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Association between mental disorders and work-related psychosocial factors in teachers

ABSTRACT

OBJECTIVE: To investigate the association between work-related psychosocial factors and the prevalence of mental disorders among pre-school and elementary school teachers.

METHODS: This cross-sectional study was undertaken with 1,024 teachers from municipal public schools and from the ten largest private schools in Vitória da Conquista, Bahia State (Northeastern Brazil) in 2001. The main independent variable was based on the demand-control model, which classifies individuals according to their job pressures. The dependent variable was the incidence of mental disorders as evaluated by a self-reporting questionnaire. The measure of frequency was prevalence, and the measure of association was the prevalence ratio. A logistic regression model was used as the main statistical technique.

RESULTS: There was a 44% prevalence of mental disorders among teachers. Evidence suggests that these were associated with work-related demands and control issues, after controlling for confounding variables such as sex, geographic region and social support. The prevalence of mental disorders among high-strain teachers was 1.5 times greater than that among low-strain teachers.

CONCLUSIONS: The prevalence of mental disorders was high among teachers of the municipality. There was evidence that this was associated with job demands.

KEYWORDS: Education, primary and secondary. Mental disorders. Occupational health. Working conditions. Job satisfaction. Questionnaires, utilization. Cross-sectional studies.

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INTRODUCTION

The proportion of services-sector employees has increased in recent decades, with education being one of the areas employing most workers. The number of teaching posts in elementary education (those teaching students aged 5 to 18) on 28/3/2001 was 2,341,951 in Brazil as a whole and 179,334 in Bahia State (School Census 2001).*

Recently, studies dedicated to this sector (rare only a decade ago) have increased substantially.[24] Some of these[6,22,24] highlight the mental torment of teachers. Nearly all address minor mental disorders, defined as "disorders classified by the psychiatric terminology – frequently anxiety, depression or somatization disorders – but do not necessarily require specialized treatment" (Borges & Faria,[2] 1993, p. 9).

The review of Brazilian studies that have used the Self Reporting Questionnaire[9] (SRQ) includes three surveys with patients not admitted for overnight care in hospital.[3,7,18] These revealed proportions of mental disorders of from 33% to 63% with a cutoff threshold of 7/8 (negative results: score of 7 or less; positive results: score of 8 or more). In research[18] where an attempt was made to confirm the validity of the SRQ, a sensitivity of 83% and specificity of 80% were obtained. In another,[3] with a 33% positive proportion to the SRQ-20, 49% of patients were diagnosed as having perturbations in psychiatric interviews. In two studies of adult urban populations,[7] not verified with subsequent diagnostic methods, 23% of individuals obtained high scores.

Of 14 studies published from 1990 to 2004 on workers from several categories, eight used a cutoff threshold at 6/7, two at 7/8 and one at 5/6; for a single sex, two employed 7/8, two 5/6, one 8/9 and one 4/5. The positive results to the SRQ-20 varied from 19% to 39%. In five of these studies, the SRQ-20 was validated using other diagnostic methods. The sensitivity of three of these studies[8,12,16] was significantly lower than in research[18] with patients in primary care clinics (from 56% to 62%). The remaining two studies were similar to previous others[21] (from 71% to 83%). The specificity ranged from 65% to 86%.

Seven studies were found of Brazilian teachers, all with a cutoff threshold at 6/7 and without diagnostic validation. In four of these, positive results to the SRQ-20 ranged from 18% to 20%; in the others[6,22,24] from 42% to 56%.

Among job characteristics most frequently cited by teachers as associated with illness are: repetitive work, a stressful environment, fast pace, continuous supervision and pressure from superiors.[6,22,24] These psychosocial aspects of employment are included in the demand-control model,[13] which classifies individuals according to the psychological demands and control over the work environment and considers lack of control the primary risk factor for worker health.

A broad investigation was requested by the Union of Public Municipal Teachers and the Union of Teachers of Bahia State to describe aspects of teacher mental health and work conditions in Vitória da Conquista, Bahia. In this context, the present study seeks to evaluate the association between psychosocial aspects of work and the prevalence of mental disorders in elementary school teachers.

METHODS

From September to November 2001, a self-reporting questionnaire was administered to teachers in Northeastern Brazil in a cross-sectional study. Subjects (teaching students aged 5 to 14) were chosen from both municipal public and private schools. The target population was the set of employed teachers in this municipality. A census of teachers was conducted in municipal schools (where three was not a high school).

Based on lists from the Municipal Secretary for Education and labor unions, the effective population for the study was estimated to be 963 teachers from municipal public schools and 272 from private schools. Of these 1,235 eligible teachers, 808 municipal and 216 private school teachers participated in the study (1,024 individuals). Two-hundred and eleven (17%) potential subjects were unavailable for the study: two due to maternity leave, five because of illness, two because of sabbatical, and nine which did not receive the questionnaire. Ninety-one declined to participate and 102 did not return the questionnaire. Furthermore, 284 of those questioned omitted a reply to one or more questions, and they were thus excluded from the estimate of indices in the final model. The total loss was 495 subjects (40% of eligible teachers).

Also excluded were teachers of physical education, chess, art, and computing, reading assistants and those dedicated exclusively to administrative or coordination roles, because they are not exposed to a classroom teaching environment.

The main independent variable represented psycho-

*Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. Censo Escolar 2001. Disponível em http://www.inep.gov.br/ [acesso em 22 fev 2005]

social aspects of employment, as outlined in the categories of the demand-control model and defined based on the Job Content Questionnaire, for which permission was secured from the author.[13] The four categories of the model are: low-strain job (low psychological demand, high control over work environment), active work (high demand, high control), passive work (low demand, low control) and high-strain work (high demand, low control). The *demand* indicator is composed of variables that measure work rhythm, volume, amount of time allocated to complete tasks and the presence of conflicting demands. The *control* indicator includes variables that measure learning, creativity, ability, differentiation of tasks and repetition at work.[13] The assignment of subjects to these categories was based on the cutoff thresholds of the median level of the psychological demands and the 25th percentile on the scale of control over work environment.

The dependent variable was the occurrence of mental disorders during the month prior to the administration of the questionnaire, as measured by SRQ-20.[9] Scores from 8 to 20 were considered suggestive of mental disorders, as per the best cutoff threshold suggested by Mari & Williams[18] and Jardim et al.[12] The 6/7 threshold was not adopted here, as in some other studies with teachers, because Fernandes & Almeida Filho[8] consider this inappropriate.

Other variables analyzed were: sex, age, schooling level, marital status, geographic region, work status, time working as a teacher, weekly workload, employment at other schools, additional paid activities, union status and social support. Social support describes the amount of mutual support among employees and with supervisors,[13] which encompasses indicators of competence, mutual interest in the work of others, cordiality and collaboration at work.

Logistic regression was used to evaluate the association between variables with unconditional estimation of the parameters by maximum likelihood. Prevalence was the measure used for frequency. The measure of association was the prevalence ratio, obtained by a conventional method based on the estimate of the probabilities of occurrence of the dependent variable, according to each category of the independent variable. The respective 95% confidence intervals were defined based on the estimate of the variance of the natural logarithm of the estimator of prevalence ratio (using the delta method) with the covariance matrices generated by logistic regression.[20]

Variables were evaluated individually during the preselection in order to define the logistic regression model. Epidemiological relevance was adopted as the criterion and a likelihood ratio test p value lower than 0.25 was chosen for the significance of the coefficient.[11,19] This criterion was used so that important variables were not excluded since, in the evaluation of the potential confounding, the priority is to show that the strata (from the stratified analysis) of the covariate do not differ significantly in relation to the potential effect of the independent variable.[5] An attempt was thus made to test for type II error (incorrectly reject the effect of a covariate). An alternative was to choose a high critical value to test for significance. This statistical procedure was used (despite well-founded criticism on the use of these tests in the analysis of confounding[5,14]) because the basis for the presence of confounding in the association between work and mental distress in the covariates analyzed was not found in the literature.[5,19]

Best subsets selection was chosen because of the possibility that variables weakly associated with the effect, when evaluated separately, might become important in the prediction of the effect when considered together.[11] The minimum model used dummy variables of the demand-control model and the maximum model contained all of the pre-selected variables.

The criteria adopted for the best subsets selection were:[11] the lowest value of the Mallows C_q criterion [17] (the estimate of the expected value from the adequacy for prediction measure based on the least squares of a subset of variables); relevance of the variables in explaining mental illness; and the fewest excluded variables and observations.

Effect modification was defined by the statistical significance of the terms of interaction in the model analyzed in the likelihood ratio test with a level of 10%. The presence of confounding was evaluated based on the extent of variation in the estimated coefficients of the main independent variable with the introduction of other variables into the model and by the deviance of the model examined.[11] Confounding effects from other independent variables were controlled for using the conditional prediction method[15] for adjustment by regression, using the mean of each covariate as a standard value to obtain an estimate of prevalence adjusted for each group of interest in the model.

The programs SAS 8.01 and Stata 7.0 were used for statistical analyses.

The project was approved by the Committee for Ethical Research of the Faculdade de Medicina of the Universidade Federal da Bahia (Register n. 218/02).

RESULTS

The majority of teachers were: women, married, individuals under-educated for their position, public school workers, persons working in urban areas, teaching ages 7 to 10, full-time or in contested positions, without other paid employment and belonging to a union (Table 1).

Low-strain jobs, with lower expected risk of illness, were characteristic of approximately one third of teachers, a similar proportion to those in the active job category (Table 1). In these two subsets, there was high control over the workplace environment. The majority of teachers received reasonable social support.

The average age of participants was 34, the average time working as a teacher was 11 years and the total weekly workload in the school was 30 hours (Table 2).

The dummy variables of the demand-control model, sex, geographic region of work and social support, were selected initially. This set presented the second lowest C_q value, had the fewest number of variables (six), had the smallest loss of information from excluded observations (284) and included variables relevant to the explanation of mental illness. In the final model, social support was represented by two dummy variables, which contrasted the low and medium levels of social support with that of the high level (reference group). These were defined based on the quartiles of the corresponding continuous variable, with intermediate quartiles grouped together.

There were no apparent confounding variables in the stratified analysis, which would be characterized by statistically significant association with the independent and dependent variables (among the non-exposed). There were no substantial differences between the crude value of the prevalence ratios and the values adjusted by the control variables (Table 3).

The evaluation of variables through logistic regression identified *sex* and *social support* as potential modifiers of the association effect. However, the corresponding product terms were not considered because their adjustment was questionable due to the low number of male teachers and the low social support in some strata. The final model included the dummy variables of the demand-control model (dc1, dc2 and dc3), sex, geographic region of work and the dummy variables of social support (ssup1 and ssup2). Effect modification was not observed in the data analyzed. In the adjusted model, P(md=1) denotes the probability of an individual presenting a mental disorder.

$$\text{logit}[P(md=1)] = -2.6906 + 0.7624(dc1) - 0.0723(dc2)$$

Table 1 - Sociodemographic characteristics of elementary school teachers. Northeastern Brazil, 2001.

Variable	Category	Study population		Final model		Values absent from final model	
		Frequency	Proportion	Frequency	Proportion	Frequency	Proportion
Sex	Male	71	7.1	58	7.8	13	4.9
	Female	933	92.9	682	92.2	251	95.1
Schooling	University	256	25.3	197	26.9	59	21.3
	Other	754	74.7	536	73.1	218	78.7
Marital status	Single	348	34.5	261	35.5	87	31.9
	Married	556	55.1	403	54.8	153	56.0
	Widowed	22	2.2	15	2.0	7	2.6
	Separated	83	8.2	57	7.7	26	9.5
School type	Public	808	78.9	577	78.0	231	81.3
	Private	216	21.1	163	22.0	53	18.7
Geographic region of work	Rural	357	34.9	254	34.3	103	36.4
	Urban	666	65.1	486	65.7	180	63.6
Student ages	5-6 years old	149	16.8	117	17.8	32	13.7
	7-10 years old	516	58.0	359	54.7	157	67.4
	11-14 years old	224	25.2	180	27.4	44	18.9
Work status	Full-time contract	400	40.7	277	38.8	123	45.6
	Contested position	437	44.5	327	45.9	110	40.7
	Substitute teaching	146	14.9	109	15.3	37	13.7
Work at other schools	No	589	63.1	422	62.0	167	66.0
	Yes	345	36.9	259	38.0	86	34.0
Other paid activity	No	824	91.2	607	90.6	217	92.7
	Yes	80	8.8	63	9.4	17	7.3
Member of union	No	284	28.9	200	27.5	84	32.8
	Yes	700	71.1	528	72.5	172	67.2
Social support	Low level	224	25.1	190	25.7	34	22.2
	Medium level	505	56.5	416	56.2	89	58.2
	High level	164	18.4	134	18.1	30	19.6
Demand-control	Low-strain	300	36.1	276	37.3	24	26.1
	Passive work	131	15.7	117	15.8	14	15.2
	Active work	270	32.5	241	32.6	29	31.5
	High-strain	131	15.7	106	14.3	25	27.2
Mental disorder	No	565	55.6	411	55.5	154	55.8
	Yes	451	44.4	329	44.5	122	44.2

Table 2 - Sociodemographic characteristics of elementary school teachers (continuous variables). Northeastern Brazil, 2001.

Variable	Study population			Final model			Absent values		
	N	Mean	Standard deviation	N	Mean	Standard deviation	N	Mean	Standard deviation
Age (years)	975	34.2	8.3	715	33.6	8.1	260	35.8	8.6
Years of work	961	10.5	6.7	702	10.1	6.5	259	11.6	7.0
Total hours per week	985	30.2	11.8	718	30.1	12.0	267	30.2	11.4
Classroom hours	944	26.3	11.7	708	26.1	11.824	236	27.0	11.3

+ 0.7258(dc3) + 1.3995(sex) + 0.2857(geographic region) + 1.2723(ssup1) + 0.5098(ssup2)

The global prevalence of mental disorders was of 44% in the 1,016 teachers (from the 1,024 investigated) for whom information was available. With a cut-off threshold of 6/7, this proportion was of 53%.

Among the 284 teachers for whom observations were excluded from the final model because of partial omissions in the questionnaire, the distributions for mental disorders, sex, geographic region of work and social support were approximately equal to the other teachers (showing differences of less than five percentage points). The proportion of teachers with low-strain jobs was lower and those with high-strain jobs was higher in the discarded subjects than those used in the study (Table 1).

Table 4 presents the estimated values of the prevalence ratios and their respective 95% confidence intervals for the demand-control model (adjusted for confounding from covariates). The prevalence of mental disorders was significantly greater in the categories of *high-strain* and *active work* than in the reference category (*low-strain*), resulting in prevalence ratios of 1.5. The prevalence of mental disorders in the *passive work* category was approximately equal to the reference category. The adjusted prevalence ratios were inferior to those not adjusted.

In logistic regression models for which each variable was considered, in turn, as a main independent variable (whilst controlling for the others) women showed 2.6 times more mental disorders than men, low social support was twice that of high support and the medium level 1.4 times that of the high level. There were no differences relating to the geographic region of work (Table 4).

The Pearson χ^2 (χ^2=32.66; p=0.48) and Hosmer-Lemeshow (χ^2=5.00; p=0.76) statistics indicated that the logistic model was adjusted satisfactorily, with agreement between the observed frequencies and those expected from the dependent variable.

The area under the ROC (Receiver Operating Characteristic) curve (0.68) suggested that the model discriminated well subjects with probable disorders from healthy individuals.

The goodness-of-fit of the model was assessed over the set of fitted values determined by the covariates in the model. Forty-one covariate patterns were observed, totaling 740 individual observations. Four covariate patterns were poorly fitted, with discordance between the observed frequency of mental disorders to that predicted by the fitted model. Only a single covariate pattern, when excluded, produced substantial changes in the coefficients and the fitted measures, but these discrepancies did not justify its exclusion.

DISCUSSION

Cross-sectional studies can potentially overestimate cases of long-term illness and underestimate short-term illnesses. If exposure is associated with the duration and severity of the disease, there will be an overestimation of the exposure-disease association in minor illnesses and an underestimation in more severe cases, even if the exposure does not alter the risk of illness.[23] Moreover, they are inappropriate for investigations of rare illnesses. In large populations without random sampling, the frequency of diseases and other characteristics are invalid if the status of the ill individual or the level of the exposure factor influence the probability of selection (selection bias). Cross-sectional studies, without additional data, do not allow for: a) the characterization of a causal relationship between exposure to a factor and illness (nor the direction of this relationship once it is identified) nor b) the chronological sequence of events, without additional information.[14]

The present study was based on a census. The mental disorders are relatively common, long-term or transitory, and recurring, but rarely fatal. Thus they do not affect patient survival, but can result in lost work days for teachers. However, in this study, it was not possible to evaluate job-leaving or absenteeism resulting from work-related illnesses.

Another limitation was that the instruments used to quantify the underlying constructs (psychosocial as-

pects of work and mental morbidity) may not have satisfactorily accomplished this objective. The SRQ-20 score is only suggestive of a disorder or of mental suffering, rather than a means of diagnosis.

The final proportion of those individuals successfully receiving the questionnaire is considered good according to Babbie.[1] Although the status of non-respondents cannot be estimated vis-à-vis the psychosocial aspects of work and illness, the exclusion from analysis of incomplete questionnaires probably did not distort the results (Table 1).

This investigation was based on the understanding that "the way humans live (and work) determines the way humans are" and that the "the profile of morbidity and mortality of the population is a condition produced socially and defined by the inclusion of the individuals in the processes of exploitation and transformation of Nature" (Codo & Jacques,[4] 2002, p. 20). Despite the understanding that mental suffering affects the individual in extremely subjective ways, it is frequently determined by factors independent of the subject. This makes it necessary to identify, despite individual differences, what provokes such symptoms. However, it is "very difficult to reconstruct the links between the individual and the social, particularly when discussing mental suffering, which by definition is hidden from the both the sufferer and others around her/him". In addition, "the way in which work is organized in a modern capitalist society, by definition, hides fundamental determinations" (Codo & Jacques,[4] 2002, p. 25). This is another limitation of the study when measuring the dependent variable.

Table 3 - Association between sex, geographic region of work and social support with demand-control at work and with mental disorders of teachers. Northeastern Brazil, 2001.

Variable	Category	Demand-control	Mental disorder					
			Yes	No	Total	Prevalence	PR	95% CI
Total		High-strain	75	56	131	57.25	1.72	1.38-2.14
		Active work	146	124	270	54.07	1.63	1.34-1.98
		Passive work	48	83	131	36.64	1.10	0.84-1.45
		Low strain	99	199	298	33.22	1.00	-
Sex	Female	High-strain	67	45	112	59.82	1.65	1.33-2.05
		Active work	135	113	248	54.44	1.50	1.24-1.82
		Passive work	46	71	117	39.32	1.08	0.82-1.43
		Low strain	99	174	273	36.26	1.00	-
	Male	High-strain	6	7	13	46.15	nc	nc
		Active work	6	9	15	40.00	nc	nc
		Passive work	1	11	12	8.33	nc	nc
		Low strain	0	25	25	0.00	nc	nc
PR adjusted for sex		High-strain					1.79	1.44-2.22
		Active work					1.58	1.30-1.92
		Passive work					1.11	0.84-1.45
		Low strain					1.00	-
Geographic area	Urban	High-strain	46	39	85	54.12	1.59	1.21-2.09
		Active work	104	74	178	58.43	1.72	1.37-2.16
		Passive work	36	49	85	42.35	1.25	0.91-1.70
		Low strain	69	134	203	33.99	1.00	-
	Rural	High-strain	29	17	46	63.04	2.00	1.38-2.89
		Active work	42	50	92	45.65	1.45	1.00-2.09
		Passive work	12	33	45	26.67	0.84	0.48-1.49
		Low strain	30	65	95	31.58	1.00	-
PR adjusted for region		High-strain					1.72	1.38-2.15
		Active work					1.63	1.34-1.98
		Passive work					1.12	0.85-1.47
		Low strain					1.00	-
Social Support	Low	High-strain	38	16	54	70.37	1.45	1.00-2.10
		Active work	49	27	76	64.47	1.33	0.91-1.92
		Passive work	14	12	26	53.85	1.11	0.68-1.80
		Low strain	18	19	37	48.65	1.00	-
	Medium	High-strain	20	27	47	42.55	1.21	0.82-1.79
		Active work	72	59	131	54.96	1.56	1.20-2.03
		Passive work	28	59	87	32.18	0.91	0.63-1.32
		Low strain	57	105	162	35.19	1.00	-
	High	High-strain	3	7	10	30.00	1.28	0.46-3.59
		Active work	19	22	41	46.34	1.98	1.18-3.34
		Passive work	0	6	6	0.00	0.00	-
		Low strain	18	59	77	23.38	1.00	-
PR adjusted for support		High-strain					1.31	1.01-1.71
		Active work					1.56	1.28-1.90
		Passive work					0.92	0.68-1.25
		Low strain					1.00	-

PR: Prevalence Ratio; nc: Prevalence Ratio not calculated (Prevalence was zero in the denominator).

Table 4 - Prevalence of mental disorders in teachers, prevalence ratios and confidence intervals, according to the categories of the demand-control model, sex, geographic region of work and social support from colleagues. Northeastern Brazil, 2001.

Independent variable	Category	Mental disorder (without control for confounding effects)			Mental disorder (with control for confounding effects)		
		Prevalence (%)	Prevalence ratio	95% CI	Prevalence (%)	Prevalence ratio	95% CI
Demand-control	High-strain	57.25	1.72	1.38-2.14	53.22	1.50	1.16-1.94
	Active work	54.07	1.63	1.34-1.98	54.13	1.52	1.24-1.88
	Passive work	36.64	1.10	0.84-1.45	33.87	0.95	0.70-1.30
	Low strain*	33.22	1.00	-	35.51	1.00	-
Sex	Female	46.00	2.18	1.38-3.43	46.32	2.64	1.48-4.71
	Male*	21.13	1.00	-	17.55	1.00	-
Geographic region	Urban	46.22	1.13	0.97-1.31	46.34	1.18	0.97-1.43
	Rural*	41.08	1.00	-	39.35	1.00	-
Social support	Low	62.50	1.97	1.54-2.52	60.31	2.02	1.50-2.73
	Medium	41.24	1.30	1.02-1.67	41.48	1.39	1.03-1.87
	High*	31.71	1.00	-	29.86	1.00	-

*Reference categories

The positive results obtained in the SRQ-20 were similar to studies with high results among teachers (Silvany Neto et al,[24] who undertook a pilot study; Delcor et al[6] and Reis et al,[22] who analyzed separately the data from the present work).

The observed frequencies were superior to those from other studies of teachers,[6,22,24] of other categories of workers[2,8,12,16,21] and of the general population.[7] These values were similar to studies of primary health care patients,[3,7,18] i.e. persons who recognize themselves as possibly ill, however, not always of mental disorders.

This self-recognition regarding illness was manifested by teachers in a seminar at which the initial results of the research were presented to them.

Illnesses and the symptoms among professors occur seasonally, being most pronounced at the end of academic trimesters/semesters.* The teachers from a labor union in Bahia State often identify, facetiously, "Octoberitis" as a common affliction.

Because data were collected at the end of the school year, it is probable that teachers were under more intense work pressures, due to the final evaluation of students, for example. This may have amplified the accumulated tensions from the entire year.* There is evidence from previous studies of variations in work tension between the beginning and end of academic periods, which teachers themselves recognize.[10] Moreover, the period of the study also overlapped with a workers' mobilization convoked by labor unions in a dispute over salary and work conditions. This aggregation of stressing factors may have increased psychological symptoms, their identification and their verbal expression.

The prevalence of mental disorders was approximately equal in the *passive work* and *low-strain* categories. However, even this baseline value was high in comparison with results from similar studies with teachers.**

Contrary to expectation based on other studies that have used the demand-control model,[12] the "control" variable did not discriminate the mental suffering of teachers according to its categories, contrary to the "psychological demand" variable. This is probably a consequence of the fact that the teachers studied generally considered themselves as having satisfactory levels of control over their work environment, resulting in low variation of this characteristic.

In conclusion, there was evidence of high prevalence of suspected mental disorders and indices suggested an association of this prevalence with the demands of work among teachers. Additional studies, with appropriate methodologies, are necessary to understand the reasons for this elevated prevalence and to clarify the observed association.

However, regardless of additional studies, it is vital that municipal education authorities and union representatives carefully examine the situation in order to ameliorate it. It is recommended that periodical medical exams for teaching staff be conducted and medical and psychological support for the cases requiring assistance be provided. It is also recommended that attention be given to work conditions that are potentially harmful to teacher health and that a dialogue be initiated with them addressing health, and how to maintain and improve it.

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