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INTRODUCTION

A large percentage of children at risk for heightened depressive symptoms as well as the one of children at risk for negative features connected with lowered school achievement remain unrecognized, although the children's sensitivity to prevention and intervention is high. Both heightened levels of depressive symptoms and lowered school achievement present problems relatively stable over time and connected with numerous negative concurrent and subsequent outcomes. Relationships between the two variables in children present an important clinical and educational issue.

Even though research attention devoted to the issue has been growing in the Euro-American region, the number of relevant Czech studies still remains low. Our project was designed to help fill this gap by working with a relatively large Czech community sample. We aspire to contribute to better understanding of the associations between depressive symptoms and school achievement and to bring several results beneficial to the improvement of the established research methodology in the area.

ABSTRACT

The study addressed relationships between depressive symptoms and school achievement and explored selected limits of the Children's Depression Inventory (CDI) in this area. The sample consisted of 814 Prague school children aged 9 to 11 years. Children were individually assessed; the variables included school achievement (Czech language grade, math grade, and grade point average), depressive symptoms (self-reports on the CDI), sex, age, parental education status, and intelligence (Wechsler Intelligence Scale for Children).

All three school achievement measures significantly correlated with the total CDI score, as well as with the five CDI subscales. These associations lasted even when possible confounding variables intelligence and parental education status were controlled. The CDI_C Ineffectiveness scale demonstrated the most consistent relationships with the school achievement measures. This CDI subscale worked as a more salient predictor of the school achievement measures than the total CDI score. After excluding the CDI_C Ineffectiveness score from the total CDI score, such modified total CDI score showed weaker correlations with school achievement measures, as well as weaker power in their prediction. However, the results remained significant, thus the relationships found cannot be accounted for by confounding influence of the CDI_C Ineffectiveness.

These findings imply that: 1) prevention and intervention in the domains of depressive symptomatology and school achievement as early as late childhood are appropriate; 2) practitioners dealing with depressive symptoms or school achievement can benefit from measuring the respective other domain; 3) practitioners and investigators in this area should notice the CDI_C Ineffectiveness scale and related possible methodological limits of the CDI.

ABSTRAKT

Studie sledovala vztahy mezi depresivními symptomy a školním výkonem a zkoumala vybrané limity Sebeuposuzovací škály depresivity pro děti (CDI) v této oblasti. Soubor se skládal z 814 pražských školních dětí ve věku 9 až 11 let. Děti byly individuálně vyšetřeny; sledované proměnné zahrnovaly školní výkon (známku z češtiny, známku z matematiky a známkový průměr), depresivní symptomy (sebeuposouzení v CDI), pohlaví, věk, vzdělání rodičů a inteligenci (Pražský dětský Wechsler).

Všechny tři ukazatele školního výkonu významně korelovaly s celkovým skórem CDI, stejně jako s pěti subškálami CDI. Tyto vztahy přetrvaly i při kontrole nežádoucích proměnných inteligence a vzdělání rodičů. Nejvíce konzistentní vztah k indikátorům školního výkonu vykazovala škála CDI_C Nevýkonnost. Tato subškála působila jako lepší prediktor ukazatelů školního výkonu než celkový skóre CDI. Po vyloučení skóre CDI_C Nevýkonnosti z celkového skóre CDI vykazoval takto modifikovaný celkový skóre CDI slabší korelace s ukazateli školního výkonu, stejně jako slabší sílu při jejich predikci. Nicméně výsledky zůstaly signifikantní, takže nalezené vztahy nemohou být přičteny zkreslujícímu vlivu CDI_C Nevýkonnosti.

Tyto poznatky naznačují, že: 1) prevence a intervence v oblastech depresivní symptomatiky a školního výkonu je vhodná už od pozdního dětství; 2) pro praktiky zabývající se depresivními symptomy nebo školním výkonem může být užitečné sledovat i druhou oblast; 3) praktici a výzkumníci v této oblasti by si měli všimnout škály CDI_C a s ní spojených možných metodologických omezení CDI.

I. THE EXISTING KNOWLEDGE

I. 1. Depressive Symptoms

I. 1. 1. Definition and Assessment

In the research area examining various forms of depressive experience, most researchers use a single term *depression* regardless of different conceptualizations and assessment methods. The word depression has traditionally been used to label mostly psychiatric disorders, and thus implies connotations of clinically significant levels of specifically defined symptoms. However, most studies of depressive symptoms in children use the term depression to label groups of differently defined and assessed (mostly by a single self-report measure) depressive symptoms that need not signalize depressive syndrome or affective disorder.

Cantwell and Baker (1991) differentiate four meanings of the word depression:

1. Depression as one depressive symptom, a meaning common among nonexperts.
2. Depression as various depressive symptoms (depending on assessment

methods used), the most common meaning in research of “depression in children”. (A single measure of depressive symptoms is possible.)

3. Depression as a depressive syndrome, a specific group of depressive symptoms signaling somatic or psychiatric disorder. (A comprehensive clinical assessment is needed.)

4. Depression as one of affective disorders. (A comprehensive clinical assessment is needed.)

In this dissertation project, we use the term depression keeping with the fourth definition and we use a term depressive symptoms or depressive symptomatology in the meaning of the second definition. Depressive symptoms are symptoms typical for patients with depressive syndrome or affective disorders, but their presence is to a certain level common also in nonclinical populations. To what extent clinical and nonclinical forms of depressive symptomatology differ quantitatively and qualitatively is an issue of debate. However, research has convincingly shown that subclinical level of depressive symptoms is a strong predictor of subsequent occurrence of depressive disorder (Allgood-Merten, Lewinsohn, & Hops, 1990).

The main depressive symptoms as cited in Krejčířová (2001, p. 602) are following:

1. Depressive mood – mainly feelings of hopelessness, irritability, loss of interest and joy from daily activities, boredom, feelings of emptiness, sorrow, anger
2. Disturbed appetite – particularly loss of appetite, less often overeating

3. Disturbed sleep – insomnia or excessive somnolence
4. Apathy, loss of interest and joy, loss of motivation and diligence
5. Motor inhibition or agitation
6. Feelings of worthlessness or feelings of guilt
7. Reduced capacity for concentration
8. Suicidal ideation, self-destructive behavior, risk and potentially self-destructive behavior

In children's symptoms, we can find greater interindividual and intraindividual variability than in adolescents or adults. A great discussion was elicited by the model of *masked depression* formulated by Glaser (1968, as cited in Čermák, Klimusová, & Vízdalová, 2005) and Malmquist (1971, as cited in Čermák et al.). The model states that we can diagnose depression even when the main symptom – depressed mood- is missing. The authors argue that behavioral disorders, hyperactivity, enuresis, excessive separate anxiety, eating disorders, and psychosomatic complaints often express hidden depression (Čermák et al.). The concept of masked depression has not been widely accepted and the basic symptom – depressed mood – is still considered essential for diagnosis of depressive disorder by most of the clinicians, counselors, and researchers. However, there is an agreement on the fact that this main symptom can be difficult to observe, because in children somatic symptoms, hyperactivity or learning and behavioral problems tend to be more expressive (Kadlecová , 1983). Therefore it is recommended to devote particular attention to this domain when interviewing a child or his/her parents (Svoboda, Krejčířová, & Vágnerová 2001).

The variability and the relative instability of child depressive symptoms and their high comorbidity with other disorders make proper and timely diagnosis difficult (Kadlecová, 1983; Svoboda et al., 2001). The assessment is a complex and multifaceted procedure that requires an understanding of developmental issues that contribute to the expression of depressive affect as well as a firm knowledge of assessment practices. Paclt, Florian, and Malá (1997) state that there are four areas of symptoms that are less apparent or missing compared to adults: oscillation of mood during a day, reduction of body weight, psychomotor retardation, and insomnia. Paclt and Florian (1998) offer the following detailed list of depressive symptoms typical for children: dysphoric or depressive mood; anhedonia; feeling of being not loved; crying; loss or decrease of energy; loss or decrease of interests; loss or decrease of appetite; insufficient concentration; feelings of emptiness; depersonalization; suicidal ideation; depressive ideation; feelings of helplessness or hopelessness.

The assessment required gathering information from the child and third persons (peers, parents, teachers), as well as from all other available information sources such as school records. A detailed analysis of subjective symptomatology and anamnestic data needed to be performed. Because child depressive symptoms are highly comorbid with other psychopathological symptoms and psychiatric disorders, including anxiety, attention-deficit/hyperactivity disorder, and conduct disorder, it was important to assess these areas simultaneously. The instruments for obtaining information from the child needed to be developmentally sensitive and adapted to reword and better obtain information in those domains that are inherently difficult for children, including questions about internal affect state and questions requiring judgment.

Basic ways to detect depressive symptoms in children include observation, interview, anamnesis, projective techniques, and report and self-report techniques.

A reliable assessment should combine and integrate data from several sources. During observation and interview with a child or a parent, a clinician or a counselor explores various relevant domains of symptomatology within their concrete context. There are several guides that might be used to conduct a structured interview (e.g. a guide to Hamilton Depression Rating Scale). A careful attention should be taken to the duration and frequency of the symptoms that present necessary information for making a diagnosis of depressive disorder. Past research has shown that the children's reliability in providing this information is limited (Puura et al., 1997).

Svoboda et al. (2001) state that besides the personal anamnesis of the child, valuable information can be gathered also from the family anamnesis and particular attention should be devoted to problems such as depressive disorders or alcohol abuse.

Many clinicians consider projective diagnostic methods to be an indispensable part of the assessment of depression. The projective methods particularly useful in children include the Rorschach Test, the Thematic Apperception Test, and drawing and sentence completion techniques (Svoboda et al., 2001).

We concentrate mainly on the report and self-report measures as one such measure was part of our project. Among the report and self-report measures developed to capture depressive symptoms in children, the most often used measures are the Hamilton Depression Rating Scale (Hamilton, 1980), the Children's Depression Inventory (CDI) (Kovacs, 1992), and the Centers for Epidemiological Studies-Depression Scale (Radloff, 1977, 1991). The

Hamilton Depression Rating Scale is a 21-question multiple choice questionnaire. The clinician rates the severity of a child's depressive symptoms such as low mood, insomnia, agitation, anxiety and weight loss, and might use a structured interview guide for this purpose (Hamilton, 1980). The questionnaire has recently been one of the most commonly used scales for rating depression in clinical settings. The Centers for Epidemiological Studies-Depression Scale is a 20-item self-report scale detecting symptoms with focus on affective problems associated with depression, e.g. irritability, sleep, and eating disturbances (Radloff, 1977, 1991). The most widely used instrument, the CDI is described in the next chapter. Apart from the Hamilton Depression Rating Scale and the CDI, a 30-item inventory the Reynolds Child Depression Scale (Reynolds, 1989) has also gained great popularity.

Given the subjective nature of many depressive symptoms, the self-reports are particularly important for detecting this psychopathology area (Weiss et al., 1991). As Svoboda et al. (2001) noted, the data from the report and self-report measures should be interpreted in combination with more detailed exploration of the reports and information from other methods and from other informants. The self-report questionnaires require quite high ability and willingness to report on inner states, so in younger children we face a danger of low introspection or insufficient understanding of the questionnaire items (Svoboda et al., 2001). However, the child's reports on his/her depressive states are usually accepted as valid starting at the age of 9 (Hankin & Abramson, 1999). The validity of the adult's reports (parents or teachers) are more questionable, because the child inner experience is not easily accessible to others, and the discrepancies between reports of adults and self-reports of children are high. Given the hard accessibility of children's inner emotional experience, for example the teachers' readiness and skills for identifying internalizing problems are limited. Kleftras and Didaskalou (2006) warn that teachers tend to overlook depressive symptoms

and to focus on behavior problems, while attributing the children's difficulties mainly to factors lying outside the school context. The reports of parents are viewed as more valid and when we consider how to understand the

discrepancies between the reports of parents and self-reports of children, we can profit from the findings of a unique study by Cole and Martin (2005) that addressed the longitudinal structure of the Children's Depression Inventory (CDI). They found that the self-reports of children reflect more a state autoregressive dimension of depression than a stable trait dimension, whereas the parents' reports reflect more the trait than the state dimension. In accordance with this outcome, the agreement between parent and child CDI reports was found to be better on symptom change over time than about time-specific symptoms (Cole et al., 2002). Given the advantages of the report and self-report instruments, especially their effectiveness in gathering information with low time and money expenses and their verifiable psychometric properties, these measures has become widely spread and popular among clinicians, counselors, and researchers.

Children's Depression Inventory

The Children's Depression Inventory (CDI) is a common clinical and educational screening assessment method, and also the most widely used research measure of depressive symptoms in children and adolescents (Craighead, Smucker, Craighead, & Illardi, 1998). In the field, approximately 50% of the research projects use this measure (Fristad, Emery, & Beck, 1997).

The CDI (Kovacs, 1992) was developed as an adaptation of the adult oriented Beck Depression Inventory (Beck & Beamesderfer, 1974) with content and language adjusted to

age range from 7 to 17 years old. The test requires probably the lowest reading level of any self-report measure of depressive symptoms in children, so even children as young as 7 can understand the items' wording (Berndt, Schwartz, & Kaiser, 1983, as cited in Kovacs, 1992). Sitarenios and Stein (2004, p. 1) summarize the proper use of the CDI as follows: *“The CDI can be helpful in the early identification of symptoms and in the monitoring of treatment effectiveness. The CDI can play a role in the diagnostic process, but it should not be used alone to diagnose a depressive disorder.”*

The inventory consists of 27 items that cover several areas of children's life including their mood, hedonic capacity, vegetative functions, self evaluation, or interpersonal behaviors. The author points out that the items are worded to fit into the contexts that are specifically relevant to children. The measure comprises five scales: CDI_A Negative mood, CDI_B Interpersonal problems, CDI_C Ineffectiveness, CDI_D Anhedonia, CDI_E Negative self esteem and combines them into a total CDI score (Kovacs, 1992).

The CDI proved to have sufficient psychometric characteristics. Craighead et al. (1998) summarize that a number of past studies showed a very good internal consistency and adequate test-retest reliability of the CDI. The inventory also proved to have a very good convergent validity in identifying depressed versus nondepressed children (Craighead, Curry, & Ilardi, 1995; Kovacs, 1992; Laurent et al., 1999). However, several studies point to limited discriminant validity of the CDI. The inventory is probably not enough sensitive to differentiate between types of internalizing symptoms, between depressive symptoms, anxious symptoms, and other negative emotions. Some anxious and depressive symptoms overlap and there is high comorbidity between the anxiety and depressive disorders. The CDI might reflect a more general level of emotional distress commonly labeled negative affect

than specifically depressive symptoms (Cole, Peeke, Dolezal, Murray, & Canzoniero, 1999; Laurent et al., 1999).

I. 1. 2. Prevalence; Age and Sex Differences

At any given time, approximately 10 - 15% of children's population suffer from a moderate to severe level of depressive symptoms (Nolen-Hoeksema, Girgus, & Seligman, 1992). The estimates of prevalence rates of affective disorders range between 2 and 5% (Kovacs, 1989; Paclt & Florian, 1998). Tram and Cole (2006) found that in prepubertal children the stability of individual differences in depressive symptoms (assessed using the CDI) over time is very high and does not differ with respect to gender.

During late childhood (proved since fourth grade) and adolescence the depressive symptomatology increases with age, especially during a transitional period connected with pubertal changes between sixth and seventh grade (Cole et al., 2002; Kovacs, 1989; Nolen-Hoeksema & Girgus, 1994; Paclt & Florian, 1997). The growth is not consistent, but varies as a function of developmental level.

In most studies, a predominating similarity between the emotional experience of girls and boys including similar rates of depressive symptoms has been found (Allgood-Merten et al., 1990; Compas et al., 1997). Some studies indicate that boys might have higher risk to suffer from depressive disorders (Paclt et al., 1997), but the found differences are usually very small (Hankin et al., 1998; Wichstrom, 1999). The often discussed lifelong predominance of females in prevalence of depressive symptoms probably emerges first in puberty starting sometime between the age of 12 or 14 years (Allgood-Merten et al.; Compas et al.; Ge, Conger, & Elder Jr., 2001; Hankin et al. 1998; Wichstrom, 1999) and is preceded by a gender difference in growth curve trajectories of symptomatology in late childhood (Cole et al., 2002).

I. 1. 3. Related Factors

The children's vulnerability to depressive symptomatology has been studied in context of many factors covering various domains such as genetic, cognitive, personality or social phenomena. Below, we review basic findings concerning several selected domains.

Child Factors

Cognitive and Personality Factors

Both intelligence (a general cognitive ability) and selected aspects of cognitive functioning such as vigilance, memory, or information processing have been studied in connection with children's depressive symptomatology. Rapport, Denney, Chung, & Hustace, (2001) summarize that the findings concerning intelligence are mixed (inconsistently pointing to weak associations), whereas the specific cognitive abilities show consistently weak or moderate relationships. For example, depressive symptoms co-occur with self-reported problems with attention and thinking (Čermák et al., 2005, Herman, Lambert, Ialongo, & Ostrander, 2007), with vigilance and short-term memory (Rapport et al., 2001), and with working memory function and concentration (Aronen, Vuontela, Steenari, Salmi, & Carlson, 2005). Herman et al. (2007) found that inattention problems in first grade predicted subsequent depressive symptoms in third grade and that this association was mediated by academic performance. The memory impairment varies as a function of depressive symptoms severity and may be observable only when a certain level of severity is reached (Lauer et al., 1994). Similar development can be expected in other areas of cognitive functioning. Preiss,

Kučerová, Navrátilová, & Černík (2006) review past research on cognitive deficit in unipolar depression and conclude that up to 50% of the patients suffer from deficits in cognitive domain, especially in attention, perception, memory, reasoning, and executive functions. The cognitive deficit is related to pathological brain processes; however, also subjective factors such as lowered motivation, low resistance to fatigue, personality structure or actual emotional experience play an important role (Preiss et al., 2006).

Apart from cognitive abilities, cognitive traitlike specifics such as negative attributional/ explanatory style outlined in the latter chapter (Nolen-Hoeksema et al., 1992), self-efficacy (Bandura, 1982), or self-perceived academic and social competence (Chan, 1997; Chen, Rubin, & Li, 1995; Hoffman, Cole, Martin, Tram, & Seroczynski, 2000; Seroczynski, Cole, & Maxwell, 1997) have been identified as correlates of children's depressive symptomatology.

Negative attributional/explanatory style (a tendency to view causes of bad events as internal, stable, and global, and at the same time to attribute positive events to external, unstable, and specific factors) predicts future increases of depressive problems in adolescents aged 14-15 (Cole et al., 2008), possibly also at younger ages (Nolen-Hoeksema et al., 1992). Within the traitlike personality characteristics a particular attention has been devoted to Bandura's self-efficacy (1982) and similar concepts covering beliefs and views on one's abilities or competencies. The children's self-efficacy (a belief in one's abilities) was found to decrease the risk to suffer from depressive symptoms (e.g. Urbánek & Čermák, 1997).

When depressive symptoms were examined in associations to traditional personality dimensions as measured by the Eysenck Personality Questionnaire, significant associations were found for psychoticism (del Barrio, Moreno, López, & Olmedo, 1997), extraversion and

neuroticism (Rusting & Larsen, 1997). The neuroticism highly overlaps with a concept of negative affect, which has been defined as general distress factor representing the temperaments and moods common to depression and anxiety (Clark & Watson, 1991).

Depressive symptoms have been found to be closely related to self-esteem and self-concept (Cole, 1991). Lowered self-esteem constitutes one of depressive symptoms. There is a great body of research on self-perceived competence, an important part of self-concept that is especially relevant to our study. The competency-based model of childhood depressive symptoms state that the symptoms reflect underlying low self-competence. This is a relatively stable system of maladaptive beliefs developed in context of failures in functioning (Cole, 1991). Chan (1997) reported that in his study of 7 to 12-graders, depressive symptoms were highest in students who perceived themselves as relatively incompetent academically and socially.

Longitudinal empirical analyses highlighted that in children's negative self-appraisals of competence (in academic, physical, behavioral and social area) can predict subsequent depressive symptoms. These symptoms predict subsequent negative self-appraisals of competence that are discrepant with appraisals of others (i.e. underestimating appraisals), but not negative appraisals that reflect the evaluations of others (Hoffman et al., 2000). Weisz, Sweeney, Proffit, & Carr (1993) correlated the CDI total score to self-perception profile and contingency scale across five specific domains in a nonclinical sample of children aged 8 to 12 years. A strong relationship between measures of perceived competency and the CDI scores emerged. Children's perceived academic competence and contingency accounted for 35 % of the variance in the CDI scores. The results of this study indicated that children's beliefs about their academic self-image, defined as the way they represent themselves as students, strongly

relate to depressive symptoms (Weisz et al., 1993). Masi et al. (2000) got similar results in a sample of 150 adolescents aged 14 to 18 years. The authors suggest that the relationship between academic self-perceptions and depressive symptoms is mediated by global self-image. A 16-year prospective follow up study of Finnish adolescent sample realized by Pelkonen, Marttunen, Kaprio, Huurre, & Aro (2008) showed that dissatisfaction with academic achievement at the age of 16 was one of psychosocial problems that consistently predicted depressive symptoms at the age of 22 and 32.

Psychopathology Factors

Depressive disorders are highly comorbid with other psychiatric diagnoses, especially with anxiety and conduct disorders (Kovacs, 1989). The co-occurrence of depressive and other psychopathological symptoms and psychosocial problems has also been documented at a subclinical level in community studies (e.g. Chen et al., 1995; Cole, Peeke, Martin, Truglio, & Seroczynski, 1998; Čermák et al., 2005).

Depressive and anxiety symptoms have been proven to present highly overlapping but still separable constructs. A solid support was found for theories considering depressive and anxiety symptoms related but distinct dimensions of a third more general construct such as negative affect or distress. Both dimensions show relatively little change in individual differences over time, and thus present relatively stable characteristics of a child. Some empirical data point to anxiety symptoms as one of precursors of future depressive symptoms (Cole et al., 1998).

The depressive symptoms include internalizing problems such as negative humour,

anhedonia or low self-esteem, but also externalizing symptoms such as irritability, aggressiveness or diminished efficacy in academic achievement (Aluja & Blanch, 2004a). Past research has documented comorbidity of depressive symptoms with disruptive, aggressive, antisocial, and delinquent behaviors (Capaldi, 1991; Chen et al., 1995; Čermák et al., 2005; Kerr, Tremblay, Pagani, & Vitaro, 1997; Little & Garber, 2005). As Little and Garber (2005) summarize, the longitudinal studies have supported the hypothesis that disruptive behaviors was more likely to precede depressive symptoms, as opposed to follow them. Capaldi (1992) reported that while 31.5% of boys who displayed only conduct problems in the 6th grade suffered from serious depressive symptoms in the 8th grade, only 12.9% of depressed-only boys in the 6th grade exhibited later conduct problems. Interestingly, the findings of an extensive study of siblings aged 10 to 18 years conducted by O'Connor, McGuire, Reiss, Hetherington, & Plomin (1998) suggest that approximately 45% of the covariance between depressive symptoms and antisocial behaviors could be explained by a common genetic liability. Each of the two domains separately and especially both disturbed domains together relate to increased risk of school maladjustment (Marmorstein & Iacono, 2003).

Contextual Factors

Social Factors

In children, depressive symptoms co-occur with behavioral problems in social area (Čermák et al., 2005) and some studies demonstrate that social adjustment problems predict

future depressive symptoms (Chen et al., 1995; Haavisto et al., 2004). It has been hypothesized that heightened levels of symptomatology are associated with social skills deficit that makes children isolated and less effective in their social interactions. Kovacs (1989) summarizes that the experimental studies prove that depressed children manifest difficulties in interpersonal problem solving tasks and show a lack of proper self-control, lower expectations of their own achievement in these tasks, subsequent unfavorable self-evaluation, and also lower perceived reinforcement from their peers. The social skills deficit can be connected both with internalizing and with externalizing problems such as conduct problems including impulsiveness, disruptiveness, and aggression. The social problems (including conflictual family relationships or peer rejection) have been also hypothesized to work as partial mediators between externalizing problems and subsequent depressive symptoms. Empirical data showed that children with higher levels of externalizing problems generated more social stressful life events in their lives and, in turn, experienced more depressive problems (Little & Garber, 2005).

Family conditions, including variables such as socioeconomic status, parenting behavior, maternal acceptance and rejection, marital conflict, parent-child conflict present important factors traditionally linked to depressive symptomatology (Kovacs, 1989; Schwartz, Gorman, Duong, & Nakamoto, 2008). Living in a step- or single-parent family and punitive parenting increases the risk of future depressive symptoms and this association is mediated by maternal depressive symptoms and negative attributional style (Lau, Rijdsdijk, Gregory, McGuffin, & Eley, 2007). Depressive symptoms are also connected with the sense of secure attachment to mother (Graham & Easterbrooks, 2000) and with parent-child conflict (Marmorstein, & Iacono, 2004). Another consistent correlates of child's depressive affect is parental depressive symptomatology (Graham & Easterbrooks, 2000; Marmorstein & Iacono,

2004). In a 10-year follow up study of Haavisto et al. (2004), poor adaptive functioning within family predicted increases in depressive symptoms.

Relationships including peer friendships and social standing within a peer group present another important domain related to depressive symptomatology (Haavisto et al., 2004; Little & Garber, 2005; Schwartz et al., 2008). Low acceptance by peers and peer rejection are predictive of future depressive symptomatology and might work as a mediator between externalizing problems and subsequent depressive symptomatology (Little & Garber, 2005). Having fewer than two close friends was one of factors associated with subsequent depressive symptoms in a longitudinal study of Haavisto et al. (2004). Schwartz et al. point out that peer relationships interact with other risk and protective factors. Their study showed that children with few friends tended to suffer from higher levels of depressive symptoms, but this effect was markedly lower for children with high school achievement, and vice versa. The authors suggest that competencies in one domain can moderate the risks associated with difficulties in the other area. Friendships might buffer other adjustment problems (e.g. academic problems), because they serve as a source of emotional support, social support, and self-affirmation (Schwartz et al.).

Teacher-child relationships were also hypothesized to be related to depressive symptomatology. Mullins et al. (1995) found support for this notion when examining self-reported symptomatology of children and teachers' negative social responses.

Stressful Life Events

Stressful life events are considered one of important correlates of depressive

symptoms and play an important role in etiological models of depression (Hankin & Abramson, 1999; Nolen-Hoeksema & Girgus, 1994). Past research has found a considerable support for both directions of prospective predictive relationships. Lewinsohn et al.'s (1994) longitudinal study of adolescents demonstrated that elevated levels of stress characterize people that are prone to depressive affect at all times (before they become depressed, while they are depressed, and after they have been depressed).

Cole, Nolen-Hoeksema, Girgus, and Paul (2006) divide theoretical approaches in the area into two main categories: *stress exposure models* (stressful life events precede and increase the risk of heightened levels of depressive symptoms) and *stress generation models* (heightened levels of depressive symptoms increase the risk of future stressful life events). The stress exposure processes have been documented by multiple studies. For example, Little and Garber (2005) focused on social stressful life events, such as interpersonal conflicts or peer rejection. The pathway from experiencing social stressful life events to subsequent elevated levels of depressive symptoms has been clearly supported. Social interpersonal stressors have been examined within the stress generation models as well. Individuals with higher levels of depressive symptoms tend to generate more interpersonal stressors in their lives (Hammen, 1991).

In a 6-year longitudinal study of Cole et al., (2006), children were traced from 3rd to 8th grade. The authors found support for both the stress generation model (depressive symptoms predicted future negative life events) and the stress exposure model (negative life events predicted future levels of depressive symptoms). The support for the stress generation model increased with age, whereas the support for the second model did not vary as a function of age.

Probably the most elaborated and the most studied model of mutual relationships between depressive symptomatology and stress is a cognitive diathesis - stress model that was proposed by Nolen-Hoeksema et al., (1992). The model follows up on cognitive-behavioral theories of depression (mainly the Seligman's learned helplessness theory) that state that ways individuals think about negative life events determine whether they react to such events with depressive affect. The authors state that pessimistic explanatory/attributional style (attributing negative life events to internal, stable, and global causes) presents a cognitive diathesis increasing the risk for depressive symptomatology. The mechanism is that the diathesis constitutes a personality trait that interacts with the depressogenic impact of negative life events. Nolen-Hoeksema et al. longitudinal project found that such mechanism is not apparent in younger children and that it emerges at later times and the effects were observable from 5th grade. Cole et al. (2008) extensive longitudinal study revealed that the cognitive diathesis – stress mechanisms started to work in adolescents at eight or nine grades, not earlier. The authors suggest that at younger ages the attributional style is under construction and not enough traitlike, and thus may not serve as the hypothesized diathesis.

I. 2. School Achievement

I. 2. 1. Definition and Assessment

School achievement has been understood as results that students achieve in activities focused on goals of the study plan (Dan, 2002). This evaluative variable reflects the children's ability to reach certain common goals and how they succeed in academic competition. The definition implies that the variable varies in different socio-cultural settings. The existing research has usually operationalised the school achievement as results of standardized achievement tests or as teachers' rating¹ via standardized grades.

In our study, we operationalised the variable as teacher-rated standardized grades obtained at school report. Grades have been supposed to work as an external factor motivating children to achieve and maintain optimal performance. They provide feedback informing children and parents and enabling inter-individual and intra-individual comparison. The Czech national grading system consists of a five-point scale ranging from 1 (very good) to 5 (unsatisfactory). The validity and reliability of grades is more restricted compared to the standardized achievement tests. Subjectivity of teachers and differences in requirements over time and among different teachers impose biases on this achievement indicator. However, the grades at school report present a valuable research source, because they capture long-term achievement and reflect school adjustment determined by a complex set of cognitive and non-

¹ Self-rating of school achievement has been studied as a related variable, usually labeled as self-perceived academic competence (Cole, Peeke, Dolezal, Murray, & Canzoniero; 1999).

cognitive factors. The school results represented by grades have become a phenomenon playing crucial role in study career and later work success. The remarkable social importance attributed to grades is apparent in families, where grades present the main school theme discussed between parents and their children (Škaloudová, 2005).

I. 2. 2. Age and Sex Differences

Individual differences in school achievement are highly stable across time (Maughan, Rowe, Loeber, & Stouthamer-Loeber, 2003). With increasing age, the achievement decreases nonlinearly (Gutman, Sameroff, & Cole, 2003; Kowalski-Jones & Duncan, 1999). The variability of grades widens and the average level of performance decreases, because the teachers' evaluation becomes stricter and the requirements become more demanding (Škaloudová, 2005).

There have been found some sex differences in school achievement. The outcomes on possible gender gaps in grade point average and performance in math are mixed (Aluja & Blanch, 2004b; Bolger & Kellaghan, 1990; Pungello, Kupersmidt, Burchinal, & Patterson; 1996). The results concerning languages and humanities are more consistent, pointing to possible better performance of girls (Pungello et al.; Škaloudová, 2005). This finding might be explained by an argument that girls show better adjustment to formal school requirements and higher preparedness to study according to the teacher's instructions (Chráška, 1996). Aluja and Blanch (2002; 2004b) suggest that girls adopt personality traits that favor socialization, adjustment to norms, integration, and better study habits. However, the results are often mixed even in languages and humanities. For example, Bolger and Kellaghan (1990) examined whether the sex differences found varied as a function of measurement method (multiple-choice tests versus free-response tests). In their study, 15-years-old boys performed significantly better than females on multiple-choice tests in math, Irish, and English.

I. 2. 3. Related Factors

There have been many cognitive (e.g. intelligence, neuropsychological parameters) and non-cognitive factors (e.g. parental educational status, anxiety, personality characteristics, learning habits) in relationship with school performance. We review selected outcomes especially relevant to the issues of our interest.

Child Factors

Cognitive and Personality Factors

The best single predictor of school success is intellectual capacity measured by intelligence tests. The IQ score has been considered an excellent indicator of level of cognitive functioning. The correlation between IQ score and school achievement usually ranges between .49 and .65 (Glutting, Youngstrom, Ward, Ward, & Hale, 1997). Some studies, especially in our sociocultural area, report somewhat lower correlation coefficients. For example, a recent study of Czech children attending fifth grade revealed correlation .43 (Škaloudová, 2000). Gutman et al. (2003) report that the direct promotive effect of intelligence on grades is very stable over the school years. High-IQ children have a stable long-term advantage in their study career. However, high IQ score has no significant effect on a slope of the academic trajectory from the 1st to the 12th grade. It is not related to greater acceleration of school achievement (Gutman et al., 2003).

There were found several interactive effects of intelligence on children's achievement. For example, Garnezy, Masten, and Tellegen (1984) found a protective association between

IQ and stressful life events (as measured by achievement test and school grades) in younger elementary school children. Similar interactive effects for younger elementary school children were found between IQ and low socioeconomic status (Easterbrooks, Davidson, & Chazan, 1993). However, in high school students, vulnerability interactions instead of protective effects were found (Gutman et al., 2003; Luthar & Zigler, 1991).

The variable intelligence is a global instrument that reflects not only a cognitive capacity but also non-intellectual and cultural factors (Kubička, Bursík, & Jirásek, 1973). Some researchers argue that the concept of intelligence should be widened to enhance also underlying neuropsychological parameters that reflect specific domains of neural biological base of cognitive functioning (Reiten & Wolfson, 1992). Significant associations to school performance were found in neuropsychological parameters such as attention (Durbrow, Schaefer, & Jimerson, 2001; Herman et al., 2007), executive functions (Biederman et al. 2004), and working memory (Aronen et al., 2005).

Study effort, an important determinant of school success, reflects multiple motivational characteristics. Their various concepts and ways of assessment often overlap. The main ones include goal orientation and control understanding (or related variables such as control beliefs or locus of control). The motivational dynamics of the achievement depends partly on kinds of social and academic goals that children adopt and on the motivating properties of these goals (Covington, 2000). Control understanding, perceived competence, and perceived autonomy present other inner sources of achievement (Grolnick, Ryan, & Deci, 1991).

A remarkable portion of research focused on personality variables related to academic self-perceived competence. The academic self-perceived competence presents a part of

academic self-image, which is a crucial factor constituting global self-image (Alva & de los Reyes, 1999; Carr, Borkowski, & Maxwell, 1991; Nolen-Hoeksema & Girgus, 1994; Pastorelli et al., 2002). Academic self-image can be understood as a child's representation of himself/herself as a student. It is a complex entity that can be affected by the way one portrays one's cognitive functioning and competence, but also by the perceived strength of emotional attitude in a learning situation. Emotional aspects of academic achievement are probably related to the way the children represent their capacity of coping with external reality. Possible negative academic self-cognitions, such as negative competency beliefs and self-appraisals, as a part of global self-image, relate to emotional distress and have other psychopathological implications (Cole et al., 1999; Hoffman et al., 2000; Masi et al., 2000; Pelkonen et al., 2008; Weisz et al., 1993).

The time predictive analyses revealed that high achievement predicted increases in self-competence (Guay, Marsch, & Boivin, 2003) and self-esteem (Trautwein, Ludtke, Koller, & Baumert, 2006). Negative affect (including depressive and anxiety symptoms) did not predict changes in academic competence over time, whereas the academic competence predicted future changes in negative affect (Cole, Martin, Powers, & Truglio, 1996; Cole et al., 1999). Cole (1991) suggests that a negative social feedback connected with school performance problems can inhibit development of positive self-schemas and facilitate development of negative self-schemas related to depressive affect. In accordance with these results the majority of longitudinal studies exploring associations between depressive symptoms and school achievement show that the achievement probably predicts future depressive symptomatology.

Some authors suggest that personality traits that relate to socialization, adjustment to

norms, or social integration, are essential for explaining academic achievement (Aluja & Blanch, 2002; Aluja & Blanch, 2004b). Cole et al. (1999) reported high correlations between academic and social self-perceived competence (possibly because of higher order factors such as global self-worth or self-esteem). In their study, the social self-perceived competence predicted future academic self-perceived competence in boys; the opposite direction time predictive associations were not supported (Cole et al., 1999). A clear association to school achievement has been found in personality dimension of Psychoticism as measured by Eysenck Personality Questionnaire (Aluja & Torrubia, 1998). The Psychoticism includes traits of aggressiveness, hostility, lack of responsibility, and lower social competence (Aluja & Blanch, 2002). These findings are in accordance with studies pointing to relationships of school performance to disruptive and nonsocialized behaviors.

Another non-cognitive characteristic highly relevant to school achievement is learning behaviors or learning habits (Aluja & Blanch, 2004b; Dubrow, Schaefer, & Jimerson, 2000). The habitual learning behaviors develop during early school years and as children grow older, it adopts more and more important role (Gutman et al., 2003). Dubrow, Schaefer, and Jimerson (2000) report that this factor together with anxiety and attention accounted for 32-35 percent of the variance in academic scores of their sample of 6- to 12-years-old children. Aluja & Blanch (2004b) suggest that study habits present an important factor mediating the relationship between personality traits and academic achievement. In their study, socialized personality traits predicted the achievement and the effect was mediated by study habits.

Psychopathology Factors

Some researchers argue that a remarkable portion of children showing school performance problems suffer from psychopathological problems. Stoep, Weiss, Kuo, Cheney, and Cohen (2003) state that in the United States more than a half of the adolescents failing to complete secondary school suffer from a diagnosable psychiatric disorder.

A close association of low school achievement has been repeatedly found in attention deficits (Biederman et al. 2004; Herman et al., 2007; Johnson, McGue, & Iacono, 2005), disruptive behaviors (Hinshaw, 1992; Jimerson, Egeland, & Teo, 1999; Johnson et al., 2005), and non-socialized and antisocial behavior (Ma, Shek, Cheung, & Lee, 1996). In the Minnesota Twin Family Study, Johnson et al found that the association between disruptive behaviors and low school achievement might be partly accounted for by the covariance with attention problems and low intelligence. The authors emphasize that about 75% of the variance in latent inattention, ability, behavior, and school grades can be attributed to genetic influences.

A longitudinal study of Jimerson et al. (1999) showed that a downward trajectory of achievement was connected not only with behavioral but also socioemotional problems. Besides depressive symptoms, anxiety symptoms seem to be connected with lower performance at school (Aronen et al., 2005; Durbrow et al., 2001). Cole et al. (1999) proved that negative affect including anxiety had time predictive effects on self-perceived academic competence (opposite direction effects were not apparent). Global mental health has been found a correlate of school achievement as well (Gutman et al., 2003). Past research has also demonstrated several interactive effects of mental health on academic outcomes. The studies of Teo, Carlson, and Mathieu (1996) and of Jimerson et al. found that for high social risk

children, better mental health worked as a protective factor that bolstered their school grades. Gutman et al. conducted a comprehensive longitudinal study and found no similar protective effect. An interactive effect that occurred in this study was a vulnerability effect of poor mental health. In low-risk children, worse mental health was negatively related to grade point average and to the slope of grade point average from 1st to 12th grade. The authors suggest that for children who are exposed to social risk factors, good mental health might bolster grades in the short term (when one or two time points are measured), but cannot sustain long-term patterns of achievement (Gutman et al.).

Contextual Factors

Social Factors

When a decrease of achievement had been studied, particular attention was devoted to non-cognitive social risk factors. Various combinations of social risk factors proved to work as possible causes rather than any single variable. Moreover, the number of risk factors was more important than the kind of factors studied (Sameroff, Seifer, Baldwin, & Baldwin, 1993; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987). Sameroff et al. (1993) found that multiple social risk² had significant direct effect on school outcomes even when socioeconomic status, ethnicity, and mother's IQ were controlled.

One of crucial factors for school success is family socioeconomic status, a total

² The variable was a summary of following background variables: minority school status, occupation of head of household, maternal education, family size, father absence, stressful life events, parental perspectives, maternal anxiety, maternal health problems, positive interaction (Sameroff et al., 1993).

measure of economic and social position based on income, education, and occupation of family members. As Gutman et al. (2003) summarize, the children from disadvantaged backgrounds tend to fall behind their classmates and to have more and more academic problems as they grow older. Unfortunately, early in the school years many of the children do not acquire the basic skills needed for future academic success. In general, the children with low socioeconomic status tend to show lower school achievement, more grade retentions and course failures, and fewer completed school years (Gutman et al., 2003). Early in the school years, high intelligence might work as a protective factor and bolster the school grades even when the family socioeconomic status is disadvantaged (Easterbrooks et al., 1993). This protective effect probably disappears once children enter adolescence (Gutman et al., 2003; Luthar, 1991). One of possible reasons is that as children grow older, they experience higher freedom from home and school and the children and adolescents with low socioeconomic status use this freedom to invest into other areas of life and decrease their investment into school efforts (Luthar, 1991).

The development of school achievement is to a great extent influenced by the parent-child relationship. The poor relationship predicts future low performance at school, as well as other negative developmental outcomes (Pianta & Harbers, 1996; Sameroff et al., 1993). Early psychosocial-developmental history (consisting of quality of caregiving relationship, child's psychosocial adjustment, and quality of psychosocial environment) in the first 3 years of life predicted the school performance in standardized tests in the 1st grade, in the 6th grade, and at 16 years (Teo et al., 1996). Home background (including stimulating home experience, caregiver involvement, affluence, and caregiver education) explained a significant portion of school achievement variability in 6- to 12-years-old children studied by Durbrow, Schaefer, and Jimerson (2000). Grolnick et al. (1991) found that parental involvement and autonomy

support predicted performance in school and that their effects might be mediated by motivational variables (control understanding, perceived competence, and perceived autonomy). Parental involvement is probably also associated to the number of absences (Gutman et al., 2003). Hill and Craft (2003) summarize that parental involvement in children's school work and achievement is an important contextual factor that is consistently associated with improvements in school behavior, social competency, and school performance. The academic achievement involves important interpersonal consequences and influences future relationships between children and their caregivers. The authors point out that whereas a majority of parents want their children to be successful in school, many do not know the best ways to enhance their children's school performance (Hill & Craft, 2003). Repetti (1996) reports that school stressors including poor performance have negative effects on the parent-child relationship.

The links between the school performance and peer relationships vary in different contexts. In certain contexts, for example in minority inner-city youth, peer popularity and good achievement can be incompatible, and thus low-achieving children are quite popular (Steinberg, Dornbusch, & Brown, 1992; Schwartz, Gorman, Nakamoto, & Mc Kay, 2006). In other contexts low-achieving children can experience remarkable social sanctions from peers, probably insofar as the sociocultural background emphasizes the importance of achievement (Schwartz, Chang, & Farver, 2001).

An important area of social and environmental factors associated to school performance includes teacher, classroom and school related variables. School successes and failures occur in the very public setting of the classroom. Teachers present significant others that children seek and frequently receive evaluations of their relative competence and

incompetence from (Seroczynski et al., 1997). Covington (2000) points out that the quality of student learning and the will to continue learning depends partially on classroom reward structures.

Stressful Life Events

Significant correlations have been found between stressful life events and school achievement, indicating that students experiencing high levels of stress tend to do poorly in school (Alva & de los Reyes, 1999; Garmezy et al., 1984; Luthar & Zigler, 1991). An evidence for both directions of predictive prospective associations has been demonstrated. Children exposed to stressful life events tend to show subsequent decrement of the school achievement (Garmezy et al., 1984; Gutman et al., 2003; Luthar & Zigler, 1991). Further problems with school achievement tend to work as a stressful experience with potential future negative impact (Cole, 1991). The children who do not fulfill academic standards are often given negative feedback and seen as problematic. School failures and related negative social feedback from the side of significant others (parents, teachers, and peers) can generate stress and discomfort (Mlčák, 1999). It is important to note that children actively seek and sensitively receive evaluations of their competence and incompetence, because one of key developmental tasks of this period is a construction of personal sense of self-competence (Seroczynski et al., 1997). In this context, experiencing school achievement problems and related negative social evaluations can be stressful and promote development of negative self-concepts (Cole, 1991).

It was found that good school achievement can also protect from the negative impact of some social stressful experiences that increase the children's vulnerability to depressive

symptoms (Schwartz et al., 2008). The protective function of the performance might be based on self-competence processes. It has been demonstrated that children's self-concepts tend to be biased by an emphasis on positive information, and thus their vulnerability to depressive symptoms might be influenced more by successes than failures (Seroczynski et al., 1997).

Protective factors that might bolster the effects of stressful life events on school achievement include intelligence. For example, high-IQ younger school children reached good school performance regardless of level of stress, whereas low-IQ children showed a decrement of achievement as a function of higher stress (Garmezy et al., 1984). Interestingly, later in the development, vulnerability interactions instead of protective effects were found (Gutman et al., 2003; Luthar & Zigler, 1991). Luthar and Zigler (1991) reported that high-IQ high school students showed good performance at low levels of stress, while at high levels of stress lost their advantage and did not reach good school grades. Similarly, in a longitudinal study of Gutman et al. (2003), intelligence did not appear to be enough to bolster school grades of adolescents with high multiple social risk score³. The authors suggest that the developmental period studied might be the reason for different interactive effects found. Intelligence may have protective effects in the early grades, but may lose it as children grow older, because they start to change classmates and teachers very often and other non-intellectual factors such study habits become more important (Gutman et al.).

³ The multiple social risk score consisted of disadvantaged minority school status, occupation of head of household, maternal education, family size, father absence, stressful life events, parental perspectives, maternal anxiety, maternal health problems, and positive interaction (Gutman, Sameroff, & Cole, 2003).

I. 3. Depressive Symptoms and School

Achievement Relationships

There is a broad expert debate going on about the possible links between depressive symptoms and school achievement in children. The published projects come out from various conceptual and methodological frameworks and bring multiple, often somewhat contradicting, findings. Most of the studies are based on correlation analyses or comparing groups and do not explore time predictive relationships. The time predictive studies differ on approach to understanding of the influence that the explored risk or protective factors have on the outcomes. Within time prediction, they examine direct effects or interactive effects, and sometimes also various factors that might mediate or moderate the relationship. The majority of the studies on the issue was conducted on community samples and measured depressive symptoms via the CDI.

Given the relatively high stability of school achievement and depressive symptoms over time (Cole et al., 1998; Haavisto et al., 2004; Maughan et al., 2003), their predictive relationships are difficult to identify. Potential causal effects need quite a long time to be apparent.

I. 3. 1. Correlational Studies and Studies Comparing Groups

In community samples of children, existing correlational studies (Capaldi, 1991; Fauber, Forehand, Long, Burke, & Faust, 1987; Glied & Pine, 2002; Strauss, Lahey, & Jacobson, 1982) have showed a mild significant correlation between the total level of self-reported depressive symptomatology and school achievement. We found no correlational project with contradictory findings except a study of Henderson (1987), in which the association of the depressive symptoms and a reading performance in recognition and comprehension only approached statistical significance. However, this result might be explained by the low number of subjects involved in the study (59 children) or by the fact that only a single reading performance test was used.

Some of the cited projects explored if the correlation found would persist after controlling for selected possible undesirable variables. The correlation was significant after controlling for intelligence, a strong predictor of school achievement and a mild correlate of depressive symptoms (Strauss et al., 1982). The association also stayed significant after controlling for life events, a correlate of both depressive symptoms and school achievement (Glied & Pine, 2002).

In accordance with the outcomes of the correlational projects, the group comparison studies showed that the school achievement is lower in depressed than in non-depressed children (Ezpeleta, 1990; Mattison, Handford, Kales, Goodman, & McLaughlin, 1990), as well as that high achieving children reach higher levels of depressive symptoms than low

achieving children (Blechman, McEnroe, Carella, & Audette, 1986; Fráňová, Lukavský, & Preiss, 2006).

I. 3. 2. Prospective Studies

In Table 1, we summarize relevant recent prospective studies conducted on community children samples.

Table 1

Findings of Longitudinal Studies

Study	School achievement as a predictor of subsequent depressive symptoms	Depressive symptoms as a predictor of subsequent school achievement
Herman et al. (2008); United States; 661 participants traced from 1 st to 7 th grade (2-wave follow up)	Math and reading achievement (as measured by standardized tests) predicted future self-reported depressive symptoms, even when conduct problems, inattention, and social problems were controlled.	Not addressed.
Schwartz et al. (2008); United States; 199 participants traced from 9 to 11 years (2-wave follow up)	Low grade point average predicted future total level of self-reported depressive symptomatology, but this effect did not hold for children who had numerous friends.	Not addressed.
Kistner, David-Ferdon, Lopez, and Dunkel (2007); United States; 641 participants traced from 3 rd to 5 th grade	Academic achievement scores predicted increases in self-reported depressive symptoms over time.	Not addressed.
Maughan et al. (2003); United States; 1517 boys in grades 1, 4, and 7 traced for 2 years (5-wave follow up)	Severe, persistent reading problems predicted future self-reported depressive symptoms, even when family risks and conduct problems were controlled. The association was weak once prior depressive symptoms level had been taken into account.	Self-reported depressive symptoms failed to show and significant effects on future reading problems over and above the stability effects of reading achievement.
Rappport et al. (2001);	Not addressed.	Teacher-rated

Hawai; 325 participants aged 7 – 15 years and traced for 3 or 4 years (2-wave follow up)		anxious/depressive features predicted future teacher-rated classroom performance over and above the effects of intelligence.
Chen and Li (2000); China; 540 participant traced from 6 th to 8 th grade (2-wave follow up)	Achievement in Chinese and math did not have any unique contributions to the prediction of future total level of self-reported depressive symptoms over and above the stability effects.	Total level of self-reported depressive symptoms predicted future achievement in Chinese and math, over and above the sex and stability effects.
Chen et al. (1995); China; 261 participants traced from 2 nd to 4 th grade (2-wave follow up)	Achievement in Chinese and math predicted future total level of self-reported depressive symptoms only in children from families with rejecting mothers and parental conflicts.	Total level of self-reported depressive symptoms (dichotomized to depressed and nondepressed children) predicted future achievement in Chinese and math.

In the Table 1, we can see that seven of the six of the cited studies addressed the question of school achievement predicting subsequent depressive symptoms and four of them examined the opposite direction of the predictive relationships. The studies point to marked stability of both variables (Chen & Li, 2000; Haavisto et al., 2004; Maughan et al., 2003; Schwartz et al., 2008). In summary, the projects convincingly supported the direction from school achievement to subsequent depressive symptoms and brought somewhat mixed support for the opposite direction.

Five of the prospective projects confirmed that the academic achievement scores predicted increases in subsequent depressive symptoms (Chen et al., 1995; Herman et al., 2008; Kistner et al., 2007; Maughan et al., 2003; Schwartz et al., 2008). The only contradictory finding was brought by a study of Chen and Li (2000), in which no unique contribution to the prediction over and above the stability effects was found. In two other studies, the stability

effects were controlled and the relationship stayed significant (Maughan et al.; Schwartz et al., 2008). In accordance with these outcomes, it has been documented that subsequent depressive symptoms were predicted also by other variables closely related to the performance, e.g. teacher-rated school competence and learning problems (Chen & Li, 2000), dissatisfaction with academic achievement (Pelkonen et al., 2008), dissatisfaction with grades and failure to do homework (Lewinsohn et al., 1994), and poor adaptive functioning in education (Haavisto et al., 2004).

It should be taken into account that the performance might predict subsequent depressive symptomatology due to third variable influences. A particular attention has been devoted to possible undesired variables such as conduct problems, social problems, inattention, or family risks. Herman et al. (2008) confirmed the association persisted even when conduct problems, inattention, and social problems were controlled. Maughan et al. (2003) got similar outcomes controlling for conduct problems and family risks.

Several investigators point out that when we study the increases in depressive symptomatology, we often find risk and protective factors to interact and to work as mutually dependent predictors. For example, in a study of Schwartz et al. (2008), the achievement did not predict depressive symptomatology in children, who had numerous friends⁴. Likewise, in a study of Chen et al. (1995), the achievement predicted level of depressive symptoms only in children from families with rejecting mothers and parental conflicts.

⁴ Friendships might compensate difficulties in academic domain, buffer emotional problems and foster adjustment in difficult situations. Another possible explanation is that children who have numerous friends can be more oriented toward affiliation and less concerned with achievement-related outcomes (Schwartz et al., 2008).

Developmental theories have also hypothesized that a decrement of school achievement might occur as a consequence of depressive symptoms, because symptoms such as loss of concentration, psychomotor retardation, lack of energy, and cognitive distortion may interfere with the school learning processes (Chen & Li, 2000). A particular attention has been devoted to cognitive deficit in clinically depressed individuals and existing body of research indicates that many of the depressed individuals (possibly up to 50%) suffer from deficits of cognitive and executive functions (Preiss et al., 2006). Within the subclinical level of depressive symptomatology in children, these issues remain poorly understood, because the number of existing studies is still very low. Several investigators confirmed that the depressive symptoms had preceded decreases in the achievement (Chen & Li, 2000; Chen et al., 1995; Rapport et al., 2001), others did not (Maughan et al., 2003). The undesired stability effects were controlled in two of the four projects (Chen & Li, 2000; Maughan et al.).

Several studies examined whether the depressive symptoms predict the subsequent achievement due to hidden third variables. The prediction lasted even after controlling for sex (Chen & Li, 2000) and intelligence (Rapport et al., 2001). Other possibly undesired variables such as conduct problems, family problems, or other psychopathology factors need to be studied in future.

Some interesting insights were brought by longitudinal studies exploring depressive symptoms as a predictor of future academic competence, a subjective self-/teacher- evaluation of the school performance. A decrement of teacher-rated school competence and an increase in teacher-rated learning problems occurred following depressive symptoms in a study of Chen and Li (2000). In another study, negative affect (including depressive and anxiety symptoms) did not predict changes in self-perceived academic competence over time (Cole et

al., 1996; Cole et al., 1999). However, when the self-appraisals were examined in detail, the symptoms appeared to predict subsequent negative self-appraisals of competence that were discrepant with appraisals of others (i.e. underestimating appraisals), but not negative appraisals that reflected the evaluations of others (Hoffman et al., 2000).

Past research suggesting causal nature of the found predictive relationships has proposed several factors that might mediate the effect of the achievement on subsequent depressive symptomatology or vice versa. The possible mediating factors include variables such as impaired cognitive functioning (Aronen, et al., 2005; Cole et al., 2006; Rapport et al., 2001), maladaptive explanatory style (Nolen-Hoeksema et al., 1992), self-efficacy, tendency to give up, low attention, anxiety, stress in achievement situations (Bandura, 1982), low motivation (Strauss et al., 1982), perceived control (Herman et al., 2008), self-appraisals of academic competence as a part of self-concept (Cole et al., 1996; Cole et al., 1999; Hoffman et al., 2000; Masi et al., 2000), or negative life events and stress (Patterson & Capaldi, 1990).

The cited long-term studies showed certain prospective predictive relationships, but the issues of causality, possible hidden undesired variables, and the issues of specific underlying mediating or moderating mechanisms should be explored in more depth. Future studies could also try to verify more complex models such as a transactional model suggesting that the variables might mutually interact and determine one another (Chen & Li, 2000). It would be especially beneficial to design projects to monitor more than two time points, to control the stability effects of both variables, and to catch long-term interactive processes between multiple risk and protective factors. Even though more longitudinal data is needed, the current knowledge underlines the importance of identifying children with academic problems or heightened levels of depressive symptomatology early in the school years.

II. THE STUDY RATIONALE

Monitoring depressive symptoms and understanding of their relationships to other domains of psychosocial adjustment are particularly important in prepubertal children because of big opportunities to timely and effective prevention and intervention. Past research indicates that the tendency to experience negative emotions can be to a great extent influenced mainly before the age of 11 (Cole et al., 1999). We focused on 9- to 11-year-old children from Prague elementary schools. At this age period, the children are highly sensitive to possible intervention and can already provide valid information about their symptoms. Starting at the age of 7-9 years, the CDI has been shown to work as a useful screening tool for community samples (Kovacs, 1992). The children's self-reports on their depressive states are usually accepted as sufficiently valid starting at the age of 9 years (Hankin & Abramson, 1999).

Past research has demonstrated that depressive symptoms relate to school achievement (Aluja & Blanch, 2002; Chen & Li, 2000; Chen et al., 1995; Fauber et al., 1987; Glied & Pine; 2002; Strauss et al., 1982), while the underlying mechanisms stay mostly unrecognized. Both the variables present complex concepts highly stable over time and connected with multiple factors. Most of the studies on their associations worked only with the total level of depressive symptomatology reported on the CDI and did not examine roles of particular CDI scales. Relevant Czech studies using larger children samples have been missing. We tried to fulfill this lacks by the present study.

We addressed relationships of depressive symptoms and school achievement in the context of four additional possibly intervening variables (sex, age, parental education status,

and intelligence). We verified basic correlational and group comparison findings of foreign studies and enhanced the current knowledge by a complex series of detailed analyses at the level of the CDI scales. Moreover, unlike the past studies we had an opportunity to use three indicators of school achievement: Czech language grade, math grade, and grade point average.

We followed two interlinked goals:

Goal 1: We want to enhance understanding of the relationships between the school achievement and the depressive symptoms reported on the CDI – to verify basic findings of international studies in a Czech sample of prepubertal children, to perform a unique detailed series of analyses of the relationship on the level of the CDI scales, and to test the predictive power of the CDI in a context of other possible predictors of school achievement.

Goal 2: We want to explore selected limits of the CDI in the area of studying the relationships between depressive symptoms and school achievement. Even though the inventory is the most widely used measure for these purposes, appropriate reflection of its limits is missing.

To be able to correctly address the issues outlined above, we needed to deal with four **preliminary questions** first. Those were:

Preliminary Question 1: Can our data collected in four successive waves be merged and analyzed together?

Preliminary Question 2: Is the reliability of the CDI data sufficient?

Preliminary Question 3: What are the relationships of demographic variables (sex, age, and parental education status) to the other variables registered?

Preliminary Question 4: What are the relationships of full scale IQ to the other variables studied?

These preliminary questions had important implications for the planned subsequent analyses, and thus we addressed them before the main questions and hypotheses were formulated.

On the basis of existing knowledge and the preliminary analyses, we formulated five areas of main hypotheses and questions addressing the relationships between the depressive symptoms (the CDI data) and the school achievement variables/school grades (the Czech language grade, the math grade, and the grade point average). The first four areas consist of specific hypotheses that pursue the first goal of the study: to enhance understanding of the relationships between the variables studied. The last area comprises of three exploratory questions that aim to fulfill the second goal of the study: to explore selected limits of the CDI in this area of research. The **main hypothesis and questions** were following:

I. Correlations Between the CDI Scores and School Grades

Hypothesis 1: The total CDI score relates to the school achievement variables.

Hypothesis 2: The total CDI score relates to the school achievement variables even

when controlled for parental education status and full scale IQ.

Hypothesis 3: The five CDI scales relate to the school achievement variables.

Hypothesis 4: The five CDI scales relate to the school achievement variables even when controlled for parental education status and full scale IQ.

Hypothesis 5: Within the CDI scales, the CDI_C Ineffectiveness shows the highest correlation with school achievement variables.

II. Prediction of School Grades from the CDI Scales

Hypothesis 6: Within the CDI scales, the CDI_C Ineffectiveness consistently works as the most salient predictor of the school achievement variables.

III. Prediction of School Grades from Sex, Age, Parental Education Status, Intelligence, and the CDI Data

Hypothesis 7: The CDI_C Ineffectiveness works as a more salient predictor of the school achievement than the total CDI score.

Hypothesis 8: In the context of other predictors (sex, age, parental education status, and full scale IQ), the CDI_C Ineffectiveness consistently proves to be a significant predictor of the school achievement variables.

IV. Comparison of Groups Divided According to the Total CDI Score

Hypothesis 9: Children with high total CDI score reach worse results in the school achievement variables.

V. Selected Methodological Limits of the CDI

Question 1: What is the difference between the correlations of the school achievement variables with the total CDI score and with the modified total CDI score (the total CDI score cleansed of the CDI_C Ineffectiveness score)?

Question 2: In prediction of the school achievement variables, what is the difference in predictive power between the CDI total score and the modified total CDI score in the context of the other variables registered (sex, age, parental education status, and full scale IQ)?

III. PROCEDURE AND METHODS

III. 1. Sample and Procedure

The sample consisted of 814 children aged 9 - 11 years attending 12 Prague elementary schools. We randomly selected one school from each of the 10 Prague districts except two largest districts. Two schools were selected from each of these districts. Age and sex served as the main inclusion criteria. Children were included if their age at the time of assessment differed one month or less from the expected age levels 9;00,10;00 or 11;00 years. The average age was 10.01. The sample was selected to consist of similar ratio of girls and boys. The sample composition is shown in Table 2.

Table 2

Sample Composition

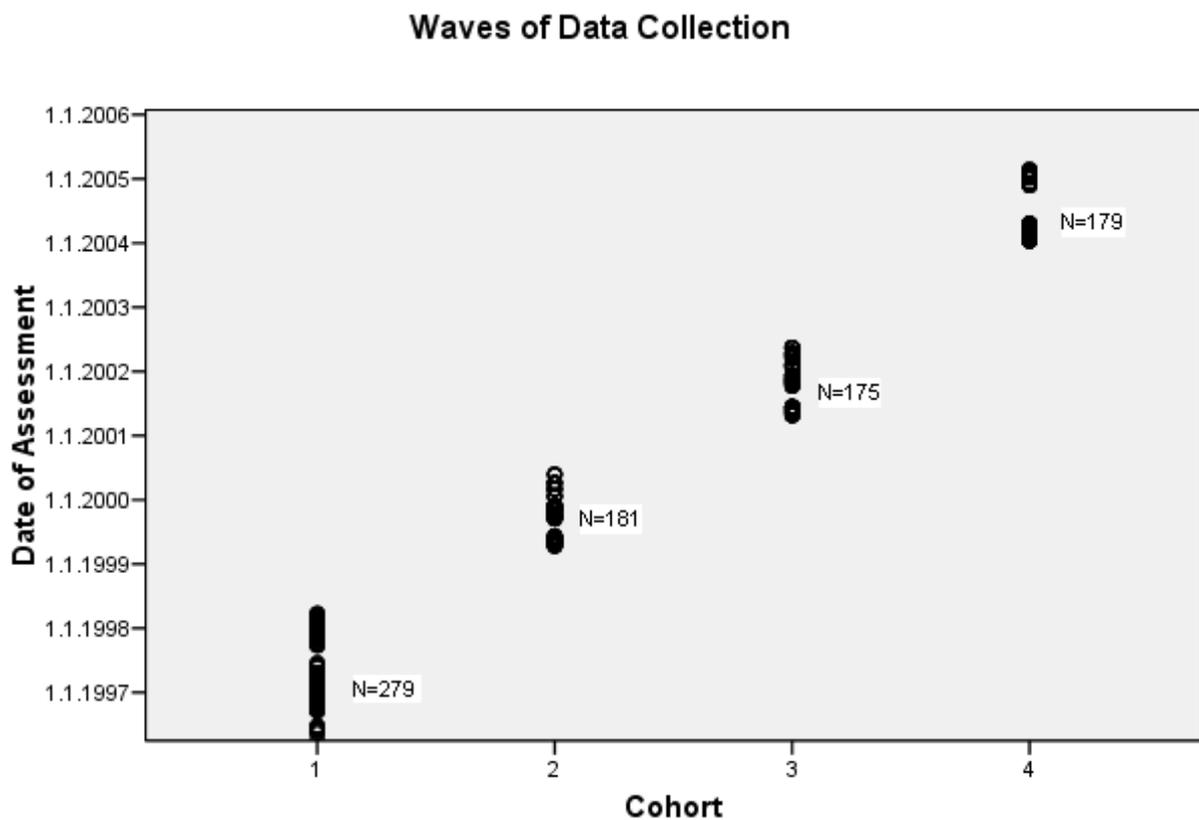
	9-year-old	10-year-old	11-year-old	Total
Boys	135 (17%)	124 (15%)	136 (17%)	395 (49%)
Girls	134 (16 %)	147 (18%)	138 (17%)	419 (51%)
Total	269 (33%)	271 (33%)	274 (34%)	814 (100%)

We drew data from a broader study “Research of Intelligence in Prague Children” carried out by the inter-institutional collective led by Preiss from the Prague Psychiatric Center. Within this project, a representative sample of Prague school children selected according to the above-described procedure was tested in schools using the Czech versions of the CDI and the WISC and several neuropsychological measures.

All the tested children and their parents were informed about the purpose and course of the assessment in advance 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 – 2005. Particular waves are described in Figure 1.

Figure 1

Waves of Data Collection



Note. Cohort 1: April 10, 1996 – March 26, 1998; n=279; Cohort 2: April 15, 1999 – May 25, 2000, n=181; Cohort 3: April 26, 2001 – May 16, 2002; n=175; Cohort 4: January 15, 2004 – February 24, 2005, n=179

The data of the four observed cohorts were grouped together, because no significant differences were found among them (for details see chapter IV.1.1.).

III. 2. Instruments and Variables

There were 13 basic variables in the study. Table 3 shows the full list of them.

Table 3

Variables Registered

	Variable Label	Variable
1	Sex	Sex
2	Age	Age
3	PES	Parental education status
4	CDI_T	Total CDI score
5	CDI_A	CDI_A Negative mood
6	CDI_B	CDI_B Interpersonal problems
7	CDI_C	CDI_C Ineffectiveness
8	CDI_D	CDI_D Anhedonia
9	CDI_E	CDI_E Negative self esteem
10	CLG	Czech language grade
11	MG	Math grade
12	GPA	Grade point average
13	IQ	Full scale IQ score

The instruments used to register the variables were following.

Sex, Age, Parental education status (PES) were three demographic variables registered. The PES was calculated as a mean of Mothers' and Fathers' education status. The codes were following: 1-no education completed 2- elementary education, 3-vocational education, 4-secondary education, 5-university education. When calculating PES, we substituted missing values by median values. We decided to substitute missing values by median not modus, because the Father's education status had bimodal distribution.

Children's Depression Inventory (CDI), a self-report questionnaire designed for children and adolescents aged 7 to 17 years served as a measure of depressive symptoms. We worked with a Czech validated version of the CDI (Kovacs & Preiss, 1998).

The inventory consists of 27 items. The subject is instructed to choose a statement that best describes his/her feelings during the past 2 weeks from three given possibilities on each item. Responses are scored 0, 1 or 2 with higher values indicating greater severity of symptoms. According to Kovacs (1992), the score 0 means that the child is symptom free, 1 refers to definite but not disabling symptom severity, and 2 reflects a clinically significant complaint. The author of the test states that approximately half of the items (randomly selected) are formulated so that the first choice refers to the lowest severity of symptoms and the other half is formulated in reversed order.

The CDI contains five scales: CDI_A Negative mood, CDI_B Interpersonal problems, CDI_C Ineffectiveness, CDI_D Anhedonia, and CDI_E Negative self esteem. The Total CDI score is calculated as a sum of the CDI scales' scores. Inspired by the work of Aluja & Blanch (2002), we work apart from the CDI scales' scores and the Total CDI score also with the Modified total CDI score, in which the CDI_C Ineffectiveness is eliminated.

The test has a relatively high predictive validity in discriminating between healthy children and children suffering from depressive disorders. Cronbach's alpha usually ranges between 0.71 and 0.89 depending on a sample and methodology used. The values of test-retest range between 0.38-0.87 (Kovacs & Preiss, 1998). Psychometric properties of the inventory has been documented in multiple studies (Kovacs, 1992).

Czech language grade (CLG) obtained at the last school report served as an indicator

of child's achievement in native language skills (reading, writing, communication) and in work with Czech literature. The values follow the national five-grade system, ranging from “excellent” (1) to “unsatisfactory” (5).

Math grade (MG) obtained at the last school report reflects a level of child's achievement in arithmetics, geometry, and their applications. The grades range from “excellent” (1) to “unsatisfactory” (5).

Grade point average (GPA) of all grades obtained at the last school report was used as a rough indicator of average school achievement.

Wechsler Intelligence Scale for Children (WISC) as adapted for Czech population was used to measure intelligence (Kubička et al., 1973)[\[1\]](#). The WISC was the first generation of worldwide spread Wechsler's tests appropriate for assessing children's and adolescents' intelligence. The WISC comprises five basic (plus one additional) Verbal scale subtests and five basic (plus one additional) Performance scale subtests. The Verbal scale consists of verbal-based items and the Performance scale uses visual-motor items that are less dependent on language. Subtests produce scale-specific IQ scores that can be combined into a Verbal IQ, Performance IQ, and Full scale IQ scores. In this study, we used only the Full scale IQ score as a global ability indicator, because it has been found to work as the most powerful and useful predictor of academic achievement obtainable from the WISC-III (Glutting et al., 1997).

[\[1\]](#) Today, revised versions of the WISC (WISC-R and WISC-III) are available, but in 1996, when our data collection started, the original WISC was the only version standardized to

Czech population.

III. 3. Statistics

We performed all statistical operations using the software SPSS 15.0. The statistic analyses constituted of independent samples testing, on correlation analysis, and on multiple regression analysis. Because most of the data were ordinal, we have chosen mainly nonparametric methods. The only exception was the linear regression analysis.

We worked with quite large N and performed multiple tests, so the probability of type I errors was quite high. To minimize the problem, we followed two procedures. First, when performing group comparison tests, we applied Bonferroni correction of α level thresholds. Second, when describing and discussing results of the correlation analyses, we were careful in interpretation and we did not draw any conclusions from the relations significant at α levels lower than 0.01.

IV. RESULTS

IV. 1. Descriptive Statistics and Preliminary

Analyses

In this chapter, we present and discuss the results of the preliminary analyses that preceded the analyses pursuing the main goals of the study.

IV. 1. 1. Waves of Data Collection

Preliminary Question 1: Can our data collected in four successive waves be joined and analyzed together?

Because the data were collected in four successive waves, we inspected, if we could join the gathered materials and analyze them together. Therefore, we examined, if the four cohorts differed significantly in the variables registered. We performed Kruskal-Wallis test for all the variables except sex. The results are shown in Table 4.

Table 4

Results of Kruskal-Wallis test for Differences Between the Four Cohorts

Variable	Chi-square	df	P-value
Age	0.08	3	0.994
Parental education status	0.30	3	0.960
Total CDI score	3.38	3	0.337
CDI_A Negative mood	3.45	3	0.327
CDI_B Interpersonal problems	2.96	3	0.398
CDI_C Ineffectiveness	3.60	3	0.308
CDI_D Anhedonia	6.67	3	0.083
CDI_E Negative self esteem	0.84	3	0.841
Czech language grade	5.19	3	0.159
Math grade	4.48	3	0.214
Grade point average	5.36	3	0.147
Full scale IQ	10.37	3	0.016

Note. After Bonferroni correction of α level threshold for 12 tests being carried out at a time ($0.05/12=0.004$), no significant differences appeared. $n=814$.

We adjusted the alpha level threshold of significance according to Bonferroni correction, because 12 tests were carried out at a time. No significant differences between the four observed cohorts appeared, so we joined all the gathered data together and analyzed them as a total.

Distribution of the Variables

The histograms describing the distribution of the variables registered are shown in Appendix A. Table 5 shows the summary of the variables descriptive characteristics (n, range: minimum - maximum, mean, and standard deviation) for the total sample.

Table 5

Summary of Descriptive Characteristics of the Variables

Variable	n	Range	M	SD
Parental education status	814	0-5	3.66	1.08
Total CDI score	812	0-34	9.16	5.66
CDI_A Negative mood	812	0-9	1.79	1.63
CDI_B Interpersonal problems	812	0-5	0.74	1.03
CDI_C Ineffectiveness	812	0-8	1.82	1.60
CDI_D Anhedonia	812	0-11	2.68	2.09
CDI_E Negative self esteem	812	0-8	2.13	1.31
Czech language grade	807	1-5	1.8	0.75
Math grade	811	1-4	1.59	0.69
Grade point average	793	1-3,5	1.32	0.36
Full scale IQ	814	10-148	111.35	13.84

Note. n=814.

The mean parental education status 3.66 (with range 0-5) reflects higher educational background of the Prague urban area.

The average full scale IQ score was also high, it equaled 111.35. It exceeded the average IQ score 100 probably partly because of the obsolete norms of the WISC, partly because of the selected geographic area. Children from large urban areas typically reach higher average IQ scores than other children populations.

The mean of the Czech language grade was 1.8, of the math grade 1.59, and of the grade point average 1.32. Grades were in general very good, which corresponds to the age level studied.

When the difference between the age ranges examined is taken into account, the mean of the total CDI score 7.34 is comparable to the mean 9.81 reported by Kovacs (1992). While the Kovacs' value was calculated for children aged 7 to 12 years, we used a sample of a narrower range 9 to 11 years. Our means of the five CDI scales also reached similar values as the Kovacs' normative American sample. For the CDI_A Negative mood the means were: 1.79 (2.15), for CDI_B Interpersonal problems: 0.74 (0.76), for CDI_C Ineffectiveness 1.82 (1.87), for CDI_D Anhedonia 2.68 (3.22), and for CDI_E Negative self esteem 2.13 (1.81)⁵. We cannot compare our values to the relevant Czech norms (Kovacs & Preiss, 1998), because the samples used overlap⁶.

When we took the total CDI raw score of 20, the most appropriate cut-point for general screening purposes recommended by Kovacs (1992), 51 children, i. e. 6.3% of the

5 The values reported by Kovacs (1992) are written in parentheses.

⁶ Because we worked with probably the largest Czech sample of the Children's Depression Inventory data (n=814) that overlaps with the sample (n= 369) used for norms published in the Czech manual to the inventory (Kovacs & Preiss, 1998), we were interested what would our norms look like. The Table B1 introduced in the Appendix B shows the percentiles for the total CDI score and for the 5 CDI scales. The obtained percentiles are almost the same as those published by Kovacs and Preiss (1998). The norms can be considered relevant only for Prague children at the age 9 to 11. There is a need for broader standardization of the CDI that would include older children and adolescents.

sample, were selected as showing clinically significant level of depressive symptoms.⁷ Using the same procedure, Kovacs (1992) identified 9.9% of her sample. The difference could probably be accounted for by the fact that we studied a narrow age range of younger children. The American normative sample consisted of children and adolescents aged 7 to 17 years. Research repeatedly shows that prevalence of depressive symptoms in children and adolescents increases with age (e.g. Hankin et al., 1998).

⁷ The cut-point of 20 minimizes the probability of false positives, and thus is appropriate for general screening. In clinical setting, in which we want to minimize false negatives, the cut-point of 12 or 13 is recommended (Kovacs, 1992).

IV. 1. 2. Reliability of the CDI Data

Preliminary Question 2: Is the reliability of the CDI data sufficient?

Because in focus of our research attention was the CDI data, we examined, whether the reliability of it was sufficient. First, we calculated the corrected item-total Spearman correlations for all the 27 items. Next, we calculated the Cronbach's α coefficients for the whole inventory and for the 5 CDI scales separately.

The correlations of items and the total CDI score were corrected in that the particular item in computation was not included in the total CDI score for that correlation. The values in Table 6 indicate how well each item correlates with the rest of the items.

Table 6

CDI Corrected Item-Total Correlations

Item n.	Item label	R with corrected total CDI score
1	Sadness	0.27*** (0.39)
2	Pessimism	0.31*** (0.49)
3	Self-deprecation	0.33*** (0.54)
4	Anhedonia	0.19*** (0.36)
5	Misbehavior	0.30*** (0.29)
6	Pessimistic worrying	0.19*** (0.34)
7	Self-hate	0.27*** (0.52)
8	Self-blame	0.33*** (0.39)
9	Suicidal ideation	0.26*** (0.45)
10	Crying spells	0.28*** (0.41)
11	Irritability	0.33*** (0.51)
12	Reduced social interest	0.20*** (0.41)
13	Indecisiveness	0.46*** (0.38)
14	Negative body image	0.28*** (0.42)
15	School-work difficulty	0.39*** (0.38)
16	Sleep disturbance	0.38*** (0.41)
17	Fatigue	0.24*** (0.35)
18	Reduced appetite	0.27*** (0.22)
19	Somatic concerns	0.27*** (0.28)
20	Loneliness	0.40*** (0.58)
21	School dislike	0.23*** (0.43)
22	Lack of friends	0.29*** (0.43)
23	School performance decrement	0.44*** (0.42)
24	Self-deprecation (via peer comparison)	0.39*** (0.49)
25	Feeling unloved	0.27*** (0.50)
26	Disobedience	0.28*** (0.32)
27	Fighting	0.36*** (0.39)

Note. *** $p < 0.001$. The values reported by Kovacs (1992) are written in parentheses. Kovacs did not report level of significance. $n=587$

In the Table 6, we see that in approximately one third of the items, the correlations

with corrected total CDI score are comparable to the coefficients reported by Kovacs (1992) and in the rest two thirds, they reach markedly lower values. The results might reflect lower reliability characteristics of the inventory in different language and cultural context, and in different age range studied.

Next, we examined the Cronbach's α coefficients. The alpha 0.80 of the whole CDI indicates good internal consistency reliability of the whole inventory and corresponds to the coefficients reported by Kovacs (1992): 0.71 to 0.89. The alpha values for the CDI scales ranged from 0.40 to 0.59. The coefficients are shown in Table 7. To enable comparison, we enclosed also Cronbach's α coefficients published by Kovacs (1992).

Table 7

Internal Consistency of the CDI Scales

The CDI scale	Cronbach's α	Item numbers
CDI_A Negative mood	0.49 (0.62)	1, 6, 8, 10, 11, 13
CDI_B Interpersonal problems	0.40 (0.59)	5, 12, 26, 27
CDI_C Ineffectiveness	0.59 (0.63)	3, 15, 23, 24
CDI_D Anhedonia	0.53 (0.66)	4, 16, 17, 18, 19, 20, 21, 22
CDI_E Negative self esteem	0.49 (0.68)	2, 7, 9, 14, 25

Note. The values in parentheses are the coefficients reported by Kovacs (1992). n=587. For the list of the CDI items see Table 19.

As can be seen in the Table 7, our values are lower than those obtained by Kovacs (1992), which points to limited internal consistency of the scales. However, when the short extent of the scales studied (they consist of 4-8 items) is taken into account, the obtained Cronbach's α coefficients can be considered acceptable. (The scale CDI_C Ineffectiveness, to

which we devote particular attention in the further analyses, shows the highest internal consistency of all the 5 CDI scales.)

IV. 1. 3. The Relationships in Demographic Variables

Preliminary Question 3: What are the relationships to other variables in demographic variables registered (sex, age, parental education status)?

Sex

We were interested in possible sex differences in mean scores of the variables registered. Therefore we calculated the descriptive characteristics for girls and boys separately and examined possible differences between them using Mann-Whitney test. Table 8 presents the results.

Table 8

Variables' Descriptives for Girls and Boys; Testing Gender Differences

Variable	BOYS		GIRLS		P-value (Mann-Whitney test)
	M	SD	M	SD	
Parental education status	3,65	1,11	3,66	1,04	0,848
Total CDI score	9,18	5,69	9,13	5,63	0,892
CDI_A Negative mood	1,78	1,59	1,80	1,67	0,821
CDI_B Interpersonal problems	0,84	1,10	0,63	0,95	0,006
CDI_C Ineffectiveness	1,82	1,56	1,82	1,63	0,736
CDI_D Anhedonia	2,67	2,17	2,69	2,02	0,526
CDI_E Negative self esteem	2,06	1,28	2,19	1,34	0,199
Czech language grade	1,90	0,78	1,70	0,72	0,000
Math grade	1,57	0,71	1,62	0,67	0,147
Grade point average	1,36	0,38	1,29	0,33	0,011
Full scale IQ	112,91	14,90	109,87	12,59	0,000

Note. Significant differences are written in bold letters. The α level thresholds were adjusted according to

Bonferroni ($0.05/11=0.005$; $0.01/11=0.001$; $0.001/11=0.000$). Boys: $n=395$; Girls: $n=419$.

After Bonferroni correction of α level thresholds, almost all the tested variables appeared similar for both genders. Small but statistically highly significant differences were found in the Czech language grade with girls reaching better outcomes and in full scale IQ, in which boys obtained higher scores.

Not surprisingly, no significant gender difference in the CDI total score was found. Although females are consistently reported to be about twice as likely to become depressed as males, in childhood the prevalence rates are equal for both genders. Some researchers suggest that in preadolescent period, boys are slightly more likely to become depressed than girls. (Angold, Costello, & Worthman, 1998; Twenge & Nolen-Hoeksema, 2002). However, most studies report no gender differences in prevalence rates prior to puberty (Nolen-Hoeksema & Girgus, 1994).

The better outcomes of girls in the Czech language might reflect their better adjustment to formal school requirements and higher preparedness to study according to the teacher's instructions (Chráska, 1996). While the outcomes of other studies focusing on gender gaps in grade point average and performance in math are mixed and vary as a function of measurement methods (Bolger & Kellaghan, 1990; Pungello et al., 1996), the results concerning languages and humanities are more consistent, showing girls to perform better (Pungello et al.; Škaloudová, 2005).

The higher full scale IQ scores of boys might reflect the usage of older version of the WISC. The findings of the studies focusing on gender differences in IQ scores are dependent

on the character of the tests used. Jelínek, Klimusová, and Blatný (2003) conducted a longitudinal study of 557 Czech children applying four different intelligence tests. The average level of intelligence in girls and boys aged 7-15 differed a little in favor of boys, but the difference did not reach statistical significance.

The found small differences point to possible different mechanisms underlying school achievement in boys and girls, and imply a need to include the sex variable in the analyses of the relationships between school grades and depressive symptoms.

Age

Even though we studied a very narrow age range of prepubertal children (9 to 11 years), we were interested whether the data reflect some trends concerning the age variable. To capture the relationships between age and the other variables, we calculated Spearman correlation coefficients. The gained correlations are summarized in Table 9.

Table 9

Correlations Between Age and Remaining Variables for Total Sample

Variable	R with age
Parental education status	-0,03
Total CDI score	0,02
CDI_A Negative mood	0,01
CDI_B Interpersonal problems	-0,07
CDI_C Ineffectiveness	0,09
CDI_D Anhedonia	-0,04
CDI_E Negative self esteem	0.13***
Czech language grade	0.20***
Math grade	0.17***
Grade point average	0.22***
Full scale IQ	-0,07

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Coefficients with $p < 0.01$ are written in bold letters. $n = 814$.

We can see that age is associated with six of the variables studied. Within the CDI results, only the scores of the CDI_C Ineffectiveness and of the CDI_E Negative self esteem proved to be slightly increasing with age. We can expect that if we had a chance to examine broader age range, an increase would be apparent also in other CDI variables, because the prevalence of depressive symptoms is proven to rise with age during childhood and adolescence (e.g. Hankin et al., 1998).

In accordance with results of other studies (e.g. Kowalski-Jones & Duncan, 1999), all three school achievement variables – the Czech language grade, the math grade, and the grade point average - showed worsening in relationship with increasing age. Škaloudová (2005) summarizes that as children grow older, their grades worsen, mainly because the requirements become more demanding and the teachers' evaluation becomes stricter.

There appeared also a very weak association between age and full-scale IQ significant only at α levels 0.05.

The results suggest that the age variable might play a role, and thus should be considered in studying the relationships between school achievement and depressive symptoms.

Parental Education Status

Next, we examined basic associations in another demographic variable, the parental education status (the mean of mother's and father's education status). Table 10 shows the Spearman correlation coefficients.

Table 10

Correlations Between Parental Education Status and Remaining Variables for Total Sample

Variable	R with parental education status
Total CDI score	-0.10**
CDI_A Negative mood	-0.02
CDI_B Interpersonal problems	-0.06
CDI_C Ineffectiveness	-0.03
CDI_D Anhedonia	-0.13***
CDI_E Negative self esteem	-0.11**
Czech language grade	-0.30***
Math grade	-0.25***
Grade point average	-0.30***
Full scale IQ	0.34***

Note. . ** p<0.01; ***p<0.001; Coefficients with p<0.01 are written in bold letters.

n=814.

The parental education status correlated mainly with the three school achievement measures and with the full scale IQ. (The close association of school grades and the IQ score is apparent in the next table.) These variables are probably closely associated on the basis of shared genetic dispositions between parents and children and also on the basis of family approach to learning and achievement (including learning habits, parental expectations etc.).

Finally, there appeared also weak correlations with the total CDI score, the CDI_D Anhedonia, and the CDI_E Negative self esteem. The coefficients of determination (ranging from 0.01 to 0.02) point to possible weak associations.

The parental education status is associated to the school achievement variables, intelligence, and slightly also to depressive symptoms, and so presents a variable that we devote particular attention to in studying the relationships between the CDI results and the school grades.

IV. 1. 4. The Relationships of Full Scale IQ

Preliminary Question 4: What are the relationships to other variables in the full scale IQ?

To see, what relationships to other variables could be found in full scale IQ, we calculated the Spearman correlation coefficients. The results are presented in Table 11.

Table 11

Correlations Between Full Scale IQ and Remaining Variables for Total Sample

Variable	R with full scale IQ
Age	-0.07*
Parental education status	0.34***
Total CDI score	-0.16***
CDI_A Negative mood	-0.06
CDI_B Interpersonal problems	-0.09*
CDI_C Ineffectiveness	-0.15***
CDI_D Anhedonia	-0.14***
CDI_E Negative self esteem	-0.11**
Czech language grade	-0.38***
Math grade	-0.47***
Grade point average	-0.47***

Note. .*p<0.05; ** p<0.01; ***p<0.001; Coefficients with p<0.01 are written in bold letters. n=814.

Besides the parental education status (as discussed in the latter chapter), the full scale IQ correlated strongly with the three achievement variables – the Czech language grade, the math grade, and the grade point average.

There appeared also significant associations between the full scale IQ and several CDI scores - the total CDI score, the CDI_C Ineffectiveness, the CDI_D Anhedonia, and the CDI_E Negative self esteem.

The authors of the Czech WISC manual report the test assesses effective intelligence, rather than primary intellectual capacity (Kubička et al., 1973). Thus, the achievement in the WISC is to a certain extent influenced by the same non-intellectual factors (such as motivational factors, psychosocial adjustment, self-esteem, attributional beliefs, mood etc.) that affect also school achievement. The found associations between intelligence and school achievement variables might reflect also the effects of such non-cognitive factors that can be related to depressive symptoms. The complex character of these relationships needs to be addressed in further research.

The full scale IQ is strongly connected with the parental education status and the school achievement variables, and slightly also to depressive symptoms. Thus, we consider it a relevant variable that we devote particular attention to in studying the relationships between the CDI results and the school grades.

IV. 2. Depressive Symptoms and School

Achievement

IV. 2. 1. Correlations between the CDI Scores and

School Grades

Hypothesis 1: The total CDI score relates to the school achievement variables.

Hypothesis 2: The total CDI score relates to the school achievement variables even when controlled for parental education status and full scale IQ.

Hypothesis 3: The five CDI scales relate to the school achievement variables.

Hypothesis 4: The five CDI scales relate to the school achievement variables even when controlled for parental education status and full scale IQ.

Hypothesis 5: Within the CDI scales, the CDI_C Ineffectiveness shows the highest correlation with school achievement variables.

This chapter presents results of correlation analysis of the associations between depressive symptoms and school grades. First we performed bivariate and partial correlation analysis for the total sample and then bivariate nonparametric correlation analysis for girls and boys separately.

Based on the past research (Aluja & Blanch, 2002; Capaldi, 1991; Fauber, Forehand, Long, Burke, & Faust, 1987; Glied & Pine, 2002; Strauss, Lahey, & Jacobson, 1982), we hypothesized that the total CDI score, as well as particular domains of depressive symptoms represented by the five CDI scales' total scores relate to school achievement variables (i.e. Czech language grade, math grade, and grade point average). Within the CDI scales' total scores we expected the highest correlations in the CDI_C Ineffectiveness, because this scale is constructed to capture depressive symptoms in the school context.

The relationship studied might be influenced by many other factors. We registered four of them: sex, age, parental education status, and intelligence. The parental education status and the full scale IQ were associated both with the achievement variables and the depressive symptoms, thus they might distort the main association studied. Therefore, besides bivariate Spearman correlations, we calculated also Spearman partial correlations controlling for the two variables mentioned. The results for total sample are presented in Table 12.

Table 12

Bivariate and Partial Correlations Between CDI Scores and School Achievement Variables for Total Sample

	Czech language grade		Math grade		Grade point average	
	Bivariate	Partial	Bivariate	Partial	Bivariate	Partial
Total CDI score	0.26***	0.20***	0.25***	0.22***	0.27***	0.23***
CDI_A Negative mood	0.12***	0.11**	0.12***	0.12***	0.13***	0.15***
CDI_B Interpersonal problems	0.18***	0.17***	0.13***	0.14***	0.16***	0.14***
CDI_C Ineffectiveness	0.29***	0.27***	0.31***	0.31***	0.34***	0.30***
CDI_D Anhedonia	0.15***	0.09*	0.17***	0.12***	0.16***	0.12***
CDI_E Negative self esteem	0.17***	0.14***	0.15***	0.13***	0.17***	0.15***

Note. *p<0.05; ** p<0.01; ***p<0.001; Coefficients with p<0.01 are written in bold letters. Partial correlations were calculated controlling for parental education status and full scale IQ. n=814.

In Table 12, we can see that all the associations studied proved to be statistically significant. Almost all the coefficients decreased after controlling for parental education status and intelligence, but stayed significant and comparable.

The magnitudes of the coefficients in all three school achievement variables were comparable. The coefficients of determination ranged from 0.04 (in partial correlation of the Czech language grade) to 0.07 (in bivariate correlations of Czech language grade and grade point average). It should be noted that the three school achievement variables were intercorrelated (see Appendix C).

The found correlations in four of the CDI scales (CDI_A Negative mood, CDI_B Interpersonal problems, CDI_D Anhedonia, CDI_E Negative self esteem) were weak or mild. The coefficients of determination ranged from 0.01 to 0.03. A scale with markedly higher results was the CDI_C Ineffectiveness, as we expected. In this scale, the coefficients of determination ranged from 0.07 to 0.12 and exceeded the shared variance between the total CDI score and the school grades.

The results suggest that the total level of depressive symptoms, as well as all the five component domains of depressive symptoms, captured by the CDI relate to the school results. The associations stayed significant even after controlling for the two confounding variables (parental education status and full scale IQ).

Next, we were interested whether the relationships of the CDI scores and school grades would manifest any apparent differences between the groups of girls and boys. Therefore we calculated the Spearman bivariate correlations for girls and boys separately. The

Table 13 shows the obtained coefficients.

Table 13

Correlations Between CDI Scores and School Achievement Variables for Boys and Girls

	Czech language grade		Math grade		Grade point average	
	Boys	Girls	Boys	Girls	Boys	Girls
Total CDI score	0.25***	0.27***	0.24***	0.27***	0.29***	0.26***
CDI_A Negative mood	0.15**	0,10	0.16**	0,09	0.19***	0,08
CDI_B Interpersonal problems	0.17***	0.17***	0.15**	0.12*	0.16**	0.15**
CDI_C Ineffectiveness	0.28***	0.29***	0.29***	0.39***	0.34***	0.33***
CDI_D Anhedonia	0.12*	0.19***	0.11*	0.22***	0.15**	0.18***
CDI_E Negative self esteem	0.16**	0.20***	0.15**	0.15**	0.18***	0.17***

Note. *p<0.05; ** p<0.01; ***p<0.001; Coefficients with p<0.01 are written in bold letters. Boys: n=395; Girls: n=419.

We can see that in general the obtained results were similar for both genders. However, at the level of the CDI subscales two apparent differences appeared. First, while in boys the CDI_A Negative mood was mildly associated to all three achievement variables, in girls it was not related to any of them. Second, in girls the correlations between the CDI_D Anhedonia and Czech language and math grades were markedly higher and more significant than in boys. The obtained differences might point to possible different underlying mechanisms in boys and girls. Therefore we decided to conduct the following regression analyses not only for the total sample, but also for both genders separately.

IV. 2. 2. Prediction of School Grades from the CDI

Scales

Hypothesis 6: Within the CDI scales, the CDI_C Ineffectiveness consistently works as the most salient predictor of the school achievement variables.

Based on the above presented results, we hypothesized that within the CDI scales' total scores, the CDI_C Ineffectiveness works as the most salient predictor of the school achievement variables. In order to assess the relationship between the CDI scales and academic achievement variables, we performed a series of simultaneous multiple regression analyses. See Appendix C for the intercorrelations between the variables entered into the regression analyses. Table 14 shows the results of the simultaneous regression analysis for the total sample and Table 15 presents results for boys and girls separately.

Table 14

Summary of Regression Analyses for CDI Scales Predicting School Achievement Variables for Total Sample

Dependent variable: Czech language grade					
Predictor	B	Std. error	β	t	p-value
CDIA-Negative Mood	-0,03	0,02	-	-	0,080
CDIB-Interpersonal Problems	0,07	0,03	0,09	2,31	0,021
CDIC-Ineffectiveness	0,13	0,02	0,27	6,42	0,000
CDID- Anhedonia	0,00	0,01	0,01	0,33	0,744
CDIE-Negative Self-Esteem	0,03	0,02	0,06	1,50	0,134
R²	0,10				
Dependent variable: Math grade					
Predictor	B	Std. error	β	t	p-value
CDIA-Negative Mood	-0,03	0,02	-	-	0,078
CDIB-Interpersonal Problems	0,03	0,03	0,04	1,15	0,250
CDIC-Ineffectiveness	0,14	0,02	0,32	7,86	0,000
CDID- Anhedonia	0,02	0,01	0,06	1,50	0,135
CDIE-Negative Self-Esteem	0,01	0,02	0,02	0,52	0,605
R²	0,12				
Dependent variable: Grade point average					
Predictor	B	Std. error	β	t	p-value
CDIA-Negative Mood	-0,01	0,01	-	-	0,343
CDIB-Interpersonal Problems	0,01	0,01	0,03	0,79	0,432
CDIC-Ineffectiveness	0,07	0,01	0,31	7,34	0,000
CDID- Anhedonia	0,01	0,01	0,05	1,28	0,199
CDIE-Negative Self-Esteem	0,01	0,01	0,04	0,94	0,348
R²	0,12				

Note. Results with $p < 0.05$ are written in bold letters. $n = 814$.

Table 15

Summary of Regression Analyses for CDI Scales Predicting School Achievement Variables for Boys and Girls

Dependent variable: Czech language grade										
Boys						Girls				
Predictor	B	Std. error	β	t	p-value	B	Std. error	β	t	p-value
CDI_A Negative Mood	-0,02	0,03	-	-	0,578	-0,05	0,03	0,11	1,84	0,067
CDI_B Interpersonal Problems	0,07	0,04	0,10	1,67	0,097	0,04	0,04	0,05	0,88	0,378
CDI_C Ineffectiveness	0,13	0,03	0,26	4,18	0,000	0,12	0,03	0,28	4,88	0,000
CDI_D Anhedonia	-0,01	0,02	0,02	0,26	0,792	0,02	0,02	0,05	0,85	0,393
CDI_E Negative Self-Esteem	0,02	0,04	0,04	0,63	0,532	0,06	0,03	0,11	2,02	0,044
R²	0,09					0,11				
Dependent variable: Math grade										
Boys						Girls				
Predictor	B	Std. error	β	t	p-value	B	Std. error	β	t	p-value
CDI_A Negative Mood	-0,01	0,03	0,02	0,31	0,755	-0,05	0,02	0,12	2,06	0,040
CDI_B Interpersonal Problems	0,05	0,04	0,08	1,44	0,150	0,02	0,04	0,03	0,48	0,628
CDI_C Ineffectiveness	0,13	0,03	0,29	4,76	0,000	0,14	0,02	0,34	6,15	0,000
CDI_D Anhedonia	0,00	0,02	0,01	0,21	0,837	0,04	0,02	0,12	2,22	0,027
CDI_E Negative Self-Esteem	0,02	0,03	0,04	0,65	0,519	0,00	0,03	0,00	0,06	0,949
R²	0,11					0,14				
Dependent variable: Grade point average										
Boys						Girls				
Predictor	B	Std. error	β	t	p-value	B	Std. error	β	t	p-value
CDI_A Negative Mood	0,01	0,01	0,03	0,49	0,625	-0,02	0,01	0,11	1,85	0,066
CDI_B Interpersonal Problems	0,00	0,02	0,00	0,03	0,974	0,01	0,02	0,03	0,59	0,555
CDI_C Ineffectiveness	0,07	0,01	0,29	4,78	0,000	0,07	0,01	0,32	5,53	0,000
CDI_D Anhedonia	0,01	0,01	0,04	0,67	0,506	0,01	0,01	0,07	1,25	0,211
CDI_E Negative Self-Esteem	0,01	0,02	0,04	0,68	0,495	0,02	0,01	0,06	1,10	0,273
R²	0,12					0,12				

Note. Results with $p < 0.05$ are written in bold letters. Boys: $n = 395$; Girls: $n = 419$.

In the analysis, the academic achievement variables were predicted from all the CDI scales. The results were in concord with our expectations. The most salient predictor for total sample, as well as for both genders separately, was the CDI_C Ineffectiveness. Its coefficient beta ranged from 0.26 to 0.34. In six of the nine regression analyses performed the CDI_C Ineffectiveness proved to be the only significant predictor. There was one extra predictor for the total sample: CDI_B Interpersonal problems in predicting the Czech language grade and there were three extra predictors for girls: CDI_E Negative self esteem in predicting the Czech language grade, and CDI_A Negative mood, and CDI_D Anhedonia in predicting math grade. All the cited extra predictors had smaller effects than the Ineffectiveness scale. Interestingly, the effect of Negative mood in girls was reversed, i.e. Negative mood predicted better not worse academic results.

IV. 2. 3. Prediction of School Grades from Sex, Age, Parental Education Status, Intelligence, and the CDI Data

Hypothesis 7: The CDI_C Ineffectiveness works as a more salient predictor of the school achievement than the total CDI score.

Hypothesis 8: In the context of other predictors (sex, age, parental education status, and full scale IQ), the CDI_C Ineffectiveness consistently proves to be a significant predictor of the school achievement variables.

We were interested, whether the information gained by the CDI can help us to predict school achievement variables in context of the other variables registered, from which two (parental education status and intelligence) were strong correlates of the school grades.

First, we needed to decide which of the CDI scores was the most relevant to our question. We have performed, unlike past studies in the field, a very detailed correlation analysis that revealed that the CDI_C Ineffectiveness might have closer relationship with school performance than the total CDI score.

We took a look at the question, whether the CDI total score cleansed of the CDI_C Ineffectiveness score would have significant contribution to prediction of school achievement variables, when examined as an independent variable together with the CDI_C Ineffectiveness score. The results of the three regression analyses performed for total sample showed that

while the CDI_C Ineffectiveness had always highly significant ($p < 0.001$) contribution to the prediction, the modified total CDI score stayed consistently nonsignificant. The CDI_C Ineffectiveness' coefficient beta was 0.26 in Czech language grade ($R^2 = 0.09$), 0.31 in math grade ($R^2 = 0.11$), and 0.30 in grade point average ($R^2 = 0.11$).

We continued in verification of the notion that the CDI_C Ineffectiveness provides better information concerning the school achievement than the total CDI score via two series of regression analyses performed for the total sample. The first series included the CDI total score and the second included the CDI_C Ineffectiveness. The dependent variables were successively Czech language grade, math grade, and grade point average. The group of independent variables consisted of sex, age, parental education status, intelligence, and total CDI score or CDI_C Ineffectiveness.

Every time we tested the predictive power of the total CDI score or the CDI_C Ineffectiveness in context of the other above cited variables, they proved to be significant predictors of school achievement variables. They had significant information contribution to the prediction. As we expected, in all the models tested the CDI_C consistently proved to be slightly more salient predictor than the total CDI score. In summary: While the R^2 of the models including the total CDI score ranged from 0.27 to 0.31, the R^2 of the models including the CDI_C Ineffectiveness ranged from 0.29 to 0.34. The coefficients beta ranged from 0.18 to 0.21 in the total CDI score and from 0.23 to 0.27 in the CDI_C Ineffectiveness. The results indicate that for prediction of the school achievement variables the CDI_C Ineffectiveness brings more relevant information than the total CDI score.

Table 16 presents the summary of the series of the regression analysis that included CDI_C Ineffectiveness for the total sample. The Table 17 shows similar summary for boys

and girls separately.

Table 16

Summary of Regression Analyses for Sex, Age, Parental Education Status, Full Scale IQ, and CDI_C Ineffectiveness Predicting School Achievement Variables for Total Sample

Dependent variable: Czech language grade					
Predictor	B	Std. error	β	t	p-value
Sex	-0,24	0,05	-0,16	-5,32	0,000
Age	0,15	0,03	0,16	5,37	0,000
Parental education status	-0,15	0,02	-0,21	-6,61	0,000
CDI_C Ineffectiveness	0,11	0,01	0,23	7,59	0,000
Full scale IQ	-0,01	0,00	-0,28	-8,56	0,000
R²	0,29				
Dependent variable: Math grade					
Predictor	B	Std. error	β	t	p-value
Sex	-0,01	0,04	0,00	-0,13	0,895
Age	0,11	0,02	0,13	4,44	0,000
Parental education status	-0,09	0,02	-0,15	-4,72	0,000
CDI_C Ineffectiveness	0,11	0,01	0,27	8,87	0,000
Full scale IQ	-0,02	0,00	-0,35	-10,95	0,000
R²	0,30				
Dependent variable: Grade point average					
Predictor	B	Std. error	β	t	p-value
Sex	-0,10	0,02	-0,13	-4,60	0,000
Age	0,08	0,01	0,19	6,36	0,000
Parental education status	-0,06	0,01	-0,17	-5,65	0,000
CDI_C Ineffectiveness	0,06	0,01	0,26	8,65	0,000
Full scale IQ	-0,01	0,00	-0,33	-10,67	0,000
R²	0,34				

Note. Results with $p < 0.05$ are written in bold letters. $n = 814$.

Table 17

Summary of Regression Analyses for Sex, Age, Parental Education Status, Full Scale IQ, and CDI_C Ineffectiveness Predicting School Achievement Variables for Boys and Girls

Dependent variable: Czech language grade										
Boys						Girls				
Predictor	B	Std. error	β	t	p-value	B	Std. error	β	t	p-value
Age	0.19	0.04	0.20	4.74	0.000	0.11	0.04	0.12	2.80	0.005
Parental education status	-0.18	0.03	-0.25	-5.62	0.000	-0.11	0.03	-0.16	-3.63	0.000
CDI_C Ineffectiveness	0.11	0.02	0.21	4.86	0.000	0.11	0.02	0.25	5.79	0.000
Full scale IQ	-0.01	0.00	-0.25	-5.52	0.000	-0.02	0.00	-0.30	-6.72	0.000
R²	0.29					0.26				
Dependent variable: Math grade										
Boys						Girls				
Predictor	B	Std. error	β	t	p-value	B	Std. error	β	t	p-value
Age	0.16	0.04	0.18	4.26	0.000	0.06	0.03	0.08	1.89	0.059
Parental education status	-0.10	0.03	-0.16	-3.43	0.001	-0.09	0.03	-0.14	-3.20	0.001
CDI_C Ineffectiveness	0.11	0.02	0.25	5.67	0.000	0.11	0.02	0.28	6.78	0.000
Full scale IQ	-0.01	0.00	-0.31	-6.81	0.000	-0.02	0.00	-0.39	-8.96	0.000
R²	0.29					0.33				
Dependent variable: Grade point average										
Boys						Girls				
Predictor	B	Std. error	β	t	p-value	B	Std. error	β	t	p-value
Age	0.11	0.02	0.24	5.64	0.000	0.06	0.02	0.13	3.23	0.001
Parental education status	-0.07	0.01	-0.20	-4.63	0.000	-0.05	0.01	-0.15	-3.32	0.001
CDI_C Ineffectiveness	0.06	0.01	0.25	5.87	0.000	0.05	0.01	0.26	6.28	0.000
Full scale IQ	-0.01	0.00	-0.32	-7.33	0.000	-0.01	0.00	-0.35	-7.79	0.000
R²	0.36					0.30				

Note. Results with $p < 0.05$ are written in bold letters. Boys: $n = 395$; Girls: $n = 419$

IV. 2. 4. Comparison of Groups Divided According to the Total CDI Score

Hypothesis 9: Children with high total CDI score reach worse results in the school achievement variables.

The obtained correlations summarized in the latter chapter are in general weak or mild. We were interested, whether there would appear any considerable differences in the school grades, when the sample was divided according to the CDI cut-point.

Using the most appropriate CDI cut-point for general screening purposes, the raw score 20, we obtained two groups of children. For our purposes, we labeled the first group as nondepressed. It included 763 children, in who the CDI did not detect a high risk for clinically significant level of depressive symptoms. The second group consisted of 51 children (25 boys and 26 girls), who were selected as showing clinically significant level of depressive symptoms. The latter group was labeled as depressed.

We calculated the descriptive characteristics of the Czech language grade, math grade, and grade point average for the nondepressed and depressed children separately and examined possible differences between the groups using Mann-Whitney test. To get a whole picture of the groups' characteristics, we explored possible differences also in the other variables registered. Table 18 presents the results.

Table 18

Variables' Descriptives for Nondepressed and Depressed Children; Testing Differences

Variable	Nondepressed		Depressed		P-value (Mann-Whitney test)
	M	SD	M	SD	
Age	10.01	0.81	9.90	0.88	0.349
Parental education status	3.69	1.08	3.25	1.02	0.002
Czech language grade	1.78	0.74	2.06	0.84	0.017
Math grade	1.57	0.67	1.90	0.84	0.005
Grade point average	1.31	0.35	1.50	0.46	0.004
Full scale IQ	111.58	13.90	107.78	12.74	0.022

Note. Significant differences are written in bold letters. The α level thresholds were adjusted according to Bonferroni correction ($0.05/6=0.008$; $0.01/6=0.002$; $0.001/6=0.000$). Nondepressed: $n=763$; Depressed: $n=51$.

The Table 18 shows that the parents of depressed children reached somewhat lower education status than the children of the nondepressed group. The depressed children consistently manifested lower school achievement. They reached slightly worse results in math grade and grade point average. Similar trends were apparent also in Czech language grade and full scale IQ, but after Bonferroni correction they did not reach statistically significant threshold.

IV. 3. Methodological Limits of the CDI

Question 1: What is the difference between the correlations of the school achievement variables with the total CDI score and with the modified total CDI score (the total CDI score cleansed of the CDI_C Ineffectiveness score)?

Question 2: In prediction of the school achievement variables, what is the difference in predictive power between the CDI total score and the modified total CDI score in the context of the other variables registered (sex, age, parental education status, and full scale IQ)?

During the statistical work, there have arisen certain methodological concerns about the appropriateness of the usage of the total CDI score in studying the relationships between depressive symptoms and school performance. The problem is that this score includes score of the scale CDI_C Ineffectiveness that has a close and consistent relationship with the school achievement, even closer than the total CDI score. The scale consists of four following items: 3 Self-deprecation (*I do everything wrong.*), 15 School-work difficulty (*I have to push myself all the time to do my schoolwork.*), 23 School performance decrement (*I do very badly in subjects I used to be good in.*), 24 Self-deprecation via peer comparison (*I can never be as good as other kids.*). The CDI_C Ineffectiveness might reflect school problems that relate to school grades, but do not need to indicate depressive symptoms. In studying the relationships of school achievement and depressive symptoms, this means a danger of distorting the results. Surprisingly, this issue has so far been omitted in the past research. We see as crucial to detect to what extent the CDI_C Ineffectiveness might be responsible for the correlations between the total CDI score and school grades.

As a first step we created a list of items with their Spearman correlation coefficients to the grade point average to check, whether the items constituting the CDI_C Ineffectiveness are those with closest relationship with the school achievement at the level of particular items. For results see Table 19.

Table 19

CDI Spearman Correlations Between the CDI Items and Grade Point Average

Item n.	Item label	R with grade point average
1	Sadness	0.01
2	Pessimism	0.11**
3	Self-deprecation	0.11**
4	Anhedonia	0.06
5	Misbehavior	0.04
6	Pessimistic worrying	0.04
7	Self-hate	-0.03
8	Self-blame	-0.01
9	Suicidal ideation	0.16***
10	Crying spells	-0.04
11	Irritability	0.07
12	Reduced social interest	0.03
13	Indecisiveness	0.10*
14	Negative body image	0.04
15	School-work difficulty	0.22***
16	Sleep disturbance	0.11**
17	Fatigue	-0.04
18	Reduced appetite	0.09*
19	Somatic concerns	0.05
20	Loneliness	0.10*
21	School dislike	0.05
22	Lack of friends	0.04
23	School performance decrement	0.18***
24	Self-deprecation (via peer comparison)	0.20***
25	Feeling unloved	0.09*
26	Disobedience	0.04
27	Fighting	0.13**

Note. *p<0.05; ** p<0.01; ***p<0.001; Coefficients with p<0.01 are written in bold letters.

n=587.

We see that all the four CDI_C Ineffectiveness (3, 15, 23, 24) items significantly correlate with the grade point average and that three of them - 15 School-work difficulty, 23 School performance decrement, and 24 Self-deprecation via peer comparison – are those with highest coefficients.

As a next step we addressed a question what would be the difference between the correlations of the school achievement variables with the total CDI score on one side and with the modified total CDI score, i. e. the CDI total score cleansed of the CDI_C Ineffectiveness score, on the other side. Table 20 presents the summary of the correlation analysis.

Table 20

Bivariate and Partial Correlations Between School Achievement Variables and Total CDI Score and Modified Total CDI Score for Total Sample

	Czech language grade		Math grade		Grade point average	
	Bivariate	Partial	Bivariate	Partial	Bivariate	Partial
Total CDI score	0.26***	0.20***	0.25***	0.22***	0.27***	0.23***
Modified total CDI score	0.21***	0.16***	0.20***	0.17***	0.21***	0.18***

Note. *** $p < 0.001$; Coefficients with $p < 0.01$ are written in bold letters. Partial correlations were computed controlling for parental education status and full scale IQ. $n = 814$.

The Spearman correlation analysis revealed that after subtraction of the CDI_C Ineffectiveness the correlation coefficients markedly decreased, but still stayed highly significant ($p < 0.001$). In the Czech language grade the correlation decreased from 0.26 to 0.21, in the math grade from 0.25 to 0.20, and in the grade point average from 0.27 to 0.21. If we take a perspective of the coefficients of determination, we see that they decrease from 0.06 – 0.07 in the total CDI score to 0.04 in the modified total CDI score, which seems as quite a

high portion. If we take the modified CDI score and conduct partial Spearman correlation analysis controlling for the parental education status and the full scale IQ, we come to still highly significant ($p < 0.001$) correlations. Nevertheless, the obtained coefficients were rather small: 0.16 in the Czech language grade, 0.17 in the math grade, and 0.18 in the grade point average. At this point, the coefficients of determination dropped to 0.03.

Finally, we were interested, what would be the difference between the predictive power of the total CDI score and the modified total CDI in the context of other variables registered. The results of a series of regression analyses performed to predict the school achievement variables for the total sample confirmed our expectations. See the summary in Table 21.

Table 21

Summary of Regression Analyses for Sex, Age, Parental Education Status, Total CDI Score or Modified Total CDI Score, and Full Scale IQ Predicting School Achievement Variables for Total Sample

Dependent variable: Czech language grade					
Predictor	B	Std. error	β	t	p-value
Sex	-0.24	0.05	-0.16	-5.30	0.000
Age	0.16	0.03	0.18	5.85	0.000
Parental education status	-0.13	0.02	-0.19	-5.97	0.000
Total CDI score	0.02	0.00	0.18	5.94	0.000
Full scale IQ	-0.02	0.00	-0.29	-8.86	0.000
R²	0.27				
Sex	-0.24	0.05	-0.16	-5.29	0.000
Age	0.17	0.03	0.18	5.93	0.000
Parental education status	-0.13	0.02	-0.19	-5.89	0.000
Modified total CDI score	0.02	0.01	0.14	4.68	0.000
Full scale IQ	-0.02	0.00	-0.30	-9.08	0.000
R²	0.26				

Dependent variable: Math grade					
Predictor	B	Std. error	β	t	p-value
Sex	-0.01	0.04	-0.01	-0.17	0.867
Age	0.13	0.03	0.15	5.01	0.000
Parental education status	-0.08	0.02	-0.13	-4.00	0.000
Total CDI score	0.02	0.00	0.20	6.51	0.000
Full scale IQ	-0.02	0.00	-0.36	-11.19	0.000
R²	0.27				
Sex	-0.01	0.04	-0.01	-0.20	0.844
Age	0.13	0.03	0.16	5.10	0.000
Parental education status	-0.08	0.02	-0.13	-3.94	0.000
Modified total CDI score	0.02	0.00	0.15	4.94	0.000
Full scale IQ	-0.02	0.00	-0.37	-11.41	0.000
R²	0.26				
Dependent variable: Grade point average					
Predictor	B	Std. error	β	t	p-value
Sex	-0.10	0.02	-0.14	-4.56	0.000
Age	0.09	0.01	0.20	6.85	0.000
Parental education status	-0.05	0.01	-0.16	-4.95	0.000
Total CDI score	0.01	0.00	0.20	6.81	0.000
Full scale IQ	-0.01	0.00	-0.35	-10.98	0.000
R²	0.31				
Sex	-0.10	0.02	-0.14	-4.54	0.000
Age	0.09	0.01	0.21	6.93	0.000
Parental education status	-0.05	0.01	-0.15	-4.88	0.000
Modified total CDI score	0.01	0.00	0.16	5.39	0.000
Full scale IQ	-0.01	0.00	-0.36	-11.21	0.000
R²	0.30				

Note. Results with $p < 0.05$ are written in bold letters. $n = 814$.

When we examine the particular coefficients beta, we see that those of the total CDI score range from 0.18 to 0.20, while those of the modified total CDI score range from 0.14 to 0.16. The difference is quite small, but supports the notion of limited predictive power of the modified total CDI score.

V. DISCUSSION

V. 1. Major Findings

The present study provided support for the stated hypotheses and brought answers to two final exploratory questions. For summary, see Table 22.

Table 22

Summary of Hypotheses, Questions, and Results

Hypothesis or Question	Result
<i>Hypothesis 1:</i> The total CDI score relates to the school achievement variables.	Confirmed
<i>Hypothesis 2:</i> The total CDI score relates to the school achievement variables even when controlled for parental education status and full scale IQ.	Confirmed
<i>Hypothesis 3:</i> The five CDI scales relate to the school achievement variables.	Confirmed.
<i>Hypothesis 4</i> The five CDI scales relate to the school achievement variables even when controlled for parental education status and full scale IQ.	Confirmed.
<i>Hypothesis 5</i> Within the CDI scales, the CDI_C Ineffectiveness shows the highest correlation with school achievement variables.	Confirmed.
<i>Hypothesis 6</i> Within the CDI scales, the CDI_C Ineffectiveness consistently works as the most salient predictor of the school achievement variables.	Confirmed.
<i>Hypothesis 7</i> The CDI_C Ineffectiveness works as a more salient predictor of the school achievement than the total CDI score.	Confirmed.
<i>Hypothesis 8</i> In the context of other predictors (sex, age, parental education status, and full scale IQ), the CDI_C	Confirmed.

	Ineffectiveness consistently proves to be a significant predictor of the school achievement variables.	
<i>Hypothesis 9</i>	Children with high total CDI score reach worse results in the school achievement variables.	Confirmed for the math grade and grade point average, but not for Czech language grade.
<i>Question 1</i>	What is the difference between the correlations of the school achievement variables with the total CDI score and with the modified total CDI score (i.e. the total CDI score cleansed of the CDI_C Ineffectiveness score)?	The correlations of the school achievement variables with the total CDI score were markedly higher than those with the modified total CDI score.
<i>Question 2</i>	In prediction of the school achievement variables, what is the difference in predictive power between the CDI total score and the modified total CDI score in the context of the other variables registered (sex, age, parental education status, and full scale IQ)?	In prediction of the school achievement variables, the predictive power of the CDI total score was higher than the one of the modified total CDI score.

The results summarized in the Table 22 constitute four major findings of the project.

First, we found support for the existence of a relationship between school achievement and depressive symptomatology. All three school achievement variables correlated with the total level of symptoms reported on the CDI (Hypotheses 1) and depressed children detected by the CDI manifested slightly worse school grades than nondepressed children (Hypothesis 9).

The size of the correlation between the total CDI score and the achievement variables was similar as in other studies (Aluja & Blanch, 2002; Ezpeleta, 1990; Fauber et al., 1987; Chen & Li, 2000; Glied & Pine, 2002; Mattison et al., 1990; Schwartz et al., 2008). The results for boys and girls were similar to those obtained for the total sample. Unlike the above cited past studies that used only a single indicator of school achievement such as grade point average, we examined the relationships in three interrelated performance measures: Czech

language grade, math grade, and grade point average. As we expected, the outcomes were similar with all three measures.

The differences between depressed and nondepressed children reached statistical significance (after Bonferroni correction) for math grade and grade point average, not for Czech language grade. However, given that the number of depressed children was quite low ($n = 51$) and that Bonferroni correction was used, the trends found for Czech language grade should also be taken into account. The results point to consistent differences between depressed and nondepressed children across all three school achievement indicators. These outcomes corroborate findings from other studies comparing these groups. Past research has shown that school achievement is lower in depressed than in non-depressed children (Ezpeleta, 1990; Mattison et al., 1990), as well as that high achieving children reach higher levels of depressive symptoms than low achieving children (Blechman et al., 1986; Fráňová et al., 2006).

There is an almost unproblematic research consensus for the fact that the children with higher achievement tend to be less depressed and vice versa. How the development of depressive symptoms is linked to the development of achievement continues to be a major question for future research. As reviewed in the Chapter 1.3., associations between depressive symptomatology and school achievement have been explained by a variety of underlying mechanisms including direct or interactive causal effects. Apart from causal bounds, we should not omit classical third variable explanations stating that both variables might be consequences of a hidden third variable (Glied & Pine, 2002). Moreover, there is also the possibility that the found correlation occurs as an artifact of a third hidden variable. Children who differ on achievement or depressive symptoms might also differ on other important

characteristics that foster or complicate adjustment such as, for example, family conditions (including family socioeconomic status), stressful life events, intelligence, self-competence, social skills or psychopathological characteristics. The variables we have studied might simply be markers of other children's characteristics related to resilience or vulnerability to negative psychosocial outcomes. Given the single-time point design of our study we could not examine time-predictive or causal effects. However, as a next step we conducted a partial correlation analysis to see whether the main relationships studied would differ when controlled for two of the possible intervening variables.

Second, the results point to the existence of a relationship between school achievement and depressive symptomatology even when the confounding variables intelligence and parental education status are considered. For the total sample, when the influences of the two confounding variables were controlled, all correlations between school achievement variables and the total level of symptoms reported on the CDI decreased, but stayed significant (Hypothesis 2).

We conducted this analysis, because our results as well as results of past studies pointed to underlying interlinkages that might distort the main correlations studied. Similarly to our findings, past research found intelligence to be strongly connected with school achievement (Glutting et al., 1997) and to be also weakly connected with depressive symptoms (Aluj & Blanch, 2002; Rapport et al., 2001). Similarly, our correlational results supported outcomes of other studies indicating that parental education status, as an important part of child family conditions, is associated with school achievement (Gutman et al., 2003; Sameroff et al., 1993) and weakly with depressive symptoms (Kovacs, 1989). Moreover, our group comparison analysis revealed that parents of depressed children reached somewhat

lower education status than the children of the nondepressed group. A similar trend was also apparent for intelligence, but it did not reach statistical significance.

A partial correlational analysis indicated that intelligence and parental education status might intervene in the relationship between school achievement and depressive symptoms. However, their influence is probably quite small and theoretically insignificant. In existing literature, we found only one study with a comparable analysis (Strauss et al., 1982) where the authors controlled for intelligence and came to similar conclusions as we did. Given the multifactorial determination of school achievement and depressive symptomatology, future research could benefit from registering more possibly intervening variables, such as stressful life events, social skills or other psychopathological characteristics.

A longitudinal research design would additionally allow examining possible time predictive associations. As Gutman et al. (2003) argue, there is a growing interest in taking a broader perspective when examining risk and protective factors in contemporary research. Because biological, psychological and social factors tend to cluster and usually no single factor can be responsible for a developmental outcome, a greater explanatory power comes from examining combinations of influences.

Third, for the total sample, the current study demonstrated significant relationships between all three school achievement indicators and all five subgroups of depressive symptoms: CDI_A Negative mood, CDI_B Interpersonal problems, CDI_C Ineffectiveness, CDI_D Anhedonia, and CDI_E Negative self esteem. Unlike other studies in this area, we performed the detailed bivariate correlation analysis at the level of the CDI subscales. Moreover, we also conducted partial correlations for the total sample showing that all five CDI scales proved to have significant associations with school achievement variables,

even after controlling for intelligence and parental education status (Hypotheses 3 and 4).

Interestingly, we found different correlational results for boys and girls. First, while for boys the CDI_A Negative mood was associated to all three achievement variables, for girls it was not related to any of them. Second, in girls the correlations between CDI_D Anhedonia and Czech language and math grades were markedly higher than in boys. These differences might point to possible gender specific underlying mechanisms. For example, some investigators argue that boys tend to be more vulnerable to academic distress, because they are more oriented to academic achievement compared to girls who tend to be more oriented to relationships and intimacy. Thus, for boys achievement might work as a more efficient buffer of negative mood than for girls (Schwartz et al., 2008). On the other hand, it has been demonstrated that girls have a greater tendency to underestimate themselves and to attribute academic failures to their low ability (Herman et al., 2008). Due to possible differences between boys and girls, we conducted subsequent regression analyses not only for the total sample, but also for both genders separately.

Fourth, within the CDI scales, CDI_C Ineffectiveness showed the highest and the most consistent relationship with school achievement variables and might have somewhat influenced the relationship between the school achievement variables and total CDI score. Results were similar for the total sample and also for both genders separately. The scale had the highest correlation with school achievement variables (Hypothesis 5). In prediction of all three school achievement variables, it worked as a markedly more salient predictor than the other CDI scales (Hypothesis 6) or the total CDI score (Hypothesis 7). In the context of other predictors (sex, age, parental education status, and full scale IQ), the CDI_C Ineffectiveness consistently proved to be a significant predictor

of school achievement variables (Hypothesis 8). After the CDI_C Ineffectiveness score was removed from the total CDI score, the correlations between CDI and school achievement variables decreased, but stayed significant (Question 1). Lastly, in school achievement variables, after the CDI_C Ineffectiveness score was removed from the total CDI score, the predictive power of such modified total CDI score was lower than the one of the total CDI score, but still significant (Question 2).

The scale CDI_C Ineffectiveness consists of four items: 3 Self-deprecation, 15 School-work difficulty, 23 School performance decrement, 24 Self-deprecation via peer comparison. Two of these statements directly relate to self-evaluation of school work and school achievement and the other two reports about self-deprecation. It should be noted that psychosocial adjustment problems tapped by the four items might, but need not, present depressive symptoms. Thus, in school settings, particular attention should be devoted to the CDI scale profile, especially to the CDI_C Ineffectiveness score.

In general, these findings support the concern that correlations between achievement variables and the total CDI score might partially reflect a conceptual overlap of the variables (Schwartz et al., 2006). However, they do not indicate that the conceptual overlap might be responsible for the correlations and regressions discussed, because all of them remained significant even when the CDI_C Ineffectiveness scale was controlled.

V. 2. Limitations

There are several limitations of this study.

First, the sample represented children from Prague aged 9 to 11 years and thus cannot be generalized to broader populations.

Previous investigators have documented that the rates of depressive symptomatology as well as the pathways leading to it vary as a function of age (Nolen-Hoeksema & Girgus, 1994). Similarly, school achievement and its determinants differ on various age periods (Gutman et al., 2003; Kowalski-Jones & Duncan, 1999). The variability of grades widens and the average level of performance decreases with increasing age, because the teachers' evaluation becomes stricter and the requirements become more demanding (Škaloudová, 2005). Moreover, with increasing age, school achievement becomes more related to non-cognitive motivational factors (Škaloudová, 2005), therefore we would expect closer associations between the achievement and the CDI in later age periods.

Less is known about potential gaps between large urban and other geographical areas. Existing studies suggest that there might be some differences, for example in the social meaning of poor academic functioning (Schwartz et al., 2006).

There has been a long-term debate about the applicability of community-based self-report data to clinically assessed or clinic-based samples. Some researchers argue that the sub-clinical symptoms are on a continuum with more extreme psychopathological outcomes (Hankin, Fraley, Lahey, & Waldman, 2005). Other investigators point to data indicating that sub-clinical and clinical data show not only quantitatively, but also qualitatively distinct signs

(Solomon, Ruscio, Seeley, & Lewinsohn, 2006). Nevertheless, existing research has documented that self-reported depressive symptoms gained from community samples are a strong predictor of subsequent depressive disorders (Allgood-Merten et al., 1990).

Second, we cannot argue for any time predictive or causal mechanisms, because we measured the variables at a single time point. A more complete analysis would require examination of time-dependent hypotheses and assessment of other possibly intervening variables, such as family conditions, stressful life events, self-esteem, social skills or psychopathological characteristics. A more comprehensive evaluation of psychopathological phenomena including anxiety, behavioral inhibition, externalizing behaviors or socio-environmental problems would be especially beneficial. Past research has shown that risk and protective factors interact with time and that the interactive processes rely on chains of associations over time (Gutman et al., 2003). Moreover, given that depressive symptomatology as well as school achievement are highly stable over time (Chen & Li, 2000; Tram & Cole, 2006), at least a two-time-point design would allow controlling for prior levels of the variables. Unfortunately, our cost possibilities did not enable such design.

Third, a self-report inventory was used as a single measure of depressive symptoms and school grades were used as indicators of school achievement.

The information we obtained from the CDI is limited by the ability and willingness of children to report about their inner experience. At the ages tested, children's reports on the CDI reflect more a state than a stable trait dimension of depression, whereas parental reports reflect more the trait than the state dimension (Cole et al., 2002). Thus, further research based on multiple reporters is warranted. Moreover, the CDI might reflect negative affect in general, rather than solely depressive symptoms (Twenge & Nolen-Hoeksema, 2002). The reasons

may lie in the psychometric properties of the inventory and also the fact that at the ages selected the symptoms are variable in time, fluctuating and to a great extent comorbid with other problems, such as anxiety symptoms or disruptive behaviors. Thus, using more assessment instruments including, for example, clinical observations and interview would facilitate a more comprehensive picture of the symptomatology.

School grades that served as an indicator of school achievement might reflect biases induced by their restricted range and changing requirements over time and among different teachers. Their validity and reliability is limited by the subjectivity of teachers and differences in requirements and rules of different teachers, classes, and schools. Standardized achievement tests are characterized by more satisfactory psychometric properties. However, our focus on grades obtained from school reports seems sensible when we posit that the grades indicate long-term school achievement and reflect child school adjustment.

V. 3. Conclusions and Implications

Throughout the project, we have become increasingly aware that it would be especially interesting to take a comprehensive longitudinal approach which examines various combinations of risk and protective factors. We have found some evidence of the relationship between depressive symptoms and school achievement, but we know little about the processes that may contribute to it, or about the developmental pattern in their associations. Nevertheless, interpreted in the context of previous research our findings have several important implications for practitioners and researchers.

First, the fact that the relationship between depressive symptoms and school achievement was found particularly between 9 to 11 years indicates that monitoring efforts as early as late childhood are appropriate. Our results together with high time stability of both depressive symptoms and school achievement demonstrated in previous research (Haavisto et al., 2004; Maughan et al., 2003; Tram & Cole, 2006) give grounds for paying special attention to the variables already during early school years. It should be noted that the sensitivity to intervention and prevention is much higher before the age of 11 than later (Cole et al., 1999). Moreover, the end of the age period studied in the present research presents a beginning of an important developmental risk period when the rates of depressive symptoms (Angold & Rutter, 1992) and stress (Rudolph & Hammen, 1999) increase.

We suggest that teachers and parents of young children could be instructed to monitor the children's development of depressive symptoms and school achievement. When they would notice a marked decrement in any of the domains, they should recommend the child to a school psychologist or a counselor. Many teachers and parents are already putting this

procedure to practice, but there is still a lack of a more widespread awareness. Next, we must not underestimate the possibilities of standardized screening measures such as the CDI and school grades. Both these measures that were also used in our study present sufficiently valid and easily accessible tools that might be effectively used for screening purposes.

Second, the consistent relationships between school achievement and depressive symptoms imply that practitioners dealing with an increase in any of the domains can benefit from registering the respective other domain. Existing longitudinal studies suggest that academic achievement predicts increases in later depressive symptoms (Chen et al., 1995; Herman et al., 2008; Kistner et al., 2007; Maughan et al., 2003; Schwartz et al., 2008). The findings concerning the issue of depressive symptoms predicting subsequent school achievement are mixed; some investigators brought supportive evidence (Chen & Li, 2000; Chen et al., 1995; Rapport et al., 2001), others did not (Maughan et al., 2003). In the context of the cited longitudinal outcomes, it seems appropriate to prevent development of depressive symptomatology by intervention for children showing decrements in school achievement. The findings also imply that practitioners assessing depressed children can benefit from considering past development of school achievement as one of possible risk factors.

Third, both practitioners and researchers in this area should notice the CDI_C Ineffectiveness scale and related possible methodological limits of the CDI. The scale closely relates to school achievement and might distort the associations between the total CDI score and school achievement. In accordance with the study of Schwartz et al. (2006), our findings raise a concern that previous observed correlations between achievement variables and the total CDI score might partially reflect a conceptual overlap of the variables. Although the effect of the CDI_C Ineffectiveness was not dramatic, it appeared consistently in all the

correlational and regression models. Thus, in school settings particular attention should be devoted to the CDI scale profile, CDI_C Ineffectiveness score, and a detailed exploration of particular items. In prediction of school achievement, the CDI_C Ineffectiveness score is more useful than the total CDI score. Future research focusing on the relationships between school achievement and the CDI could benefit from controlling the possible intervening influence of the CDI_C Ineffectiveness.

The fact that the CDI_C Ineffectiveness scale, which had the most consistent relationship with school achievement, consisted of self-evaluation and self-deprecation items implies directions of possible intervention efforts. Some of existing longitudinal studies suggest that negative self-appraisals of competence as an important part of the self-concept, might mediate the predictive associations between school achievement and subsequent depressive symptoms (Cole et al., 1996; Cole et al., 1999; Hoffman et al., 2000; Masi et al., 2000). Our outcomes interpreted in the context of previous longitudinal studies suggest that in children with school achievement decrement, it might be helpful to address self-evaluation and self-deprecation cognitions.

In summary, this dissertation thesis implies that 1) dealing with the domains of depressive symptomatology and school achievement as early as late childhood is appropriate; 2) the domains are interconnected, so when we address depressive symptoms or school achievement, measuring the respective other domain seems beneficial; 3) particular attention should be devoted to the CDI_C Ineffectiveness subscale and its possible confounding influences.

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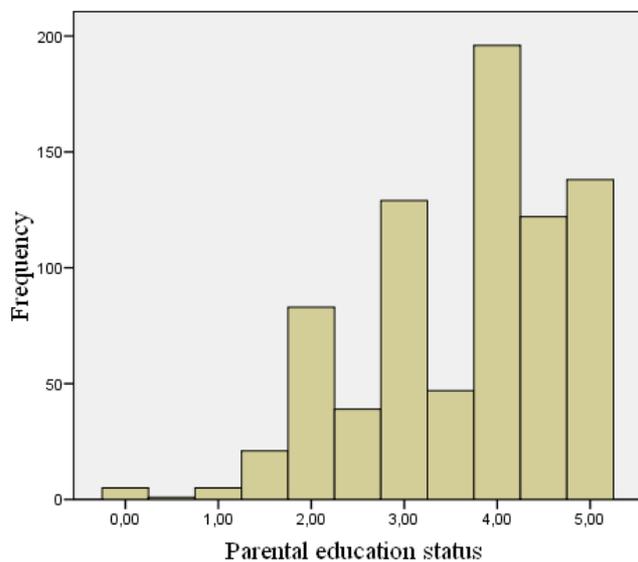
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Appendix A Histograms of Variables Registered

Figure A1 *Histogram of Parental Education Status*



N = 814

Range 0-5

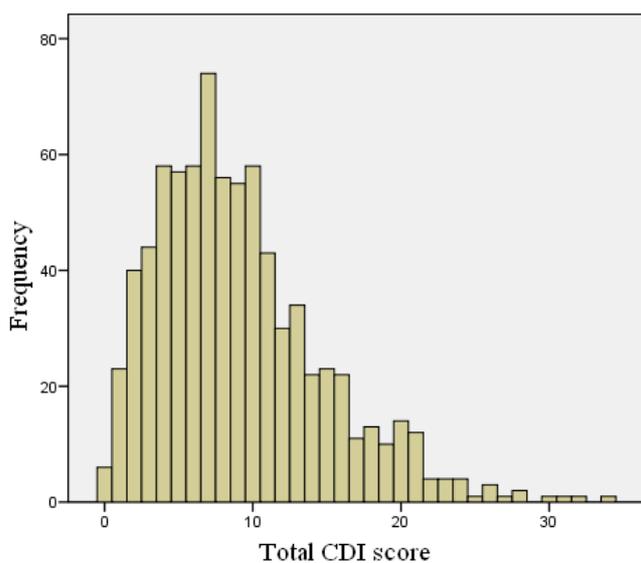
Mean = 3.66

SD = 1.08

Skewness = -0.66

Kurtosis = -0.18

Figure A2 *Histogram of Total CDI Score*



N = 812

Range 0-34

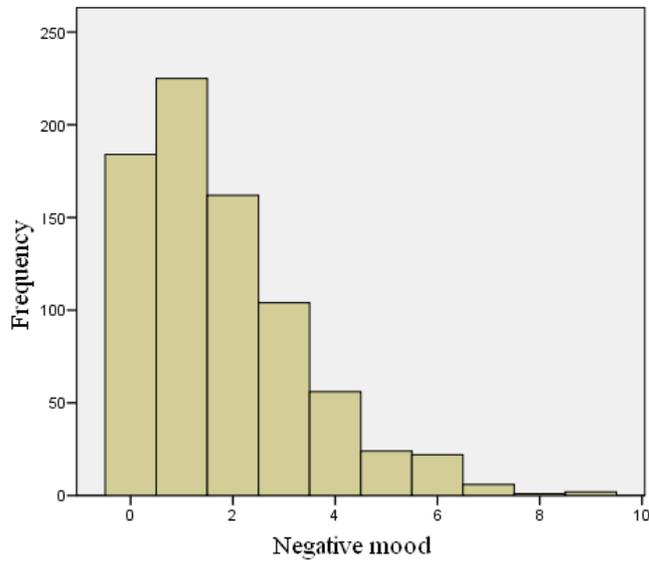
Mean = 9.16

SD = 5.65

Skewness = 1.01

Kurtosis = 1.2

Figure A3 Histogram of CDI_A Negative mood



N = 812

Range 0-9

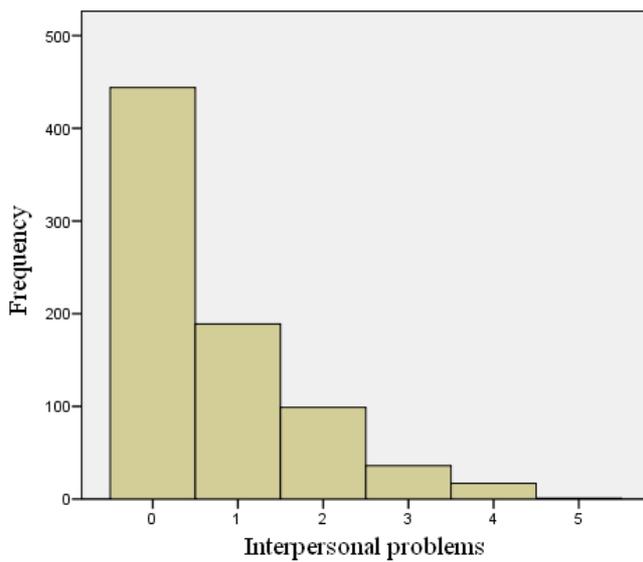
Mean = 1.79

SD = 1.63

Skewness = 1.14

Kurtosis = 1.33

Figure A4 Histogram of CDI_B Interpersonal problems



N = 812

Range 0-5

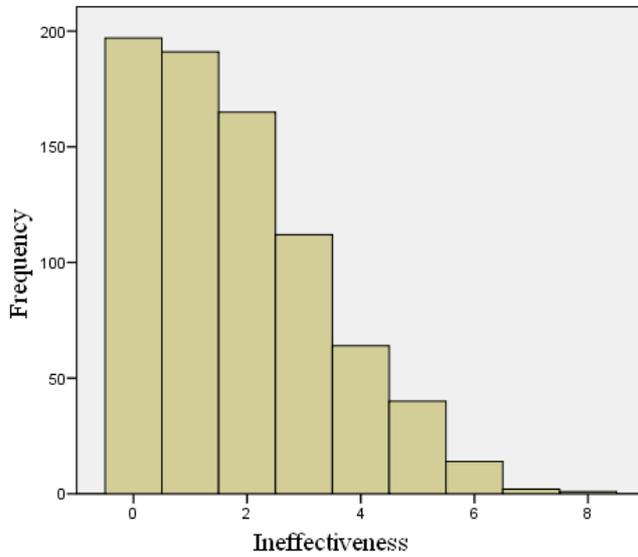
Mean = 0.74

SD = 1.03

Skewness = 1.43

Kurtosis = 1.55

Figure A5 *Histogram of CDI_C Ineffectiveness*



N = 812

Range 0-8

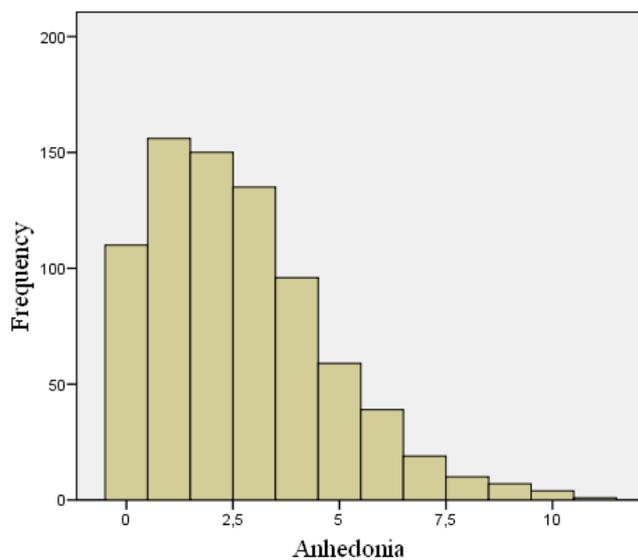
Mean = 1.82

SD = 1.59

Skewness = 0.78

Kurtosis = 0.06

Figure A6 *Histogram of CDI_D Anhedonia*



N = 812

Range 0-11

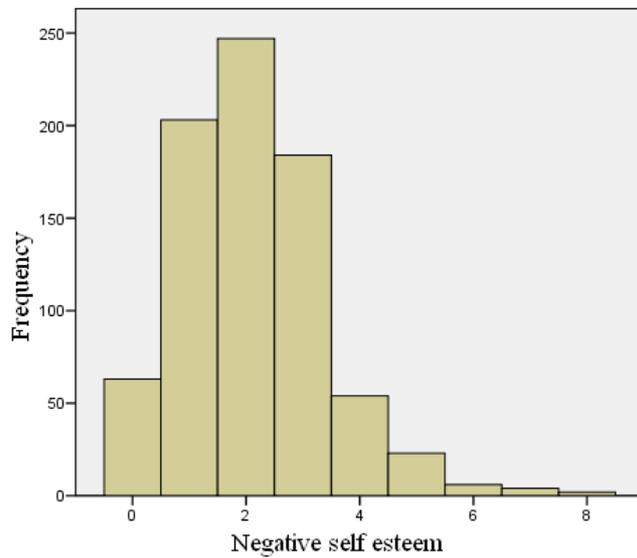
Mean = 2.68

SD = 2.09

Skewness = 0.91

Kurtosis = 0.75

Figure A7 *Histogram of CDI_E Negative self esteem*



N = 812

Range 0-8

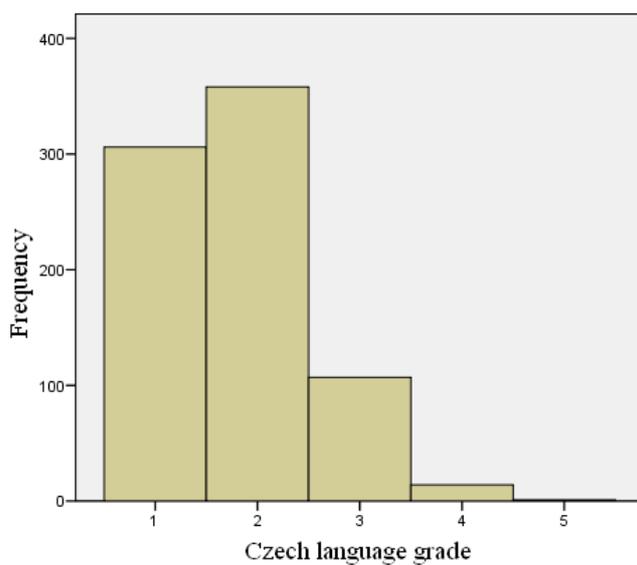
Mean = 2.13

SD = 1.31

Skewness = 0.82

Kurtosis = 1.54

Figure A8 *Histogram of Czech language grade*



N = 807

Range 1-5

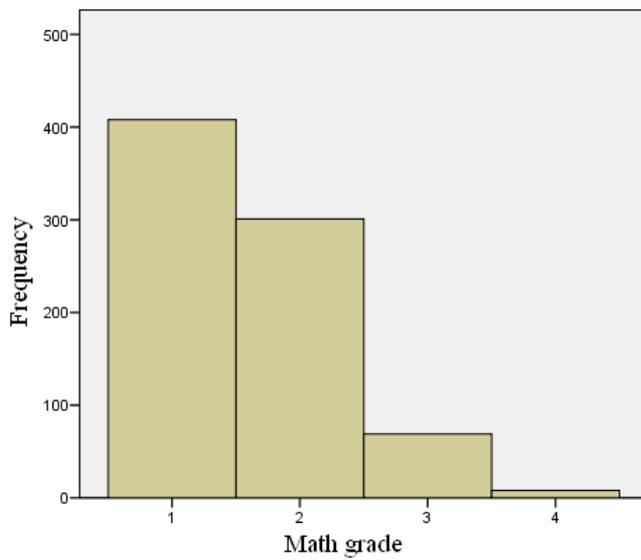
Mean = 1.8

SD = 0.75

Skewness = 0.70

Kurtosis = 0.20

Figure A9 *Histogram of math grade*



N = 811

Range 1-4

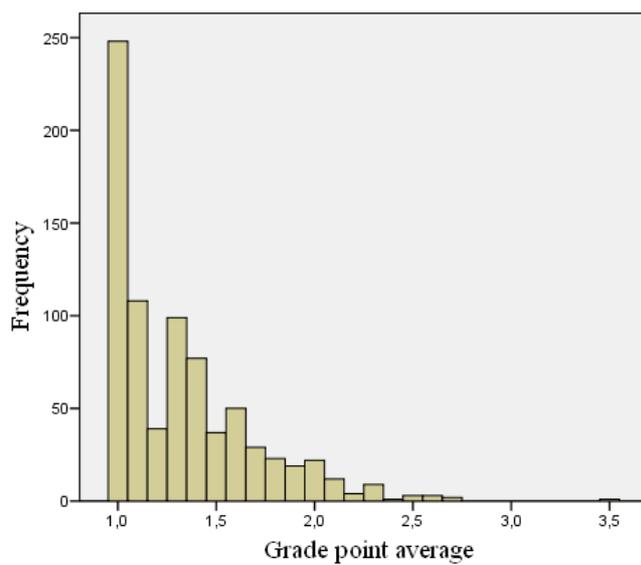
Mean = 1.59

SD = 0.69

Skewness = 0.94

Kurtosis = 0.35

Figure A10 *Histogram of grade point average*



N = 793

Range 1-3.5

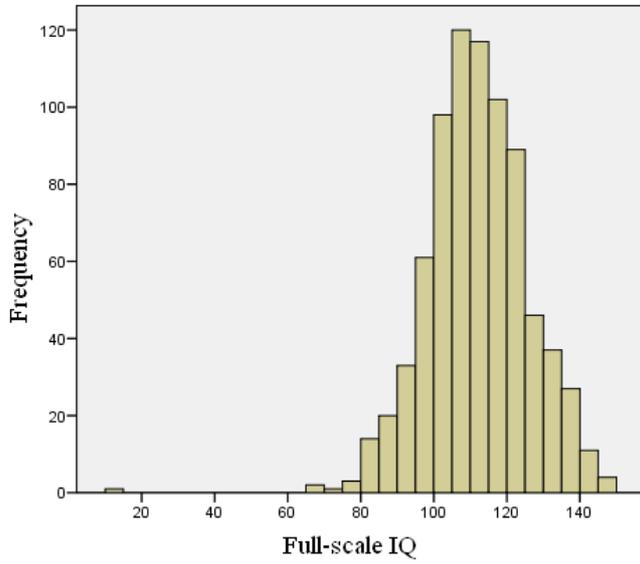
Mean = 1.32

SD = 0.36

Skewness = 1.44

Kurtosis = 2.60

Figure A11 *Histogram of full-scale IQ*



N = 814

Range 10-148

Mean = 111.35

SD = 13.84

Skewness = -0.46

Kurtosis = 3.3

Appendix B Percentiles of Children's Depression Inventory Results

Table B1 *Percentiles of the CDI Results*

Percentile	Raw score					
	CDI_T	CDI_A	CDI_B	CDI_C	CDI_D	CDI_E
5	2	0	0	0	0	0
10	3	0	0	0	0	1
15	4	0	0	0	1	1
20	4	0	0	0	1	1
25	5	1	0	1	1	1
30	6	1	0	1	1	1
35	6	1	0	1	2	2
40	7	1	0	1	2	2
45	7	1	0	1	2	2
50	8	1	0	2	2	2
55	9	2	0	2	3	2
60	10	2	1	2	3	2
65	10	2	1	2	3	3
70	11	2	1	2.1	3	3
75	12	3	1	3	4	3
80	13	3	1	3	4	3
85	15	3	2	4	5	3
90	17	4	2	4	6	4
95	20	5	3	5	7	4

Note. CDI_T - total CDI score; CDI_A - Negative mood; CDI_B - Interpersonal

problems; CDI_C - Ineffectiveness; CDI_D - Anhedonia; CDI_E - Negative self esteem.

n=814.

Appendix C Correlation Matrix of All Variables for Total Sample

Table C1 *Intercorrelations of All Variables for Total Sample*

	Age	PES	CDI_T	CDI_M	CDI_A	CDI_B	CDI_C	CDI_D	CDI_E	CLG	MG	GPA	IQ
Age	1												
PES	-0,03	1											
CDI_T	0,02	-0.10*	1										
CDI_M	-0,01	-0.12**	0.97***	1									
CDI_A	0,01	-0,02	0.75***	0.75***	1								
CDI_B	-0,07	-0,06	0.60***	0.62***	0.37***	1							
CDI_C	0.09**	-0,03	0.73***	0.53***	0.47***	0.35***	1						
CDI_D	-0,04	-0.13**	0.76***	0.81***	0.44***	0.38***	0.36***	1					
CDI_E	0.13***	-0.11**	0.65***	0.65***	0.37***	0.33***	0.41***	0.34***	1				
CLG	0.20***	-0.30**	0.26***	0.21***	0.12***	0.18***	0.29***	0.15***	0.17***	1			
MG	0.17***	-0.25**	0.25***	0.20***	0.12***	0.13***	0.31***	0.17***	0.15***	0.65***	1		
GPA	0.22***	-0.30**	0.27***	0.21***	0.13***	0.16***	0.34***	0.16***	0.17***	0.86***	0.82***	1	
IQ	-0.07*	0.34***	-0.16**	-0.14**	-0,06	-0.08*	-0.15**	-0.14**	-0.11**	-0.38**	-0.46**	-0.47**	1

Note. PES (parental education status), CDI_T (total CDI score), CDI_M (modified total CDI score, i.e. total CDI score with CDI_C Ineffectiveness subtracted), CDI_A (Negative mood), CDI_B (Interpersonal problems), CDI_C (Ineffectiveness), CDI_D (Anhedonia), CDI_E (Negative self esteem), CLG (Czech language grade), MG (math grade), GPA (grade point average). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; Coefficients with $p < 0.01$ are written in bold letters.