RELATIONSHIP OF CHILDREN'S DEPRESSION INVENTORY FACTOR STRUCTURE TO SCHOOL ACHIEVEMENT

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Abstract: We analyzed associations between school achievement operationalized as grade point average (GPA) and Children's Depression Inventory (CDI) factor structure in three different factor models. The sample consisted of 587 Prague school children (276 boys and 311 girls) aged 9-11 years (average age 10.01). The results were consistent in all the models studied. Analyses were conducted separately for girls and boys. The obtained outcomes were similar for both genders. A significant correlation between GPA and total CDI score appeared. Detailed analyses revealed a factor with a markedly closer and more consistent relationship to GPA than other factors had. This factor comprised items directly linked with perception of school achievement. If the score of this factor was subtracted from the total CDI score, the correlation between the latter variable and GPA decreased, but stayed significant. Our findings suggest that the CDI contains a factor strongly related to GPA that should be controlled when studying the relationship of the total CDI score to GPA.

Key words: Children's Depression Inventory, depressive symptoms, school achievement

INTRODUCTION

This study deals with a relationship between school achievement and depressive symptoms in children that is an important issue of clinical and educational assessment. Many definitions of school achievement exist. Our understanding of it is that it is the results that pupils and students achieve in activities focused on goals of the study plan (Dan, 2002). This definition is consistent with operationalization of the variable as grade point average. We address depressive symptoms as conceptualized and measured by the Children's Depression Inventory (CDI), a common clinical and educational assessment method, and also the most widely used research measure of depressive symptoms in children and adolescents. The CDI is a 27-item self-rated symptom-oriented inventory. It consists of the following five subscales: A. Negative Mood, B. Interpersonal Problems, C. Ineffectiveness, D. Anhedonia, E. Negative Self-Esteem, and combines them into a total CDI score (Kovacs, 1992).

Lowered academic achievement is considered a significant risk factor for depressive symptoms (Masi et al., 2001;

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Craighead, Curry, Ilardi, 1995) and vice versa (e.g., Bandura, 1982). The research examining associations between school achievement and depressive symptoms repeatedly shows that these two phenomena are significantly related (Preiss, Fráňová, 2006; Glied, Pine, 2002; Chen, Li, 2000; Ezpeleta, 1990; Mattison et al., 1990; Fauber et al., 1987). Chen and Li (2000) report that the mutual relationships of these phenomena are of a circular nature. School achievement problems may trigger depressive symptoms and in return the symptoms can worsen school adjustment. Both variables may also emerge as a result of other problems (Glied, Pine, 2002).

The main limitation of the cited works is that they mostly used only a total CDI score and did not examine what role particular CDI scales play within the found association. Aluja and Blanch (2002) addressed this issue in a study with a sample of 13-year-old children (N = 678). They found that the correlation between the total CDI score and school achievement did not reflect a truly existing relationship between school achievement and depressive symptoms. It could have been accounted for by a single factor measuring maladjusted kinds of behavior that were not necessarily depressive symptoms. The authors conducted exploratory and confirmatory factor analyses that resulted in a four-factor model, including a factor measuring social and school adjustment. The factor resembled the scale C. Ineffectiveness determined by Kovacs and Aluja and Blanch (2002) called it Incompetence-Maladjustment. When controlling for Incompetence-Maladjustment, the correlation between the total CDI score and school achievement disappeared. Moreover, the regression analysis of predictive power of the CDI factors showed Incompetence-Maladjustment to be the only predictor of low school achievement (Aluja, Blanch, 2002). We got similar results when we examined predictive power of the total CDI score in distinguishing children with no problems in the area of achievement from underachievers and children with low school achievement. We came to the conclusion that the predictive power could have been accounted for by the scale CDI-C Ineffectiveness (Fráňová, Lukavský, Preiss, 2006).

The findings of the latter two studies suggest a vicious circle: the CDI scale that best predicts school achievement and is responsible for the correlation between the total CDI score and school achievement consists of items related to school and social adjustment problems. Aluja and Blanch's (2002) stated assumption is that the CDI contains at least 7 (of the total 27) items that tend to group to a single factor and have school and socially maladjusted content not necessarily attributable to depressive symptomatology. If repeatedly replicated, such a finding would have important implications for interpreting past research and designing further studies in the area. The main question is whether the established practice of using a single total CDI score when studying associations between depressive symptoms and school achievement is appropriate.

The main goals of our study were: 1) to examine, which of the CDI factors has the closest relationship to school achievement; 2) to test whether this factor can be responsible for the correlation between the CDI total score and grade point average. Because there have been many attempts to identify CDI factor structure (see review in Kovacs, 1992) resulting in many different models, we decided to test our hypotheses on three models separately: on the original one determined by Kovacs (1992), on the

Aluja and Blanch (2002) model and finally on a model gained by the exemplary factor analysis of Weiss, Weisz, Politano, Carrey, Nelson, and Finch (1991).

Based on the background knowledge reviewed above, we formulated the following hypotheses:

1. There appears to be a significant correlation between the total CDI score and school achievement.
2. The highest correlation with school achievement can be found in the CDI factors containing items directly related to perception of school performance.
3. The significant association between the total CDI score and school achievement disappears when controlling for the CDI factor with highest correlation with school achievement.
4. When predicting school achievement from the CDI factors, the factor with highest correlation with school achievement works as best predictor.
5. If the score of the factor with highest correlation with school achievement is subtracted from the total CDI score, the correlation between the school achievement and the total CDI score ceases to be significant.

MATERIALS AND METHODS

Sample

The sample consisted of 587 children aged 9, 10, and 11 years attending 12 Prague elementary schools. 276 (47%) of them were boys and 311 (53%) girls. We randomly selected one school from each of the 10 Prague districts except the two largest districts. Two schools were selected from each of these districts. Age served as the main inclusion criterion. Children were included if their age at the time of assessment differed one month or less from the expected age levels of 9, 10 or 11 years. There were 191 (33%) nine year old, 200 (34%) ten year old, and 196 (33%) eleven year old children. Average age was 10.01 years with SD 0.81 (boys: mean 10.04, SD 0.82; girls: mean 9.98, SD 0.8).

Procedure

This work is based on data retrieved from a broader study "Research into Intelligence in Prague Children" carried out by the inter-institutional collective led by Preiss from the Prague Psychiatric Center. Within this project, a sample of Prague children selected according to the above-described procedure was tested in schools using CDI and several intelligence and neuropsychological measures. All the tested children and their parents were informed and agreed to participate in the study. The study was approved by the Ethical Committee of the Prague Psychiatric Center. Experienced psychologists from counseling facilities individually tested the participants following standard administration procedures. Assessments were administered in four successive waves during the years 1996-2002 (1st wave: 1996-1997, N = 75; 2nd wave: 1997-1998, N = 178; 3rd wave: 1999-2000, N = 175; 4th wave: 2001-2002, N = 159). The data of the four observed cohorts were grouped together, because no significant differences were found (see Results).

Instruments

Depressive symptoms. We assessed depressive symptoms using a Czech validated version of the Children's Depression Inventory, a self-report questionnaire designed for children and adolescents aged 7-17 years (Kovacs, Preiss, 1998). The inventory consists of 27 items and the

subject is instructed to choose a statement that best describes his/her feelings in the past 2 weeks from three given possibilities on each item. Each response is scored 0, 1 or 2 with higher values indicating greater severity of symptoms. As mentioned earlier, the CDI contains five subscales: A. Negative Mood, B. Interpersonal Problems, C. Ineffectiveness, D. Anhedonia, and E. Negative Self-Esteem, and combines them into a total CDI score. The reliability and validity of this scale has been documented in multiple studies (Kovacs, 1992).

Academic achievement. We used a grade point average of all grades obtained at the last school report as a measure of academic achievement. The grades follow the national system, ranging from "excellent" (1) to "unsatisfactory" (5).

Compared Models

In our study, we compared the original factor model proposed by Kovacs (1992) and the models described by Aluja and Blanch (2002) and Weiss, Weisz, Politano, Carrey, Nelson, and Finch (1991) (hereinafter only Weiss's model). Kovacs's and Aluja and Blanch's models identify which items constitute each scale, in Weiss's model we worked with the original factor loading table and assigned the items to the subscales described by the authors. In this process we assigned each item to the factor with the maximal loading, but if the difference between the highest and the next loading was less than .10, we consulted the item content.

The scales included in our study and the items constituting these scales are shown in Table 1. The Kovacs (1992) model was obtained by maximum likelihood factor analyses with oblique (direct oblimin) rotation, the Aluja and Blanch model (2002) by principle components analysis with varimax rotation. The Weiss model is based on maximum likelihood factor analysis with promax rotation. Unlike the first two models, the latter one was generated on data retrieved from a clinical sample. In the original analysis, the item 9 (Suicidal ideation) was excluded from the analysis, and therefore we decided to exclude it as well when analyzing the Weiss model.

RESULTS

Distribution of Basic Variables and Gender Differences

First, we inspected the observed cohorts and found no significant differences in the distribution of school performance (Kruskal-Wallis test, $\chi^2 = 4.246$, df = 3, n.s.), total CDI score ($\chi^2 = 4.091$, df = 3, n.s.), age ($\chi^2 = .768$, df = 6, n.s.) or sex ($\chi^2 = 1.359$, df = 3, n.s.). In further analysis we worked with a joint sample.

Because we expected different mechanisms to be involved in boys and girls, the statistical operations for both genders were conducted separately. The descriptive statistics (means, standard deviations, ranges and α coefficients) for all subscales and the gender differences (measured with t-test) are shown in Table 2. The results in CDI subscales were similar for both genders. Significant differences were found in Aluja and Blanch's CDI_Aluja_IV factor (Negative Self-Esteem), in which girls scored higher (3.67 vs 3.3), and in CDI_W4 subscale based on Weiss's Unloved factor, in which girls also scored higher (2.53 vs 2.21). These differences can be expected, because the subscales mentioned share 3 items, which may cause the similar results.

Cronbach's α reliability (internal consistency) of the CDI was .80. Kovacs (1992)

Table 1. The CDI factor models included in analyses

Subsacle code	Subscale description	Items
Kovacs's model (1992)		
CDI_A	Negative Mood	1, 6, 8, 10, 11, 13
CDI_B	Interpersonal Difficulties	5, 12, 26, 27
CDI_C	Ineffectiveness	3, 15, 23, 24
CDI_D	Anhedonia	4, 16, 17, 18, 19, 20, 21, 22
CDI_E	Negative Self-Esteem	2, 7, 9, 14, 25
Aluja and Blanch's model (2002)		
CDI_Aluja_I	Social Withdrawal	4, 9, 12, 20, 21, 22, 25
CDI_Aluja_II	Anhedonia-Asthenia	1, 6, 8, 10, 11, 16, 17, 18
CDI_Aluja_III	Incompetence-Maladjustment	3, 5, 15, 23, 26, 27
CDI_Aluja_IV	Negative Self-Esteem	2, 7, 13, 14, 19, 24
Weiss, Weisz, Politano, Carreay, Nelson, and Finch's model (1991)		
CDI_W1	Negative Affect with Somatic Concerns	1, 4, 6, 12, 17, 19, 20, 22
CDI_W2	Externalizing Problems and Negative Self-Image	3, 5, 8, 24, 26, 27
CDI_W3	School Problems	13, 15, 21, 23,
CDI_W4	Unloved	2, 7, 14, 18, 25
CDI_W5	Negative Affect (upset)	10, 11, 16

Note: Subscale code = codename in further results; Subcale description = names of subscales given by its author, Items = items of CDI constituting subscales

as well as Weiss et al. (1991) obtained Cronbach's α .86; Aluja and Blanch (2002) 0.82. In our data, the α values for each scale ranged from .40 to .59 for the Kovacs model, from .50 to .57 for the Aluja and Blanch model, and from .42 to .55 for the Weiss model. Compared with Kovacs's (1992) and Aluja and Blanch's results (2002), these values were lower (the indexes reported by Kovacs ranged from .59 to .68 and those reported by Aluja and Blanch from .58 to .64 for their subscales). The Weiss et al. study (1991) did not report factor alpha coefficients.

Relationship Between CDI Factors and Academic Achievement

Mutual correlations of observed parameters are shown in Table 3. For boys, academic achievement was related to all CDI subscales in all three models except Weiss's CDI-W4 (Unloved), for girls it was also related to them all except for Kovacs's CDI-A factor (Negative Mood) and Weiss's CDI_W1 (Negative Affect). These two subscales are correlated (r = .658 in girls). Academic achievement was

Table 2. Comparison of mean scores by gender, standard deviation, range, t-test, significance, and Cronbach's α

	Boys				Girls				t-test	p<	α
	Mean	SD	Range		Mean	SD	Range				
Age	10.04	.82	9	11	9.98	.80	9	11	.880	.38	
Academic achievement	1.37	.38	1	3	1.30	.32	1	3	2.303	**.02**	
CDI Total	8.60	5.27	0	34	9.15	5.62	0	31	-1.225	.22	.80
CDI_A	1.65	1.46	0	6	1.80	1.67	0	9	-1.126	.26	.49
CDI_B	.79	1.08	0	4	.65	.93	0	4	1.683	.09	.40
CDI_C	1.68	1.41	0	8	1.81	1.64	0	7	-.996	.32	.59
CDI_D	2.44	2.02	0	10	2.71	2.08	0	10	-1.585	.11	.53
CDI_E	2.04	1.26	0	7	2.19	1.33	0	8	-1.430	.15	.49
CDI_Aluja_I	1.61	1.59	0	9	1.57	1.56	0	7	.332	.74	.52
CDI_Aluja_II	2.08	1.94	0	9	2.38	2.07	0	10	-1.763	.08	.50
CDI_Aluja_III	1.61	1.60	0	8	1.54	1.67	0	7	.506	.61	.54
CDI_Aluja_IV	3.30	1.67	0	9	3.67	1.86	0	10	-2.551	**.01**	.57
CDI_W1	2.28	1.83	0	11	2.38	1.71	0	8	-.666	.51	.50
CDI_W2	1.75	1.60	0	7	1.80	1.60	0	9	-.385	.70	.55
CDI_W3	1.58	1.36	0	6	1.59	1.56	0	7	-.072	.94	.52
CDI_W4	2.21	1.42	0	8	2.53	1.51	0	8	-2.616	**.01**	.43
CDI_W5	0.52	.87	0	4	.66	.99	0	6	-1.746	.08	.42
N	276 (47%)				311 (53%)						

Note: CDI Total = total score in Children's Depression Inventory, CDI-A = Negative Mood, CDI-B = Interpersonal Difficulties, CDI-C = Ineffectiveness, CDI-D = Anhedonia, CDI-E = Negative Self-Esteem, CDI_Aluja_I = Social Withdrawal, CDI_Aluja_II = Anhedonia-Asthenia, CDI_Aluja_III = Incompetence-Maladjustment, CDI_Aluja_IV = Negative Self-Esteem, CDI-W1 = Negative Affect with Somatic Concerns, CDI-W2 = Externalizing Problems and Negative Self-Image, CDI-W3 = School Problems, CDI-W4 = Unloved, CDI-W5 = Negative Affect (upset)

significantly associated with almost all the studied factors, but the relationships were to a different extent (for details see Table 3). The items correlating most with academic achievement were: Item 15 (Schoolwork difficulty, Pearson correlation r = .24), Item 23 (School performance decrement, r = .21), Item 24 (Self-depreciation [via peer comparison], r = .21) and Item 9 (Suicidal ideation, r = .19).

In order to investigate the effect of each subscale on the overall CDI-academic achievement correlation, the partial correlations were carried out. In these partial correlations, the observed subscales were controlled, one at a time. In both genders, the significant relationship disappeared, when either Kovacs's CDI-C (Ineffectiveness, r = .085 and r = -.001 for boys and girls respectively), Aluja and Blanch's

Table 3. Pearson correlations of observed parameters for boys and girls (boys are on the top right-hand side, girls on the bottom left)

	Age	Academic achievement	CDI Total	CDI_A	CDI_B	CDI_C	CDI_D	CDI_E	CDI_Aluja_I	CDI_Aluja_II	CDI_Aluja_III	CDI_Aluja_IV	CDI_W1	CDI_W2	CDI_W3	CDI_W4	CDI_W5	CDI_M_Kovacs	CDI_M_Aluja	CDI_M_Weiss
Age		**0,26**	0,02	0,07	-0,08	0,14	-0,14	**0,18**	-0,02	-0,05	0,00	0,15	-0,06	0,04	0,07	0,07	0,00	-0,02	0,03	0,02
Academic achievement	**0,19**		**0,22**	0,15	0,11	**0,27**	0,10	0,15	**0,17**	0,07	**0,23**	**0,17**	0,15	**0,21**	**0,23**	0,08	0,04	**0,17**	**0,19**	**0,18**
CDI Total	0,02	**0,24**		**0,76**	**0,63**	**0,68**	**0,74**	**0,62**	**0,64**	**0,76**	**0,78**	**0,77**	**0,66**	**0,76**	**0,71**	**0,64**	**0,54**	**0,96**	**0,97**	**0,96**
CDI_A	-0,03	0,04	**0,70**		**0,41**	**0,47**	**0,45**	**0,33**	**0,32**	**0,81**	**0,57**	**0,55**	**0,57**	**0,57**	**0,59**	**0,34**	**0,55**	**0,75**	**0,75**	**0,73**
CDI_B	-0,01	0,12	**0,52**	**0,27**		**0,31**	**0,41**	**0,29**	**0,44**	**0,44**	**0,65**	**0,40**	**0,45**	**0,66**	**0,31**	**0,28**	**0,36**	**0,66**	**0,54**	**0,64**
CDI_C	0,06	**0,29**	**0,74**	**0,44**	**0,33**		**0,28**	**0,40**	**0,23**	**0,36**	**0,82**	**0,66**	**0,22**	**0,71**	**0,76**	**0,36**	**0,23**	**0,47**	**0,54**	**0,55**
CDI_D	0,02	**0,18**	**0,76**	**0,41**	**0,33**	**0,39**		**0,31**	**0,68**	**0,69**	**0,40**	**0,47**	**0,76**	**0,40**	**0,42**	**0,48**	**0,47**	**0,80**	**0,80**	**0,77**
CDI_E	0,06	0,14	**0,64**	**0,36**	**0,30**	**0,37**	**0,34**		**0,54**	**0,27**	**0,39**	**0,68**	**0,21**	**0,39**	**0,41**	**0,78**	**0,29**	**0,62**	**0,64**	**0,60**
CDI_Aluja_I	-0,07	**0,17**	**0,67**	**0,34**	**0,37**	**0,41**	**0,67**	**0,51**		**0,36**	**0,32**	**0,34**	**0,63**	**0,34**	**0,38**	**0,42**	**0,31**	**0,69**	**0,70**	**0,62**
CDI_Aluja_II	-0,01	0,12	**0,75**	**0,75**	**0,34**	**0,38**	**0,74**	**0,32**	**0,39**		**0,48**	**0,40**	**0,64**	**0,51**	**0,40**	**0,45**	**0,63**	**0,79**	**0,78**	**0,80**
CDI_Aluja_III	0,02	**0,26**	**0,76**	**0,45**	**0,63**	**0,84**	**0,42**	**0,38**	**0,39**	**0,44**		**0,58**	**0,35**	**0,77**	**0,76**	**0,37**	**0,34**	**0,65**	**0,61**	**0,67**
CDI_Aluja_IV	0,10	**0,17**	**0,77**	**0,55**	**0,30**	**0,64**	**0,48**	**0,72**	**0,40**	**0,39**	**0,52**		**0,38**	**0,65**	**0,63**	**0,63**	**0,33**	**0,70**	**0,76**	**0,73**
CDI_W1	-0,04	0,10	**0,73**	**0,60**	**0,37**	**0,40**	**0,79**	**0,30**	**0,67**	**0,69**	**0,42**	**0,47**		**0,33**	**0,35**	**0,22**	**0,35**	**0,72**	**0,71**	**0,72**
CDI_W2	0,06	**0,17**	**0,72**	**0,52**	**0,62**	**0,75**	**0,35**	**0,40**	**0,34**	**0,45**	**0,75**	**0,61**	**0,37**		**0,48**	**0,36**	**0,31**	**0,66**	**0,66**	**0,74**
CDI_W3	0,02	**0,25**	**0,76**	**0,58**	**0,28**	**0,81**	**0,48**	**0,39**	**0,49**	**0,41**	**0,76**	**0,67**	**0,51**	**0,53**		**0,41**	**0,28**	**0,59**	**0,60**	**0,55**
CDI_W4	0,10	**0,20**	**0,69**	**0,33**	**0,28**	**0,39**	**0,58**	**0,80**	**0,44**	**0,53**	**0,38**	**0,66**	**0,35**	**0,37**	**0,41**		**0,26**	**0,64**	**0,67**	**0,65**
CDI_W5	0,02	0,10	**0,61**	**0,60**	**0,35**	**0,33**	**0,56**	**0,29**	**0,35**	**0,73**	**0,41**	**0,37**	**0,51**	**0,37**	**0,34**	**0,30**		**0,57**	**0,56**	**0,57**
CDI_M_Kovacs	0,01	**0,18**	**0,96**	**0,72**	**0,53**	**0,53**	**0,82**	**0,66**	**0,69**	**0,81**	**0,61**	**0,72**	**0,77**	**0,61**	**0,63**	**0,72**	**0,65**		**0,97**	**0,96**
CDI_M_Aluja	0,02	**0,19**	**0,96**	**0,72**	**0,42**	**0,61**	**0,81**	**0,67**	**0,71**	**0,79**	**0,57**	**0,78**	**0,78**	**0,61**	**0,66**	**0,72**	**0,62**	**0,97**		**0,97**
CDI_M_Weiss	0,04	**0,21**	**0,97**	**0,68**	**0,55**	**0,64**	**0,79**	**0,62**	**0,64**	**0,80**	**0,68**	**0,73**	**0,76**	**0,72**	**0,62**	**0,70**	**0,65**	**0,96**	**0,96**	

Note: CDI Total = total score in Children's Depression Inventory, CDI-A = Negative Mood, CDI-B = Interpersonal Difficulties, CDI-C = Ineffectiveness, CDI-D = Anhedonia, CDI-E = Negative Self-Esteem, CDI_Aluja_I = Social Withdrawal, CDI_Aluja_II = Anhedonia-Asthenia, CDI_Aluja_III = Incompetence-Maladjustment, CDI_Aluja_IV = Negative Self-Esteem, CDI-W1 = Negative Affect with Somatic Concerns, CDI-W2 = Externalizing Problems and Negative Self-Image, CDI-W3 = School Problems, CDI-W4 = Unloved, CDI-W5 = Negative Affect (upset), CDI_M_Kovacs = CDI without Ineffectiveness subscale, CDI_M_Aluja = CDI without Incompetence-Maladjustment subscale, CDI_M_Weiss = CDI without School Problems subscale

Correlations with $p < .01$ are printed in bold letters

CDI_Aluja_III (Incompetence-Maladjustment, r = .106 and r = .027) or Weiss's CDI-W3 (School problems, r = .106 and r = .042) were controlled. When these subscales were not controlled, the significant relationship between academic achievement and CDI was preserved. All these factors share several items and their mutual correlations exceed .750 in both genders. Items 15 and 23, which can be found in all mentioned subscales, are the items with highest correlations with academic achievement.

We likewise inspected what would happen if we excluded these subscales from the total CDI score and then compared the school achievement and CDI correlation. With this method we derived the CDI_M_Kovacs, CDI_M_Aluja and CDI_M_Weiss scores containing all subscales except the one with the highest correlation with school achievement. From these results (presented in Table 3) we can see that the school achievement and CDI correlation was lower, but still significant.

Predicting Low School Achievement

In order to assess the relationship between the CDI subscales and academic achievement in each model, a multiple regression analysis using stepwise method was performed. The results are shown in Table 4. In this analysis, the academic achievement was predicted from all CDI subscales for each model. The results were in accord with the findings from partial correlation analysis, and the best predictors for both genders were the Kovacs CDI-C, the Aluja and Blanch CDI_Aluja_III, and the Weiss CDI-W3 subscales. There were also extra predictors for girls in the Kovacs model (CDI-A Negative Mood, and CDI-D Anhedonia), both with smaller effects than CDI-C Ineffectiveness. Interestingly, the effect of Negative Mood in girls was reversed, i.e. Negative Mood predicted better, not worse academic results. In the Aluja and Blanch model CDI_Aluja_I (Social Withdrawal) was another predictor of worse academic achievement for boys. The R^2 values for the models ranged from .066 to .114.

Table 4. Multiple linear regression, stepwise method. The CDI subscales as predictors of low academic achievement in three different factor models

Kovacs's model											
Independent variables: CDI_A, CDI_B, CDI_C, CDI_D, CDI_E. Dependent variables: Achievement											
Boys						Girls					
Predictor	B	SE B	Beta	t	p <	Predictor	B	SE B	Beta	t	p <
(Constant)	1.229	.034		36.320	0	(Constant)	1.188	.031		38.770	0
CDI_C	.082	.015	.306	5.327	0	CDI_C	.065	.013	.332	5.122	0
						CDI_A	-.030	.013	-.170	-2.520	.012
R^2 = .094						CDI_D	.019	.010	.125	2.017	.045
						R^2 = .114					
Aluja and Blanch's model											
Independent variables: CDI_Aluja_I, CDI_Aluja_II, CDI_Aluja_III, CDI_Aluja_IV. Dependent variables: Achievement											
Boys						Girls					
Predictor	B	SE B	Beta	t	p <	Predictor	B	SE B	Beta	t	p <
(Constant)	1.235	.034		36.250	0	(Constant)	1.222	.024		51.210	0
CDI_Aluja_III	.047	.015	.198	3.086	.002	CDI_Aluja_III	.051	.011	.265	4.839	0
CDI_Aluja_I	.035	.015	.149	2.324	.021						
						R^2 = .070					
R^2 = .087											

Table continues

Table 4 (continued)

Weiss's model												
Independent variables: CDI_W1, CDI_W2, CDI_W3, CDI_W4, CDI_W5. Dependent variables: Achievement												
Boys							Girls					
Predictor	B	SE B	Beta	t	p <		Predictor	B	SE B	Beta	t	p <
(Constant)	1.245	.034		37.030	0		(Constant)	1.216	.025		48.480	0
CDI_W3	.077	.016	.278	4.794	0		CDI_W3	.053	.011	.257	4.674	0
R^2 = .077							R^2 = .066					

Note: CDI-A = Negative Mood, CDI-B = Interpersonal Difficulties, CDI-C = Ineffectiveness, CDI-D = Anhedonia, CDI-E = Negative Self-Esteem, CDI_Aluja_I = Social Withdrawal, CDI_Aluja_II = Anhedonia-Asthenia, CDI_Aluja_III = Incompetence-Maladjustment, CDI_Aluja_IV = Negative Self-Esteem, CDI-W1 = Negative Affect with Somatic Concerns, CDI-W2 = Externalizing Problems and Negative Self-Image, CDI-W3 = School Problems, CDI-W4 = Unloved, CDI-W5 = Negative Affect (upset)

DISCUSSION

Major findings of the study suggest that examining the relationship of school achievement and depressive symptoms using only the total CDI score cannot be considered an adequate approach, because the CDI contains a factor that strongly relates to school achievement, and thus influences the obtained results. However, we cannot support the Aluja and Blanch hypothesis that there is a single factor fully responsible for the emergence of the correlation between school achievement and the total CDI score. The first four of our hypotheses were supported, the fifth one not. First, consistently with other studies (Aluja, Blanch, 2002; Ezpeleta, 1990; Fauber et al., 1987; Chen, Li, 2000; Glied, Pine, 2002; Mattison et al., 1990) we found that in both boys and girls the total CDI score significantly related to academic achievement. Second, within the three factor models studied, in both genders the following factors reached the highest coefficients of correlation with school achievement: Kovacs's CDI-C (Ineffectiveness), Aluja and Blanch's CDI_Aluja_III (Incompetence-Maladjustment) and Weiss's CDI-W3 (School Problems). Third, in both genders the association found between the total CDI score and school achievement disappeared, when we performed partial correlation analysis controlling for either of the three factors. When we had controlled all other examined factors, one at a time, the association stayed significant. Fourth, in accordance with partial correlation analysis results, the multiple regression analysis showed that the three factors discussed above were the best predictors of school achievement in both boys and girls, each factor within its particular model. Fifth, contrary to our expectation, after excluding the best predictors the relationship decreased but stayed significant in all the three models studied. In a similar

analysis, Aluja and Blanch (2002) found that the correlation decreased sharply (-.10 and .05 for boys and girls) and became insignificant.

In each of the models studied there was a factor consistently related to school achievement. The factors overlapped in two items: 15. School-work difficulty - *"I have to push myself all the time to do my schoolwork"* and 23. School performance decrement - *"I do very badly in subjects I used to be good in"*, which were also the items with strongest correlations with school achievement. When we conducted partial correlation analysis controlling only for these two items, the relationship between school achievement and the total CDI score remained significant. When the third highest correlating item, item 24. Self-depreciation via peer comparison -*"I can never be as good as other kids"*, was added the statistically significant association disappeared. As mentioned above, the three factors closely related to school achievement had two items in common and those were the items with content directly referring to school achievement problems. The Kovacs CDI-C (Ineffectiveness) consisted of two other items: 3. Self-depreciation - *"I do everything wrong"* and 24. Self-depreciation via peer comparison -*"I can never be as good as other kids"*. The factor Ineffectiveness was supposed to measure effects of depressive states in the school context (Kovacs, Preiss, 1998). Other items of Aluja and Blanch's CDI_Aluja_III (Incompetence-Maladjustment) included the following four items: 3. Self-depreciation (see above), 5. Misbehavior - *"I am bad all the time"*, 26. Disobedience - *"I never do what I am told"*, 27. Fighting - *"I get into fights all the time."* The authors reported that this factor referred to inefficiency, incompetence, and maladjusted or even asocial kinds of behavior (Aluja, Blanch, 2002). The Weiss CDI-W3 (School Problems) reflected perceptions that one was having problems at school and besides the two school problems there were items: 13. Indecisiveness - *"I cannot make up my mind about things"* and 21. School dislike - *"I never have fun at school."* Given the variability of multiple factor models of the CDI the content differences between the discussed factors do not surprise. The main difference was that, unlike the Aluja and Blanch model in each of the two other models studied, the school maladjustment items (15. and 23.) and the social maladjustment items (5., 26., 27.) did not group together, but were separated into two factors. Further research might work with more detailed analysis of particular school and socially maladjusted items.

We see four main limitations of our study. First, even though the findings were consistent across all the three models, different factor patterns could bring different results. In further research, comparing more patterns might generate additional information. Second, the results related to the Weiss model should be interpreted cautiously, because this model was developed on a clinical sample. The factor patterns underlying CDI in clinical and non-clinical samples can differ. In spite of this limitation, we decided to use this model, because it had been considered an exemplary factor analysis of CDI (Craighead, Curry, Ilardi, 1995). Third, if we had a chance to combine grade point average information with some of standardized assessment methods of school performance, it would give a more precise measure of school achievement. Last, we worked with a representative sample of Prague urban area children aged 9-11 years, so the findings cannot be generalized to a broader population. It would be beneficial to ex-

plore similar questions on various samples, especially samples of older children and clinically referred children. As children grow older their grade point average acquires higher variability and becomes more related to non-cognitive motivational factors (Škaloudová, 2005), therefore we would expect closer association with CDI. Closer relationship could also be expected in clinically referred children, where the CDI items related to school achievement reflect effects of depressive states in the school context to a greater extent than in non-clinical settings, where the items probably reflect a higher number of factors.

Our findings have two major implications for the interpretation of past research, as well as for the design of future studies in the area. The results of past studies examining the relationship between school achievement and depressive symptoms if measured only with the total CDI score should be interpreted with caution. When designing new studies in the area, the role of particular CDI subscales should be examined and the factor or the items strongly related to school achievement should be controlled.

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VZTAH FAKTOROVÉ STRUKTURY SEBEPOSUZOVACÍ ŠKÁLY DEPRESIVITY PRO DĚTI KE ŠKOLNÍMU VÝKONU

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Souhrn: Analyzovali jsme vztahy mezi školním výkonem operacionalizovaným jako známkový průměr a faktorovou strukturou Sebeposuzovací škály depresivity (CDI) u tří faktorových modelů. Vzorek se skládal z 587 pražských školáků (276 chlapců a 311 dívek) ve věku 9-11 let (průměrný věk 10,01). Ve všech třech studovaných modelech jsme dosáhli obdobných výsledků. Analýzy byly provedeny zvlášť pro chlapce a dívky. Získané výstupy byly u obou pohlaví podobné. Objevila se významná korelace mezi známkovým průměrem a celkovým skórem CDI. Detailní analýza odhalila faktor s výrazně užším a konzistentnějším vztahem ke známkovému průměru než u faktorů zbývajících. Tento faktor obsahoval položky přímo spjaté s percepcí vlastního školního výkonu. Když jsme skór tohoto faktoru odečetli od celkového skóru CDI, korelace mezi celkovým skórem CDI a známkovým průměrem poklesla, ale zůstala signifikantní. Naše poznatky naznačují, že CDI obsahuje faktor úzce související se známkovým průměrem, který by měl být při studiu vztahu mezi celkovým skórem CDI a známkovým průměrem kontrolován.