, with correlations between .56 en .81 (Maloney et al., 1988; Sancho et al., 2005). A good concurrent validity has been demonstrated by positive correlations with weight management efforts ( $r = .36, p < .001$ ) and body dissatisfaction ( $r = .39, p < .001$ ) (Smolak & Levine, 1994a) and by negative correlations with subscales of the Body Areas Satisfaction Scale (BASS) that measures the satisfaction with different parts of the body (Cash, 1997; Sancho et al., 2005). Five separate studies of school-aged children have performed exploratory factor analysis, each of which reported the emergence of four factors (Ambrosi-Randic & Pokrajac-Bulian, 2005; Kelly et al., 1999; Ranzenhofer et al., 2008; Sancho et al., 2005; Smolak & Levine, 1994a). Despite variation in factor labels, emergent subscales on each of these factor analyses reflect similar groupings of ChEAT items. A commonality among previous factor analyses is the emergence of factors related to (1) dieting attitudes, (2) food preoccupation, (3) eating and body/weight concerns and (4) feelings of social pressure to eat (Ranzenhofer et al., 2008). To identify disturbed versus normal eaters, the ChEAT was not sufficiently sensitive but yet very specific. The test was good at discarding an eating disorder when it was not present in the subject (few false-negatives) but it was not good as a screening instrument for detecting an eating disorder. Until now, the ChEAT identifies incorrectly too much cases with a diagnose of an eating disorder (false-positives) (Sancho et al., 2005).

### Dutch Eating Behaviour Questionnaire

Dutch Eating Behaviour Questionnaire (DEBQ; original version Van Strien et al., 1986; 2005). The child version of the DEBQ was developed by Braet et al. (2006, unpublished manuscript) for children from the age of 8 years and is also useful in obese populations. This 33-item scale is rated on a 5-point Likert-scale. It has 3 subscales which in the present study has the following alpha values: restrained ( $\alpha = .92$ ), emotional ( $\alpha = .91$ ) and external eating ( $\alpha = .79$ ). Studies on the DEBQ-parent version (Braet et al., 2007; Braet & Van Strien, 1997; Halvarsson & Sjoden, 1998) and child version (Braet et al., 2008; Braet et al., 2007; Caccialanza, Nicholls, Cena, Maccarini, Rezzani, Antonioli et al., 2004; Ricciardelli & McCabe, 2001) revealed a stable factor structure, satisfying internal consistency and external validity.

### Eating Disorder Inventory

Eating Disorder Inventory – Dutch Version (EDI-II-NL; Garner, 1991; Dutch version by Schoemaker et al., 1994; Van Strien, 2002). This 91-item scale is developed for children from the age of 12 years old and questions eating disorder related symptomatology. It contains 11 subscales and includes Dutch norms. Alpha values in the present studies are: drive for thinness ( $\alpha = .78$ ), bulimia ( $\alpha = .90$ ), body dissatisfaction ( $\alpha = .93$ ), ineffectiveness ( $\alpha = .85$ ), perfectionism ( $\alpha = .70$ ), interpersonal distrust ( $\alpha = .73$ ), interoceptive awareness ( $\alpha = .77$ ), maturity fears ( $\alpha = .68$ ), asceticism ( $\alpha = .98$ ), impulse regulation ( $\alpha = .99$ ), social insecurity ( $\alpha = 0.98$ ).

### Children's Eating Disorder Examination-Questionnaire

Children's Eating Disorder Examination-Questionnaire (ChEDE-Q; Decaluwé et al., 1999). The ChEDE-Q, is the child version of the EDE-Q (Fairburn & Beglin, 1994), – adapted in phrasing, not in content – for children from 8 to 14 years. This 30-item scale examines the past 28 days and has 4 subscales with in the present study the following alpha values: dieting ( $\alpha = .80$ ), concerns about food ( $\alpha = .71$ ), concerns about weight ( $\alpha = .86$ ) and concerns about shape ( $\alpha = .93$ ).

### Children's Depression Inventory

Children's Depression Inventory (CDI; Kovacs, 1992; Dutch version by Braet & Timbremont, 2002). This self-report test helps to assess cognitive, affective and behavioural symptoms of depression in children and adolescents from 7 to 17 years old. The 27 items are rated on a 3-point Likert-scale. The CDI reaches good levels of internal consistency, test-retest reliability, predictive validity, and concurrent validity (Braet & Timbremont, 2002). In this study internal consistency for the CDI has been demonstrated with a Cronbach's alpha value of .88 for the overall measure.

### Child Behaviour Checklist

Child Behaviour Checklist (CBCL) – parent version (Achenbach, 1966; Verhulst, Koot, Akkerhuis, & Veerman, 1990; Dutch translation by Achenbach & Rescorla, 2001). The CBCL records the behavioural problems and competencies of children, as reported by their parents. The instrument has 118 items and provides three broad band scores of which the alpha values in this study are .96 for the total score, .92 for internalising and .90 for externalising behaviours score.

### Self Perception Profile for Adolescents

Self Perception Profile for Adolescents (SPPA; Harter, 1988; Dutch version by Treffers, Goedhart, Veerman, Van den Bergh, Ackaert, & de Rijke, 2002) can be used with youngsters from the age of 12. This 35-item questionnaire measures the different aspects of the self-esteem and compares this competence estimation with those of young people from the same age. The alpha values of the 7 subscales in this study are: scholastic competence ( $\alpha = .52$ ), social acceptance ( $\alpha = .52$ ), athletic competence ( $\alpha = .65$ ), physical appearance ( $\alpha = .71$ ), close friendship ( $\alpha = .75$ ), behaviour conduct ( $\alpha = .44$ ) and global measure of self-worth ( $\alpha = .60$ ). In this study we used this questionnaire also with people under the age of 12.

### Procedure

We first selected an overweight group to participate. All youngsters enrolled in the outpatient treatment program between January 2007 and January 2008, at the Ghent university hospital who were between 8 and 15 years of age, with a normal intelligence and following regular education, were eligible for the study. All treatment seeking participants completed all questionnaires prior to initiation of the treatment.

The control group was selected according to the following matching rules: youngsters (girls: 63%) were between 8 and 12 years (33%) or 12 and 15 years (66%). One primary and two secondary schools were contacted and all agreed to take part in this study on eating attitudes. School sampling was further based on grade and type of curriculum (general, technical and vocational education), so the sample contains consequently youngsters from the three educational levels: general school ( $n = 30$ , 29.7%), technical school ( $n = 29$ , 28.7%) and vocational training school ( $n = 9$ , 8.9%). The cooperation of the schools in the present study resulted in a total sample of 101 youngsters, diverse regarding age, gender and SES. Parents and youngsters were informed about the objectives and the procedure of the study.

Sixty-eight participants, diverse regarding age, gender and SES, were

asked to fill in the ChEAT a second time after two weeks. Of this sample 63 youngsters responded on our request.

### *Statistical analysis*

#### Reliability

To examine the test-retest reliability of the ChEAT, Pearson correlation coefficient between the two measurements, with an interval of two weeks, was calculated to assess agreement between the two intervals. Intern consistency was tested by calculating Cronbach's alpha. Adequate intern consistency was defined here for alpha values  $> .60$ .

#### Validity

To determine the factor structure of the ChEAT, all 26 items were subjected to a principal component analysis with a varimax rotation. We used a factor loading cutoff of  $.40$ , consistent with previous studies (Kelly et al., 1999; Ranzenhofer et al., 2008). Concurrent validity was examined by conducting correlations with the DEBQ, EDI-II-NL, ChEDE-Q, CBCL, CDI and the SPPA. We expect positive correlations with total score and all the subscales of the DEBQ (Fairburn & Harrison, 2003; Smolak & Levine, 1994a), with total score and following subscales of the EDI-II-NL 'Drive to thinness'; 'Bulimia'; 'Body dissatisfaction'; 'Ineffectiveness'; 'Perfectionism' and 'Social Insecurity' (Bardone-Cone, Wonderlich, Frost, Bulik, Mitchell, Uppala et al., 2007; Fairburn & Harrison, 2003; Maloney et al., 1988; Smolak & Levine, 1994a; Steinhausen, Gavez, & Metzke, 2005), with total score and all the subscales of the ChEDE-Q (Fairburn & Harrison, 2003; Smolak & Levine, 1994a; Ranzenhofer et al., 2008), with total score and scores for externalising and internalising of the CBCL (Ranzenhofer et al., 2008) and negative correlations with the following subscales of the SPPA 'Social acceptance'; 'Physical appearance'; and 'global self-worth' (Cash, 1997; Fairburn & Harrison, 2003; Puhl & Brownell, 2001; Sancho et al., 2005).

Next, two independent t-tests were conducted. First, to examine whether there were differences in ChEAT-total scores between the overweight sample and the matched control group. Second, to examine whether there were differences in ChEAT-total scores between a group "Dieters" and a group "Non-dieters", based on a median split on the DEBQ-Dietary Restraint subscale (Oliver & Huon, 2001).



## Results

### *Reliability research*

#### Test-retest reliability

The test-retest reliability (Pearson correlation) for the Dutch version of the ChEAT was .72 ( $n = 63$ ,  $p < .01$ , one-tailed). Examining subgroups reveals significant correlations for boys ( $r = .84$ ,  $n = 26$ ,  $p < .01$ , one-tailed), girls ( $r = .64$ ,  $n = 37$ ,  $p < .01$ , one-tailed), secondary school ( $r = .75$ ,  $n = 32$ ,  $p < .01$ , one-tailed) and primary school ( $r = .74$ ,  $n = 31$ ,  $p < .01$ , one-tailed).

#### Internal reliability

Across the entire sample ( $N = 166$ ), Cronbach's alpha was .85 for the ChEAT. Although inspection of the correlations between each item and the ChEAT- total score did not indicate any negative correlations, the correlations with item 19 and 25 were lower than .30. When these two items with low item-total correlations were deleted (ChEAT-24), Cronbach's alpha was .88. Cronbach's alpha with only item 19 deleted (ChEAT-25), as recommended by Maloney et al. (1988), was .87. For the boys Cronbach's alpha varied between .87 and .90 for the different versions of the ChEAT (24, 25, 26). For the girls Cronbach's alpha varied between .84 and .87. For the primary school children Cronbach's alpha varied between .86 and .89 and for the secondary school youngsters between .82 and .86. For the overweight youngsters Cronbach's alpha varied between .80 and .81. When calculating Cronbach's alpha for the community sample, item 9 "vomiting" was deleted because of its zero variance. Cronbach's alpha in this subsample varied between .66 and .75. Although ChEAT 24 and 25 showed a slightly better internal reliability, because of comparison purpose we decided to select the ChEAT 26 to conduct further analyses.

### *Validity research*

#### Factor structure

Principal component analysis with varimax rotation on the ChEAT yielded seven factors with eigenvalues greater than 1.0 (Kaiser criterion). These seven factors accounted for 69.07% of the variance in item responses with Eigenvalues of respectively 7.84, 3.05, 1.87, 1.55, 1.39, 1.16 and 1.05. Due to the complexity of the result, we conducted a second principal component analysis with varimax rotation analog to previous research (Ambrosi-Randic & Pokrajac-Bulian, 2005; Kelly et al., 1999; Ranzenhofer et al., 2008; Sancho et al., 2005; Smolak & Levine, 1994a), whereby four factors were being extracted. Table 1 shows the factor loading for the four forced factor solution,

which accounted for 55.01% of the variance. An individual item was retained if it loaded at or above the .40 criterion on a single factor (Kelly et. al, 1999; Ranzenhofer et. al, 2008).

Table 1  
*Rotated component matrix for a forced 4-component solution*

	Factor 1	Factor 2	Factor 3	Factor 4
Item 16 "Stay away from sugar"	.792			
Item 7 "Stay away from carbohydrates"	.758			
Item 8 "Others would like me to eat more"	.746			
Item 9 "Vomiting"	.740			
Item 20 "Others pressure me to eat"	.734			
Item 18 "Food controls my life"	.700			
Item 26 "Have urge to vomit"	.592			
Item 13 "Others think I'm too thin"	.564			
Item 22 "Uncomfortable after sweets"	.563			
Item 21 "Spending too much time thinking about food"	<b>.553</b>			.467
Item 24 "Liking stomach to be empty"	<b>.540</b>		.482	
Item 17 "Eating diet products"	<b>.537</b>		.481	
Item 10 "Feel guilty after eating"	.516			
Item 11 "Wanting to be thinner"		.889		
Item 14 "Thinking about having fat on my body"		.858		
Item 1 "Scared about overweight"		.855		
Item 12 "Exercise to burn energy"		.685		
Item 2 "Stay away from eating when being hungry"			.762	
Item 23 "Have been dieting"			.625	
Item 6 "Aware of calorie content"			.593	
Item 3 "Think about food a lot"				.640
Item 4 "Binge eating"				.578
Item 15 "Take longer to eat"				.510
Item 19 "Control myself with food"				-.499
Item 5 "Cut food in little pieces"				
Item 25 "Enjoy trying new food"				
	23,07%	13,40%	9,70%	8,85%

Extraction method: Principal Component Analysis with varimax rotation, converted in 8 iterations

The first factor, labelled as "Dieting attitudes and feelings of social pressure to eat", accounts for 23.07% of the variance. Thirteen items loaded on this factor (items 7, 8, 9, 10, 13, 16, 17, 18, 20, 21, 22, 24, and 26). This factor describes dieting attitudes ("Stay away from sugar", "Stay away from carbohydrates", "Eating diet foods", "Vomiting") and a perceived pressure from others to eat and gain weight ("Other people think I'm too thin", "I feel others would like me to eat more", "I feel others pressure me to eat").

The second factor, labelled as "Concerns about weight and body shape", accounts for 13.40% of the variance and contains 4 items (item 1, 11, 12

and 14). This factor is related to the fear about the possibility of getting fat (“Scared about being overweight”, “Wanting to be thinner”, “Thinking a lot about having fat on my body”).

The third factor, labelled as “Eating concerns”, accounts for 9.70% of the variance. This factor contains 5 items (item 2, 6, 17, 23 and 24) and is related to restricting food (“Stay away from eating when being hungry”, “Aware of calorie content”, “Have been dieting” and “Like stomach empty”).

The fourth factor, labelled as “Food preoccupation and keeping control”, accounts for 8.85% of the variance. This factor contains 5 items (item 3, 4, 15, 19 and 21) and describes the obsession about food (“Thinking about food a lot”) and the amount of experienced control on food (“Have gone on binges”, “Control myself with food”).

Although this four factor solution provides a more clear representation of different eating attitudes and weight related cognitions, further analyses will be solely based on the total score of the ChEAT, mainly due to the inconsistencies on the factor structure of the ChEAT, and the pilot-character of this study. Analyses were repeated in the overweight and control subgroup. Although we must be careful in our conclusions, because of the small sample size, the four forced factor analyses in the overweight subgroup revealed a comparable structure. When conducting the factor analysis in the control sample, item 9 “vomiting” was deleted because of its zero variance. The result of the principal component analysis in this sample was very complex with a lot of inconsistencies.

### Concurrent validity

Correlation analyses were carried out between the total score of the ChEAT and the subscales or total scores of the questionnaires involved in the validity study. In Table 2 the found correlations are presented.

Like expected, positive correlations were found between the ChEAT-total score and the DEBQ-total score ( $r = .32, p < .01$ ), DEBQ subscale ‘Restrained eating’ ( $r = .46, p < .01$ ), EDI II NL-total score ( $r = .57, p < .01$ ), EDI II NL subscales ‘Drive to thinness’ ( $r = .76, p < .01$ ); ‘Ineffectiveness’ ( $r = .71, p < .01$ ); ‘Bulimia’ ( $r = .66, p < .01$ ); ‘Body Dissatisfaction’ ( $r = .61, p < .01$ ); ‘Interoceptive awareness’ ( $r = .79, p < .01$ ), ‘Perfectionism’ ( $r = .37, p < .05$ ), ChEDE-Q-total score ( $r = .53, p < .01$ ), all ChEDE-Q subscales ‘Dieting’ ( $r = .46, p < .01$ ), ‘Concerns about food’ ( $r = .45, p < .01$ ), ‘Concerns about weight’ ( $r = .47, p < .01$ ), ‘Concerns about body shape’ ( $r = .49, p < .01$ ), CDI-total score ( $r = .70, p < .01$ ) and CBCL externalising T-score ( $r = .18, p < .05$ ). No correlations were found between the ChEAT-total score and the EDI II NL subscale ‘Social Insecurity’, CBCL total T-score and internalising T-score.

Against our expectations we also found correlations of the ChEAT-total

Table 2  
*Found relationships between ChEAT-total scores and other self-report questionnaires*

	<b>Found correlation ChEAT-total score</b>
<b>DEBQ</b>	
Total score	.32**
Restrained eating	.46**
External eating	-.01
Emotional eating	.12
<b>EDI-II-NL</b>	
Total score	.57**
Drive to thinness	.76**
Bulimia	.66**
Body dissatisfaction	.61**
Ineffectiveness	.71**
Perfectionism	.37*
Interpersonal distrust	.18
Interoceptive awareness	.79**
Maturity fears	.28
Ascetism	.18
Impulse regulation	.15
Social insecurity	.17
<b>ChEDE-Q</b>	
Total score	.53**
Dieting	.46**
Concerns about food	.45**
Concerns about weight	.47**
Concerns about body shape	.49**
<b>CBCL</b>	
T-total score	.14
T-score internalizing	.11
T-score externalizing	.18*
CDI Total score	.70**
<b>SPPA</b>	
Scholastic competence	.13
Social acceptance	.25*
Athletic Competence	.34**
Physical appearance	.14
Behaviour conduct	.13
Close friendships	-.05
Global self-worth	-.02

DEBQ= Dutch Eating Behaviour Questionnaire; EDI -II-NL= Eating Disorder Inventory;  
 ChEDE-Q = Children's Eating Disorder Examination Self-Report Questionnaire; CBCL = Child Behaviour Checklist;  
 CDI = Children Depression Inventory; SPPA = Self Perception Profile for Adolescents.  
 \*=significant on 0.05 level, \*\*=significant on 0.01 level (two-tailed)

score with 'Interoceptive awareness' of EDI II NL, and with 'Athletic competence' of SPPA. We even find a positive correlation with SPPA's 'Social Acceptance', although we expected a negative correlation.

#### Discriminant validity

The control group ( $n = 101$ ) and the overweight group ( $n = 65$ ) were compared on the ChEAT-total score. Table 3 shows that our hypothesis was confirmed ( $t(157) = -8.79; p < .01$ ).

Table 3  
*Comparison between the control group and overweight youngsters*

	Control group		Overweight		T-test (independent groups)	
	M	SD	M	SD	t-value(df)	significance
ChEAT-Total score	5,87	5,08	15,17	8,27	8,79 (157)	p<.01

M = Mean; SD = Standard Deviation; t-value(df) = t-value with the degree of freedom; significance = significance level

Overweight = overweight group

Overweight youngsters have more problematic eating attitudes and worry more about food, weight and body shape ( $M = 15.17; SD = 8.27$ ) compared to community sample ( $M = 5.87; SD = 5.08$ ). Second, based on a median split on the subscale Dietary Restraint of the DEBQ, we made two groups "Dieters" ( $Mdn = 10.89; n = 72$ ) and "Non-dieters" ( $Mdn = 5.39; n = 79$ ). A *t*-test comparing ChEAT-total scores of these two groups also confirmed the hypothesis ( $t(149) = -4,74; p < .01$ , see table 4).

Table 4  
*Comparison between 'Dieters' and 'Non-dieters'*

	Dieters		Non-Dieters		T-test (independent groups)	
	M	SD	M	SD	t-value(df)	significance
ChEAT-Total score	14,81	8,92	6,18	6,07	6,41 (149)	p<.01

M = Mean; SD = Standard Deviation; t-value(df) = t-value with the degree of freedom; significance = significance level

Subjects, who actually show dieting behaviour, have more disturbed attitudes about food, weight and body shape ( $M = 14.81; SD = 8.92$ ) compared to subjects without dieting behaviour ( $M = 6.18; SD = 6.07$ ).

## Discussion

The aim of this preliminary study was to identify the translated ChEAT as a valid and reliable measure instrument for the assessments of attitudes and cognitions about food, weight and body shape. For this aim, test-retest reliability, internal reliability, factor structure, concurrent validity and discriminant validity were examined.

The test-retest reliability (Pearson correlation) for the Dutch version of the ChEAT was .72 ( $n = 63$ ,  $p < .001$ ). Good results were found in both the total group as well as in the subgroups of boys, girls, youngsters of secondary schools and elementary schools. Compared to the original research of Maloney et al. (1988,  $r = .81$ ) the test-retest reliability here was lower. The test-retest reliability in a recent large study of the Catalan adapted version of the ChEAT was however even lower ( $r = .56$ ; Sancho et al., 2005). Differences between studies might be explained by the interval between the two measurements; while in the Spanish study this was 5 months, the current study used a two weeks interval.

The original ChEAT (like the EAT) consisted of 26 items, but Maloney et al. (1988) recommended reducing this to 25 items. The present analysis examined both the 25- and 26-item versions, as well a 24-item version. Internal reliability was adequate for all three versions, and as well as for the total sample as for each subsample according to gender, age, school level, and weight status. Compared to the studies on the English version (Maloney et al., 1988; Ranzenhofer et al., 2008; Smolak & Levine, 1994a) we can conclude that the Dutch ChEAT has similar intern reliability.

The factor analysis showed a factor structure quite different from the original ChEAT (Maloney et al., 1988). The principal component analysis yielded seven factors which accounted for 69.07% of the variance in item responses. Due to the complexity of this result, we conducted a new analysis with four forced factors, which accounted for 53.80% of the variance. The second factor "Concerns about weight and body shape" and the third factor "Food preoccupation and keeping control", which were found in both the whole as well in the overweight subsample, show considerable similarity with the factors of Ranzenhofer et al. (2008).

Concurrent validity was assessed by examining the correlations of ChEAT-total scores with self-reported eating behaviour, characteristics of eating disorders, problem behaviour, depression and self-perception questionnaires. As expected, we found positive correlations with instruments that measure eating pathology and concerns about eating, weight and body shape (DEBQ, EDI II NL and ChEDE-Q). These results are similar to the study of Smolak and Levine (1994a), who also found positive correlations between the ChEAT-total score and body dissatisfaction. In this study the

ChEAT-total score also correlates positively with scales that measure dieting behaviour, bulimic characteristics and perfectionism. Eating behaviour and eating attitudes are, as expected, correlated. This hypothesis was also confirmed in previous research (Smolak & Levine, 1994a).

From the correlation between the CDI and the ChEAT, we can decide that disturbed eating attitudes are significantly related with negative affect and depression. Moreover, also a correlation between the externalising problem score and the ChEAT-total score was found, which confirms the hypothesis that the ChEAT-attitudes were more prevalent in at-risk youngsters. However, the expected correlations were not found for internalising problems on the CBCL. A first explanation can be that different informants were being addressed. The CBCL was filled in by parents while the other questionnaires were self-report-measurements. Second, the CDI measures cognitions as well as the ChEAT, while the CBCL measures behaviour. In contradiction with this study, a correlation with both internalising and externalising scales of CBCL and the ChEAT was found in the study of Ranzenhofer et al. (2008).

The association between ChEAT and self-esteem is interesting. There were no significant relationships with the subscales 'Physical appearance' or 'Global self-worth' of the SPPA. We did indeed find positive correlations with 'Social acceptance' and 'Athletic competence'. This means that higher total scores on the ChEAT, more pathological eating attitudes, are related to higher rates of a person's social acceptance and athletic competence. This result shows the social importance of looks, athletic competence and body shape among youngsters. The lack of a relationship with physical appearance and global self-worth is in this context very remarkable.

Finally, the results for the discriminant validity were satisfying. The overweight group scored, as expected, higher on the ChEAT. Children and youngsters, who apply for outpatient treatment for their overweight, have more disturbed eating attitudes compared to the peers in the community. Second, youngsters who show diet behaviour have, as expected, more disturbed eating attitudes compared to not-dieting youngsters. We assume that attitudes and behaviour are related, as predicted by the TPB. Because of the cross-sectional character of our study, the question of causality remains however unanswered.

To conclude, the translated ChEAT has some promising properties. A strength of this study is the appearance of a well-balanced control group of schoolchildren of different ages and educational levels and both normal weight and overweight youngsters. The study of the Dutch version of the ChEAT is still in its infancy and needs further development, specifically with respect to proposed factors or subscales. The factor structure is probably affected by its content. So, we question the fact that besides attitudes and concerns, some behavioural items are included, for example 'Have been dieting'

or 'Stay away from sugar', although the ChEAT pretends to measure attitudes. Future research could examine whether these items should be deleted.

A first shortcoming of our study is the fact that the participants were not recruited in a population based fashion. Families in the studied sample who agreed to participate may be more health conscious than the general population, as such limiting the external validity of the study. Next, the size of the sample ( $N = 166$ ) is large but when using subgroups, the size of the samples decreased seriously. In comparison with the research on the English version, our subgroups were small, which may have limited the significance of the factor structure and decreased the generalisation. Nevertheless, the revealed correlations were good, which gives us some trust in the reliability of the translated version.

Previous research found psychological and weight differences between clinical and non-clinical overweight youngsters (Braet, Mervielde, & Vandereycken, 1997; Britz, Siegfried, Ziegler, Lamertz, Herpertz-Dahlmann, Remschmidt et al., 2000; Jarvie, Lahey, Graziano, & Framer, 1983; Wardle & Cooke, 2005). Therefore, our data cannot be used as normative data. They however show that specifically in youngsters seeking treatment for their overweight, disordered eating attitudes were indeed prevalent and much higher than in normal-weight samples. Although some children of our sample were too young to complete all the questionnaires, we included also the data of the 8-years-old on the EDI in the present study, which may have caused some distortions. Some small studies however also showed the usefulness of the EDI in this age group (Eklund, Paavonen, & Almqvist, 2005). Due to the possible incomplete cognitive development of young children, it is always important to administer a multi-method multi-informant design. More specifically, we recommend to further test the validity via interviews in both representative normal weight and non clinical overweight youngsters with (un)diagnosed eating disorders. Future research is now needed to explore the assumed association between attitudes and later pathological eating behaviours. Due to the fact the present study is cross-sectional we do not have enough information about the predictive strength of the ChEAT. Longitudinal research would be the next step.

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