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Factorial dimensions obtained with the Eating Disorder Inventory (EDI) and the Karolinska Scales of Personality (KSP) in women having Anorexia Nervosa or Bulimia Nervosa as related to clinical and to other characteristics

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ABSTRACT

Sixty women, 19 with Anorexia Nervosa (AN) and 41 with Bulimia Nervosa (BN), were given the Eating Disorder Inventory (EDI) and the Karolinska Scales of Personality (KSP). The aim was by means of factor analysis of the 23 variables from these questionnaires to determine certain descriptive dimensions and relate them to symptoms and to diagnoses, as well as to signs based on results of the Defense Mechanism Technique modified (DMTm) and to the distribution of the women within five subgroups, two of these anorexic and three bulimic, as described in Wilhelmsson and Andersson (2005). The six factors found were referred to as those of somatic distress, unsatisfactory feelings, dissatisfaction with the body, interpersonal insecurity, need for change and aggressiveness. The most clear-cut findings were that personality disorder was related to high scores on unsatisfactory feelings and somatic distress and to low scores on need for change. High Body Mass Index (BMI) results were found to be associated with high scores on dissatisfaction with the body, and occurrence of a restricting anorexic type to be associated with low scores of the latter. The DMTm signs of H-repression and H afraid were found to be related to high scores on somatic distress, the occurrence of barrier isolation to high scores on unsatisfactory feelings, and the occurrence of affect anxiety to high scores on interpersonal insecurity. Differences between the subgroups were found for somatic distress, unsatisfactory feelings, dissatisfaction with the body and interpersonal insecurity.

Keywords: Anorexia Nervosa, Bulimia Nervosa, Defense Mechanism Technique modified (DMTm), Eating Disorder Inventory (EDI), Karolinska Scales of Personality (KSP)

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The Eating Disorder Inventory (EDI) was used by Wilhelmsson and Andersson (2005) in a study of 60 women with the diagnosis of either Anorexia Nervosa (AN) or Bulimia Nervosa (BN). Two of the eight main EDI variables, bulimia (the tendency to think about and engage in binge eating) and lack of interoceptive awareness (confusion and apprehension in recognizing and accurately responding to emotional states and uncertainty in the identification of certain visceral sensations related to hunger and satiety) were found to differentiate between these two eating disorder groups, high scores more often being found together with BN than with AN. A hierarchical cluster analysis was performed in an effort to identify important subgroups of AN and BN. This analysis included not only EDI data, but also clinical diagnoses (AN/BN, depression, personality disorder), eating disorder symptoms (binge eating, purging), Body Mass Index (BMI), extent of exercise and 20 variables from the Defense Mechanism Technique modified (DMTm) – a percept-genetic technique interpreted in terms of the Andersson (1991; Andersson & Ryhammar, 1998) developmental and psychodynamic model of the human mind. Five clusters were found, two of them anorexic (clusters 1 and 2) and three of them bulimic (clusters 3, 4 and 5).

The women examined earlier in Wilhelmsson and Andersson (2005) filled out not only the EDI but also the Karolinska Scales of Personality (KSP), a self-report inventory constructed as a tool for measuring personality traits indicative of vulnerability to mental disturbances. As reported in Wilhelmsson (2012), no differences were found between the AN and BN women on any of the 15 KSP scales. The scales of somatic anxiety, psychic anxiety, psychasthenia and detachment differentiated between the cluster groups however. The most marked difference was found for psychic anxiety (which indicated the degree of sensitivity, feelings of uneasiness and lack of self-reliance), women in the anorexic cluster 1 and the bulimic cluster 4 more often scoring high on this scale than those in the anorexic cluster 2 and the bulimic cluster 3. Moreover, women in the bulimic cluster 4 scored higher on detachment (the extent to which a person is distanced and avoids interpersonal relations) than those in the bulimic cluster 3. These findings for psychic anxiety and detachment corresponded on the

whole to those obtained on the EDI previously for the variables of ineffectiveness (the extent of feelings of general inadequacy, insecurity, worthlessness and lack of control over one's life) and interpersonal distrust (the degree of reluctance to form close relationships and a need to keep others at a distance) on the EDI.

The fact that both the EDI (as found in Wilhelmsson and Andersson, 2005) and the KSP (as found in Wilhelmsson, 2012) contributed with valuable information for understanding subgroups of women diagnosed as AN or BN led to the question of whether a factor analysis of the variables of the two inventories (8 variables from the EDI and 15 from the KSP) would result in certain dimensions that might be useful for describing characteristics of women with eating disorders, allowing these dimensions then to be related to all the other information available, including the clinical symptoms and diagnoses of the women, their cluster placement and their signs on the DMTm.

METHOD

Participants

Sixty women, 18-34 years old (mean age 22.9), 19 with a DSM-IV diagnosis (American Psychiatric Association, 1994) of AN and 41 with one of BN, took part in the study. Most of them were psychiatric outpatients, and those few who became inpatients remained so only a rather short period of time. The duration of their eating disorder ranged from 3 to 120 months with a median of 42 months. Ten of the women with AN were of the restricting type (no binge eating, no purging). Binge eating was found for 47 of the women and purging (self-induced vomiting or misuse of laxatives or diuretics) with 44 of them. Twenty-four were denoted as "high on exercise" since they repeatedly used excessive exercise for lowering their weight. The BMI of the women ranged from 13-28, a value of 17.5 or more being considered as high.

Thirty-one of the women were diagnosed as having a depression (7 a dysthymic disorder, 4 a major, 2 a bipolar and 18 an unspecified depression) and 32 of them a personality disorder (19 borderline, 7 dependent, 2 avoidant and 4 unspecified). Depression was found to be more common in women with BN than in those with AN. All the diagnoses were in accordance with DSM-IV and were agreed on by an experienced psychiatrist and the author.

The 60 women were distributed over the different cluster groups defined in Wilhelmsson and Andersson (2005) as follows: 11 of them were found in anorexic cluster 1 (9 diagnosed as AN, 2 as BN), 8 in anorexic cluster 2 (all AN), 16 in bulimic cluster 3 (14 BN, 2 AN), 17 in bulimic cluster 4 (all BN) and 8 in bulimic cluster 5 (all BN).

Eating Disorder Inventory.

The Swedish form of the second version of EDI was employed (Garner, 1991; Garner & Norring, 1994). It consists of 91 self-report items, 64 of them grouped into the eight main variables used here and presented in Table 1. The subject indicates the extent to which each item holds (always/usually/often/sometimes/rarely/never) weighted in four steps from 0 to 3 in the "symptomatic" direction. For the present group the degree of internal consistency calculated as Cronbach's alpha coefficient was $\geq .75$ for each of the variables (for details of these coefficients and for the correlations found between the variables, see Wilhelmsson and Andersson, 2005). The item scores were summarized for each variable and subject. The T-scores (M 100, SD 10), used in the factor analyses, were calculated for the women of the present group.

Karolinska Scales of Personality

Schalling and co-workers constructed the KSP (af Klinteberg, Schalling & Magnusson, 1986; Schalling, Åsberg, Edman & Oreland, 1987). This self-report inventory consists of 135 items grouped into the 15 variables presented in Table 1. The internal consistencies for the scales varied in the present group from a Cronbach's alpha coefficient of .27 to one of .85 (for details of this and the number of items on each scale, see Wilhelmsson, 2012). One of four alternatives (ranging from "does not apply at all" to "applies completely") is selected by the subject for each item, the results as a whole for separate items of each scale being summarized. The T-scores, used in the factor analyses conducted, were based on the Swedish norm sample of 24-34 years old women.

Table 1. *Description of variables from EDI and KSP used in the factor analyses.*

	Variable	Description	Note
EDI	Drive for thinness	Excessive concern with dieting, preoccupation with weight and fear of gaining weight	Factor 3
	Bulimia	The tendency to think about and engage in binge eating	Factor 3
	Body dissatisfaction	Dissatisfaction with the overall shape of one's body that are of greatest concern to individuals with eating disorders, i.e. stomach, hips, thighs and buttocks	Factor 3
	Ineffectiveness	Feelings of general inadequacy, insecurity, worthlessness and lack of control over one's life, closely related to low self-esteem, negative evaluation of the self and feelings of emptiness and aloneness	Factor 2
	Perfectionism	The belief that all personal achievements should be superior and that others expect one to show outstanding achievement	Not included in the final factor analysis
	Interpersonal distrust	General feeling of alienation, a reluctance to form close relationships and to express thoughts or feelings to others, and a need to keep others at a distance	Factor 4
	Lack of interoceptive awareness	Confusion and apprehension in recognizing and accurately responding to emotional states, also uncertainty in the identification of certain visceral sensations related to hunger and satiety	Not included in a single factor
	Maturity fears	The desire to retreat to the security of childhood, as well as fear of the psychological and biological experiences associated with adult weight	Not included in the final factor analysis
KSP	Somatic anxiety	Autonomic disturbances and distress	Factor 1
	Muscular tension	Muscular tension and difficulties in relaxing	Factor 1
	Psychic anxiety	Sensitivity, feelings of uneasiness and lack of self-reliance	Not included in a single factor
	Psychasthenia	Easily fatigued and stressed in situations that require a rapid tempo	Factor 1
	Inhibition of aggression	Difficulties in identifying the cause of uncomfortable feelings	Not included in a single factor
	Impulsiveness	Impulsive decisions and actions	Factor 5
	Monotony avoidance	Need for change	Factor 5
	Detachment	Social and emotional withdrawal and uneasiness in interpersonal situations	Factor 4
	Socialization	Good childhood experiences and relations and satisfaction with life	Factor 2 inverted
	Social desirability	Desire to conform socially	Not included in the final factor analysis
	Indirect aggression	Outlet of aggression by actions not related to the cause of the aggression	Factor 6
	Verbal aggression	Verbal expressions and arguments when feeling upset	Factor 6
	Irritability	Irritation and lack of patience	Factor 1
	Suspicion	Suspiciousness and difficulties in trusting others	Factor 1
	Guilt	Feeling shame and remorse for unacceptable thoughts	Factor 2

Defense Mechanism Technique modified

In DMTm (Andersson & Bengtsson, 1985; Andersson, 2004) each of two picture motifs are presented in a tachistoscope 20 times in a series, the exposure times increasing successively from 5 to 1150 milliseconds. In each picture there is a centrally placed child or young person, referred to as hero/heroine (H), of the same gender as the subject, and a threatening, elderly female (first picture) or male (second picture) person situated in the periphery (Pp). Located in front of H is a disguised sexual attribute (A). The subject is asked after each exposure to tell what he/she has seen and to draw a simple picture of it. The scoring of DMTm includes expressions of anxiety, defenses against anxiety (affect defenses, denial, denial through reversal) and various additional signs.

The scoring of DMTm was carried out independently by the present author and the originator of the scoring scheme (Andersson, 2004). In the few cases where there was a disagreement, the final scoring was arrived at by discussion. The same 20 DMTm signs that Wilhelmsson and Andersson (2005) used in their earlier cluster analysis, each of them found in at least 10 % of the participants, were included in the present study and were referred to as follows: affect anxiety, identity anxiety, H-repression, Pp-repression, A-repression, projected introaggression, inhibition, introaggression, barrier isolation, affect isolation, denial, denial through reversal I, denial through reversal II, denial through reversal III, denial through reversal IV, disappearance of threat, H positive, H afraid, H sad and wrong gender of Pp. A definition of those eight DMTm signs (together with the number of subjects scored for the sign) that are reported on in the results section is given below (for the definition of the other signs, see Wilhelmsson and Andersson, 2005).

A*ffect anxiety* (12). Here before Pp has been recognized as a person or a face, instead something dissolved, a fragment, or whatever is perceived at that location, or Pp is changed from a person or a face into something which is dissolved, diffuse, or the like, or Pp is blotted out in a marked way without being lost completely.

H-repression (26). H being seen as a petrified, inanimate or disguised being, as an animal or as a specified object.

Pp-repression (23). Pp being seen either as a petrified, inanimate or disguised being that is neither threatening nor unpleasant, as an animal or as a specified object.

Barrier isolation (15). A barrier being added between H and Pp or H and Pp belonging to different realities, or Pp being seen as a framed, empty surface or as an object distinguished by its contour.

Denial (42). Pp being missing or un-interpreted on at least seven consecutive exposures, starting with the first exposure, or Pp being lacking or un-interpreted on at least two consecutive exposures after having been specified as something other than a person or face, or, when having been specified as a person or face, Pp being lacking on at least two consecutive exposures.

Disappearance of threat (21). Denotation of threat being missing for Pp on at least two consecutive exposures after an earlier indication of it.

H afraid (10). H being explicitly reported as afraid or scared (not scored in combination with introaggression).

Wrong gender of Pp (12, in each case only found in the first DMTm series for the female Pp). The gender of Pp being incorrectly reported and not being correct on any of the exposures in a series.

RESULTS

In a principal component factor analysis with varimax rotation and Kaiser normalization to achieve simple structure, the Kaiser-Meyer-Olkin measure of sampling adequacy was found to be below .5 for two EDI variables (perfectionism, maturity fears) and for one KSP variable (social desirability). These variables were excluded in a new factor analysis involving 20 variables, one that provided six factors having Eigenvalues over 1.0. The Kaiser-Meyer-Olkin measure of sampling adequacy was above .5 for all the variables and the Bartlett test of sphericity was significant, indicating there to be a sufficient overlap of variance among variables. For a variable to be included in a single factor it was required both that a factor loading of at least .50 be present and that no difference between the factor in question and other factor loadings was less than .10 (independent of the direction). This led to that one of the EDI variables (lack of interoceptive awareness) and two of the KSP variables (psychic anxiety and inhibition of aggression) were excluded (Table 2).

Table 2. *Factors and distribution of factorial weights of the EDI and KSP variables.*

Variable	Factor					
	1	2	3	4	5	6
Somatic distress						
Muscular tension	**.83**	.32	.03	-. 02	.11	-.11
Somatic anxiety	**.73**	.53	.17	.11	.17	-.05
Irritability	**.69**	-.20	-.07	.42	-.03	.26
Suspicion	**.66**	.27	.03	.12	-.09	.25
Psychasthenia	**.59**	.38	.15	.16	-.23	-.03
Unsatisfactory feelings						
Socialization	-.22	**-.69**	.05	.14	-.13	-.30
Ineffectiveness	.19	**.68**	.30	.38	-.13	-.04
Guilt	.31	**.57**	.09	.14	.04	.05
Dissatisfaction with the body						
Drive for thinness	.02	.03	**.91**	-.05	-.16	.10
Body dissatisfaction	.17	.00	**.83**	-.05	-.06	-.17
Bulimia	-.07	.32	**.75**	.12	.06	.07
Interpersonal insecurity						
Detachment	.25	.04	-.17	**.85**	-.11	.03
Interpersonal distrust	.07	.28	.20	**.82**	-.13	-.17
Need for change						
Monotony avoidance	-.03	-.08	-.06	-.03	**.83**	.17
Impulsiveness	.19	.24	-.02	-.15	**.71**	.28
Aggressiveness						
Indirect aggression	.11	.14	-.09	.00	.07	**.87**
Verbal aggression	.00	-.01	.10	-.11	.35	**.81**
Psychic anxiety	.35	.50	.24	.27	-.55	.07
Lack of interoceptive awareness	.19	.53	.51	.43	-.10	-.12
Inhibition of aggression	.20	.52	.13	.10	-.44	-.01

The factors were denoted as follows and their internal consistency (the Cronbach alpha coefficient) was found to be acceptable: somatic distress (.83), unsatisfactory feelings (.64), dissatisfaction with the body (.74), interpersonal insecurity (.77), need for change (.66) and aggressiveness (.74). Of the six factors, those referred to as somatic distress (factor 1), need for change (factor 5) and aggressiveness (factor 6) included only KSP scales. Dissatisfaction with the body (factor 3) comprised only of EDI variables, whereas unsatisfactory feelings (factor 2) and interpersonal insecurity (factor 4) were characterized by variables from both EDI and KSP.

Table 3. *Characteristics related to the six factors (Mann-Whitney U test, two-tailed).*

Factor	Diagnosis/symptom	U	p	DMTm sign	U	p
Somatic distress	Personality disorder	253.5	.004	H-repression	263.5	.008
				H afraid	118.5	.009
				Pp-repression	279.0	.03
				Barrier isolation	224.5	.05
Unsatisfactory feelings	Personality disorder	243.0	.002	Barrier isolation	185.0	.009
				H afraid	129.0	.02
				Denial	245.0	.03
				Pp wrong gender	175.0	.04
Dissatisfaction with the body	High BMI	106.0	.000			
	Not restricting anorexic type	97.0	.002			
	Binge eating	259.0	.02			
	BN	240.0	.02			
Interpersonal insecurity	Personality disorder	308.5	.04	Affect anxiety	136.5	.005
				Pp-repression	286.5	.04
Need for change	Not personality disorder	283.5	.01			
	Not depression	318.5	.05			
Aggressiveness				Not disappearance of threat	284.5	.05

The T-scores for each of the variables belonging to a given factor were summarized and were then related to the characteristics that were available in regard to the subjects (AN/BN, restricting type of AN, depression, personality disorder, binge eating, purging, high BMI, high exercise value and each of the 20 signs scored in DMTm). The relationships with different factors that were statistically significant are shown in Table 3. BN, binge eating, and high BMI were linked with high scores, and the restricting anorexic type with low scores on the factor of dissatisfaction with the body. High scores on somatic distress, unsatisfactory feelings and interpersonal insecurity were found to be related to the diagnosis of personality disorder.

The diagnoses of depression and personality disorder were not common in those women having high scores on need for change.

The signs obtained in the DMTm were related to four of the six factors (Table 3). Affect anxiety was found in connection with high scores on interpersonal insecurity, the affect defense of H-repression in connection with high scores of somatic distress, Pp-repression in connection with high scores of both somatic distress and interpersonal insecurity, and barrier isolation with high scores of both somatic distress and unsatisfactory feelings. High scores on the latter factor were also found to be linked with the defense of denial. The sign of H afraid was found to be related to high scores on both somatic distress and unsatisfactory feelings, and the sign of disappearance of threat (disappearance of aggression in the Pp) to be related to low scores on aggressiveness. No statistically significant relationships were found between the factors in question and any form of denial through reversal (identity defenses) in the DMTm

Table 4. *Mean ranks for the five cluster groups on the six factors and p-values (two-tailed) for the Kruskal-Wallis one-way analysis of variance by ranks.*

Factor	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	p	Cluster differences
Somatic distress	37.05	28.25	17.72	38.29	32.75	.008	1vs.3, 3vs.4
Unsatisfactory feelings	42.64	15.38	20.25	39.76	29.75	.000	1vs.2, 1vs.3, 2vs.4, 3vs.4
Dissatisfaction with the body	31.09	8.38	35.31	37.71	26.88	.007	(1vs.2), 2vs.3, 2vs.4
Interpersonal insecurity	30.05	21.63	19.00	42.26	38.00	.001	(2vs.4), 3vs.4
Need for change	27.27	32.81	32.88	28.12	32.94	.86	
Aggressiveness	29.05	23.38	31.75	34.79	28.00	.61	

Note. Cluster differences referred to indicate $p \leq .10$ if in parenthesis and $p \leq .05$ otherwise.

According to results of the Kruskal-Wallis one-way analysis of variance by ranks, four of the factors – somatic distress, unsatisfactory feelings, dissatisfaction with the body and interpersonal insecurity – differentiated between the cluster groups (Table 4). The clearest difference was found for unsatisfactory feelings, women in the anorexic cluster 1 and the bulimic cluster 4 scoring higher on this factor than those in either the anorexic cluster 2 or the bulimic cluster 3 (the pair-wise comparisons of clusters being performed in accordance with Siegel and Castellan, 1988, p. 213). Similar findings were obtained for somatic distress, although here the difference between pairs of clusters was significant only for the comparisons of cluster 3 with the clusters 1 and 4. Low scores on the factor of dissatisfaction with the body were typical of women in the anorexic cluster 2, the most marked differences being obtained between this cluster and the clusters 1, 3 and 4. Women in the bulimic cluster 4 scored high on interpersonal insecurity, the most marked differences on this factor being

found for women in the clusters 2 and 3. The pair-wise comparisons carried out showed no statistically significant differences between the bulimic cluster 5 and any of the other clusters.

DISCUSSION

To judge from the findings of how the factor dimensions related to the cluster groups, the four factors referred to as somatic distress, unsatisfactory feelings, dissatisfaction with the body and interpersonal insecurity turned out to be useful for describing differences between the present women who had an eating disorder. The fact that high scores on dissatisfaction with the body often occurred together with high BMI, binge eating and the diagnosis of BN, but not of the diagnosis of AN of the restricting type, is rather self-evident in consideration of that this factor being based on the EDI variables of drive for thinness, body dissatisfaction and bulimia. The particularly low scores of dissatisfaction with the body for the women in the anorexic cluster 2 confirms the view expressed in Wilhelmsson and Andersson (2005) that these women seemed to be highly "indifferent" regarding their eating disorder.

Women in the bulimic cluster 4 displayed not only high scores on the factor of dissatisfaction with the body, but also on somatic distress, unsatisfactory feelings and interpersonal insecurity, the three factors on which the women in the bulimic cluster 3 scored low. Comparing the women in these two clusters with respect to findings reported in Wilhelmsson and Andersson (2005), the diagnosis of personality disorder for example was found to be typical of those in cluster 4, but not of those in cluster 3. Women in the anorexic cluster 1, who scored high on unsatisfactory feelings, also often had the diagnosis of personality disorder. These findings agree with this diagnosis being related here to high scores on the three factors of somatic distress, unsatisfactory feelings and interpersonal insecurity.

Somatic distress, unsatisfactory feelings and interpersonal insecurity were factors found to be clearly related to signs in the DMTm. The affect defenses of H-repression, Pp-repression and barrier isolation, which were related to one or two of the factors mentioned, were found earlier in Wilhelmsson and Andersson (2005) to be uncommon in women in the bulimic cluster 3. An interpretation of this – together with the fact that in DMTm these women had less than four scorings altogether of affect anxiety and affect defense – was that women in cluster 3 had difficulties in expressing and handling mental pain at a symbolic level, something which might be an expression of alexithymia (Sifneos, 1973). Their low scores on the factors of somatic distress, unsatisfactory feelings and interpersonal insecurity may also be indicative of what McDougall (1988, 1990) refers to as normopathy or pseudonormality, considered by her to often appear in psychosomatic patients.

The fact that the DMTm defense of H-repression was related to high scores on somatic distress – the factor which comprised the KSP variables of muscular tension, somatic anxiety, irritability, suspicion and psychasthenia – is clearly relevant to this affect defense having been

found, for example, to be common in patients with bodily complaints (Hallborg, Andersson, Nordgren & von Schéele, 1987). Barrier isolation was found like H-repression to be related to high scores on somatic distress, but most markedly to high scores on unsatisfactory feelings. Barrier isolation was found in Wilhelmsson and Andersson (2005) to be typical of the anorexic women in cluster 1, who here scored high on unsatisfactory feelings.

The specified motive for the affect defense of barrier isolation is located in the Andersson model in what Melanie Klein refers to as the depressive position. It is thus intriguing to note that guilt was one of the KSP variables included in the factor of unsatisfactory feelings. The content of the other two variables belonging to this factor, ineffectiveness (linked to feelings of general inadequacy, insecurity, worthlessness and lack of control over one´s life) and socialization (low scores on it indicating bad childhood experiences), also makes the relationships found with the DMTm signs of denial, H afraid and wrong gender of Pp understandable. According to the Andersson model, the specified motive for denial is fear of abandonment and this defense in combination with projected fear (H afraid also found to be related here to high scores on somatic distress) has been found to be common for example in women who have sought psychiatric help (Strand & Andersson, 1994). Wrong gender of Pp is a kind of impaired reality testing that previously has been observed in women who reported that they during childhood "had not had any bodily contact with their parents" (Ghaffari, 1996). In Wilhelmsson and Andersson (2005) this DMT sign was more often found with the bulimic women in cluster 4 than in the other women.

As reported in Wilhemsson and Andersson (2005), high scores on the EDI variable of interpersonal distrust were found to be related to affect anxiety in DMTm. This EDI variable was together with detachment on the KSP indicating social and emotional withdrawal and uneasiness in interpersonal situations, forming the factor of interpersonal insecurity that was here found to be clearly related not only to the bulimic cluster 4 but also to affect anxiety. Individuals who in the present study scored high on interpersonal insecurity were obviously prone to express in terms of affect anxiety the intrapsychic threat that was evoked by the DMTm.

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