

Running head: CHILDREN'S MENTAL HEALTH AND ACADEMIC ACHIEVEMENT

Mental health is a unique risk factor for poor academic achievement: Results from a longitudinal
study of Canadian children

Vasilinka Tsar

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Thesis supervisor: Dr. Tracy Vaillancourt

Thesis committee:

Dr. Alastair Younger

Dr. Jane Ledingham

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Abstract

Concurrent and prospective relationships between symptoms of depression, anxiety, attention deficit/hyperactivity disorder (ADHD), and conduct disorder (CD) and academic achievement was examined in a large sample of Canadian children. Students in Grade 5 ($N = 715$) completed the depression and anxiety subscales of the Behaviour Assessment System for Children – Second Edition. Parents reported on their child's symptoms of ADHD and CD using the Brief Child and Family Phone Interview. Academic achievement was measured using teacher-rated learning skills and students' grade point average (GPA) from their Ontario Student Record (OSR) in fifth grade and again in sixth grade ($N = 627$). Symptoms of depression, anxiety, ADHD, and CD were significantly negatively correlated with academic achievement at Time 1 and Time 2. After controlling for child's sex, household income, maternal education, and days absent, children's mental health problems accounted for an additional 12% and 11% of the variability in their Time 1 mean ratings of learning skills and GPA, respectively. Only symptoms of ADHD predicted Time 2 GPA (1% of the variance) after controlling for Time 1 GPA and other sociodemographic variables. Findings highlight the unique contribution of mental health problems in predicting academic achievement and point to the need to promote children's mental health in schools.

Mental health is a unique risk factor for poor academic achievement: Results from a longitudinal study of Canadian children and youth

A recent meta-analysis of epidemiological studies on children's mental health conducted in the United States (U.S.), Canada, and the United Kingdom (U.K.) indicated that approximately 1 in 5 children and youth between the ages of 4 and 17 met diagnostic criteria for one or more psychiatric disorders (Waddell, McEwan, Shepherd, Offord, & Hua, 2005). The most commonly reported mental health issues of childhood were anxiety disorders (6.4%), attention deficit/hyperactivity disorder (ADHD; 4.8%), oppositional defiant disorder (ODD)/conduct disorder (CD; 4.2%), and depressive disorders (3.5%). In light of these findings, promoting and understanding children's mental health has been identified as a key school issue (Morrison & Kirby, 2010; Santor, Short, & Ferguson, 2009; World Health Organization, 2004). Because mental health disorders are associated with significant distress and impairment across multiple domains such as social, emotional, cognitive, and behavioural (Jitendra, DuPaul, Someki, & Tresco 2008; Wille, Bettge, Wittchen, Ravens-Sieberer, & the BELLA study group., 2008), educators and researchers are becoming increasingly aware of the importance of the school as a medium to identify and provide services in children's mental health. In fact, a large U.S. epidemiological study found that about 70-80% of children and adolescents receiving mental health services do so only at school, making schools the default provider of mental health services (Burns et al., 1995). Moreover, over half of all mental health disorders in the U.S. are diagnosed before 14 years of age (Kessler et al., 2005). This statistic highlights the need for early identification and prevention of mental health disorders in late childhood to early adolescence when children are most susceptible.

Most of the research to date on children's mental health has focused on its relation to peer difficulties (e.g., children with ADHD are less liked by their peers; Bagwell, Molina, Pelham, & Hoza, 2001), comorbid conditions (Biederman, Newcorn, & Sprich, 1991; Kessler et al., 1996), measurement and assessment issues (De Los Reyes & Kazdin, 2005), parent practices/applied strategies for parents (see review by Waddell, Hua, Garland, Peters, & McEwan, 2007), social/emotional well-being (Jitendra et al., 2008; Waddell et al., 2007), and biological correlates (Faraone & Biederman, 1998). There are relatively few epidemiological studies that examine elevated symptoms of mental health prior to adolescence in relation to academic achievement despite the fact that these two domains of functioning are somewhat interdependent (Roeser, Eccles, & Strobel, 1998). This paucity is also curious insofar as school is the biggest 'task' of childhood. Parents worry about it, society values it and invests a lot of money into it, and achievement in school is linked to better future academic and personal outcomes (Eccles, Lord, Roeser, Barber, & Josefowicz-Hernandez, 1997). In order to bridge this gap in the literature, the aim of the current study was to examine the relationship between symptoms related to four of the most common childhood mental health disorders (depression, anxiety, ADHD, and CD) and academic achievement in a large sample of Canadian children who were in grade 5 at Time 1 and grade 6 at Time 2. This period of development (late childhood to early adolescence) is critical for children as achievement motivation tends to decline and behavioural and emotional problems tend to increase in the middle school years (Eccles, Wigfield, Harold, & Blumenfeld, 1993).

A review of the literature suggests that an earlier onset of mental health disorders significantly reduces a person's level of educational attainment. In a nationally representative U.S. sample of over 8000 respondents, Kessler, Foster, Saunders, and Stang (1995) found that having a mental health disorder (anxiety, mood, substance abuse, or conduct disorder) was

positively associated with failure to complete high school, entry into college, and completing college. Similarly, results of a longitudinal study indicated that children with early attention difficulties were at an increased risk for leaving school without qualifications (Fergusson, Lynskey, & Horwood, 1997).

Other researchers have found that mental health is stable through early elementary, middle, and high school (Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1995; Roeser, Eccles, & Strobel, 1998; Roeser, Eccles, & Freedman-Doan, 1999; Woodward & Fergusson, 2001). In terms of academic achievement, Ialongo et al. (1995) found that highly anxious first graders were 10 times more likely to be in the lower third percentile on achievement in fifth grade. One limitation of the study was that background sociodemographic variables such as income, maternal education, or lone-parent status were not examined despite the fact that these variables have been shown to be robust correlates and predictors of academic achievement (Ensminger & Slusarcick, 1992). Roeser et al. (1998, 1999) showed developmental continuity of mental health symptoms between grades 8 - 9 and categorized children into four groups based on their emotional and academic functioning: well-adjusted (i.e., high functioning in both school and mental health), poor motivation (low school value but good mental health), poor mental health (positive school engagement but poor mental health), and multiple problems (low functioning in both school and mental health). Children in the well-adjusted group had the highest grades followed by children in the poor motivation group and the poor mental health group; children in the multiple problems group had the lowest grades. A limitation of the study was that the researchers used self-reports of grades and mental health, resulting in potential shared-method variance. Although the use of self-reported grades in research and applied settings is common, they may be prone to systematic bias given the results of a recent meta-

analysis in which researchers found that students with lower grades and lower cognitive ability were more likely to over-report their grades (Kuncel, Crede, & Thomas, 2005). Woodward and Fergusson (2001) also showed developmental continuity of self-reported anxiety disorders from middle adolescence (age 14 - 16) to late adolescence (age 16 - 21) such that adolescents who had three or more anxiety disorders in middle adolescence had tripled rates of anxiety and doubled rates of depression in late adolescence compared to their non-anxious peers. These high risk adolescents were also less likely to attend university or college by age 21 even after controlling for several sociodemographic factors. In this study however, prior educational achievement was not controlled for statistically which may have inflated the relations. Moreover, retrospective reports of mental health were used which have been shown to be more prone to recall error (Henry, Moffit, Caspi, Langley, & Silva, 1994).

Using data from the Canadian National Longitudinal Survey of Children and Youth and the American National Longitudinal Survey of Youth, Currie and Stabile (2006) examined some of the longitudinal outcomes of elementary school-aged children with symptoms of ADHD. They found that children who had clinically elevated levels of ADHD had an increased risk of poor math and reading achievement test scores in both the Canadian and U.S. samples. Using data from the National Longitudinal Study of Adolescent Health, Fletcher, and Wolfe (2007) extended Currie and Stabile's (2006) findings by showing that children with elevated ADHD symptoms were more likely to have a lower grade point average (GPA) than children with few ADHD symptoms. A limitation of this study was that the researchers used retrospective self-reports of mental health. Using a large school-aged sample in the U.K., Merrell and Tymms (2001) also showed that first grade boys and girls meeting clinical cut-off scores for ADHD had significantly poorer scores on reading and math achievement than their peers at the end of the

year and at one-year follow-up. However in this study, sociodemographic variables that have been shown to be robust predictors of academic achievement were not controlled for statistically.

It is clear from the above longitudinal studies that mental health issues, in particular ADHD, are associated with poorer academic achievement (for concurrent associations see Cantwell & Satterfield, 1978; Barbaresi, Katusic, Colligan, Weaver, & Jacobsen, 2007; Barry, Lyman, & Klinger, 2002; Frazier, Youngstrom, Glutting, & Watkins, 2007; Frick et al., 1991; Pastura, Mattos, & Prufer de Queiroz Campos Araujo, 2009). Indeed, children with ADHD have an elevated risk of repeating a grade, having a lower GPA, and requiring special education (Barbaresi et al., 2007; Barkley, Fischer, Edelbrock, & Smallish, 1990).

Other disorders such as CD (Gresham, Lane, & Beebe-Frankenberger, 2005; Hinshaw, 1992) and depression (Cole, 1990; Fauber, Forehand, Long, Burke, & Faust, 1987; Slotkin, Forehand, Fauber, McCombs, & Long, 1988) have also been shown to be negatively associated with student achievement (assessed using standardized test scores in reading and math). Although anxiety disorders (especially separation anxiety disorder) in children have been associated with academic challenges arising from their avoidance of school (Elliott, 1999; Kearney, 2001), early school leaving (Kessler et al., 1995; Van Ameringen, Mancini, & Farvolden, 2003), and lower college/university enrolment (Woodward & Fergusson, 2001), there is a lack of studies that examine academic achievement as an outcome variable (for exceptions see Ialongo et al., 1995).

A related gap in the literature is that the majority of existing studies on children's mental health and achievement focus on externalizing disorders such as ODD/CD and ADHD (for exceptions see Ialongo et al., 1995; Rapport, Denney, Chung, & Hustace 2001). By definition, these disorders are characterized by outward disruptive behaviours that interfere with classroom

conduct and are thus easier to identify. Research suggests that children with ODD/CD are at a greater risk for academic failure if their condition is comorbid with ADHD (Gresham et al., 2005; Hinshaw, 1992; Taylor, Chadwick, Heptinstall, & Danckaerts, 1996). Several researchers have found that in cases where ADHD is comorbid with ODD or CD, it is the ADHD symptoms in particular that explain most of the academic difficulties (Clark, Prior, & Kinsella, 2002; Fergusson, Horwood, & Lynskey, 1993). In the present study we examined the unique contribution of symptoms of ADHD and CD in predicting academic achievement while also accounting for symptoms of internalizing disorders which have received less empirical support (Helstela & Sourander, 2005).

In contrast to externalizing disorders, the self-directed, internal nature of internalizing disorders makes them more difficult to identify in the classroom and so their effects on academic achievement are often overlooked by teachers especially when they are comorbid with externalizing disorders (Merrell, 2001). For example, when ADHD is comorbid with depression or anxiety, it is the symptoms of ADHD that are a stronger predictor of academic underachievement (Karustis, Power, Rescorla, Eiraldi, & Gallagher, 2000). Children with multiple mental health problems experience more social and cognitive impairments (Biderman, Faraone, & Chen, 1993). In an attempt to disentangle the issue of comorbidity, we examined the unique contribution of both internalizing and externalizing behaviours in predicting academic achievement.

To date, the majority of studies that have examined academic achievement have relied on standardized tests, particularly in reading and math (see Hinshaw, 1992 for review). The rationale for using standardized test scores is that they provide an objective measure of the child's current knowledge and are not subject to the bias inherent in teachers' evaluations

(Guskey & Bailey, 2001). Although we acknowledge the need for standardized tests to make comparisons across schools, we argue that on their own, they may not be the most reliable and valid measure of a child's academic performance. For example, in their meta-analytic review Fan and Chen (2001) found that the relationship between family functioning and academic achievement was stronger in studies that used a more general measure of achievement (i.e., GPA) compared to those that used a specific subject test score (i.e., reading, math). Consistent with psychometric theory, they made the argument that GPA is a more reliable measure of the student's achievement because it takes into account performance in multiple subject areas. In another study, Roeser et al. (1999) did not find group differences between well-adjusted and multiple-problem first graders on standardized test scores, but the latter group had poorer achievement motivation and grades in middle school. These research findings highlight the difference between cognitive ability and achievement in school which may be influenced by external factors such as motivation, support systems, class attendance, and both mental and physical health impairments. In the present study academic achievement was assessed using the child's average grades in English, French, Mathematics, and Science and Technology.

In examining the relationship between children's mental health and poor academic achievement, the research is clear that children with mental health problems experience academic difficulties that extend beyond their grades (Rapport et al., 2001). For example, having mental health problems can affect children's behaviours in class, concentration, and studying habits, all of which contribute to their overall academic achievement (Wentzel, 1989). In order to examine this possibility further, we also examined students' mastery of learning skills as assessed on their Ontario Student Record (OSR). In Ontario, learning skills are a core component of the evaluation of student achievement (along with grades; Ontario Ministry of

Education, 1998). Arguably, learning skills may be more representative of a child's academic ability because the skills are necessary for effective learning and are "demonstrated by the student in all subjects and in other behaviour at school" (Ontario Ministry of Education, 1998, p. 3). In order to tap into this other aspect of academic ability, we also added learning skills as a measure of academic achievement in addition to grades.

Another limitation in the literature reviewed herein is that most have used self-reports to assess mental health across both internalizing and externalizing disorders. However, it is generally accepted in clinical psychology and psychiatry that children are better reporters of their internalizing symptoms and that parents (or teachers) are better informants of children's externalizing behaviours. In their comparison of both methods of aggregating data from child and parent reports, Bird, Gould, and Staghezza (1992) found that in general, parent reports of externalizing symptoms and child reports of internalizing symptoms were more in line with clinical diagnoses. Given these findings, in the present study we utilized self-reports of internalizing behaviours (e.g., symptoms of depression and anxiety) and parent-reports of externalizing behaviours (e.g., symptoms of ADHD and CD).

The current study

In the present study, the aim was to extend the current literature on children's mental health as it relates to academic achievement by examining the symptoms of the most common internalizing (depression and anxiety) and externalizing disorders (ADHD and CD) in a large non-clinical sample of elementary school-aged children. First, we examined the concurrent relationship between these mental health problems and two indices of academic achievement that have been largely overlooked in the literature: teacher-rated learning skills and school grades. Second, this relationship was examined longitudinally in order to develop a risk assessment

model for individuals with elevated symptoms of mental health in terms of their learning skills and school grades one year later. The present study also extends the literature by using a multi-method approach to assess academic achievement in children by using both learning skills and school grades. Further, we controlled for important key variables (child's sex, maternal education, days absent, family income, and prior achievement) that have been shown to be robust predictors of academic achievement (Ensminger & Slusarcick, 1992).

Several hypotheses were examined. First, we expected that symptoms of depression, anxiety, ADHD, and CD in children would be associated with poorer ratings of mean learning skills and grades both concurrently and longitudinally. Second, we predicted that even after controlling for key variables that are strong predictors of poor academic achievement (days absent, maternal education, household income, and child's sex), symptoms related to depression, anxiety, ADHD, and CD would uniquely contribute to explaining the variance in student's academic achievement both concurrently (at Time 1) and prospectively (at Time 2). More specifically, of the four mental health problems examined, we expected that symptoms of ADHD would be the strongest predictor of poor academic achievement.

Method

Participants

Fifth grade students were recruited from 50 randomly selected schools in a large public district school board in southern Ontario to participate in a longitudinal study examining stability and change in social experiences from childhood to adolescence. The consent rate for this study was 80%.

To ensure confidentiality, those students who did not have parental consent or declined to participate completed a mock survey. At the request of the school board ethics committee,

information on pre-existing psychiatric conditions was not collected. Students who returned a consent form were compensated with a pack of sugar-free gum and parents who completed a telephone interview were compensated with a \$5 gift card. Parents were asked to provide consent for the researchers to access the students' academic information from the Ontario Student Record (OSR) in fifth grade (Time 1 mean learning skills and grades) and again in sixth grade (Time 2 mean learning skills and grades).

Our sample of fifth grade students ($N = 715$; 53.4% girls) had a mean age of 10 years and 5 months ($SD = .51$) at Time 1. Time 2 data were collected 12 months later ($N = 627$) with an attrition rate of 12.3% ($n = 88$). Dropout status was not found to be related to any of the measures used in this study. The majority of participants were of Caucasian descent (70.8%). Of the parents/guardians who participated ($N = 715$), 85.2% were biological mothers, 10.2% were biological fathers, and 4.6% were non-biological parents. Parents/guardians were predominately 36 years and older (84.0%), married (70.1%) completed post-secondary education (72.5%), and had a household income above \$80,000 (47.1%). These statistics were in line with the national average income ($M = \$84,800$) for two-parent families with children in Canada (Statistics Canada, 2008).

Measures and Procedure

Demographic data (child's sex, maternal education, household income) and symptoms related to depression, anxiety, ADHD, and CD were collected in the spring of 2008 (Time 1). Students completed a 45-minute in-class survey in which they provided self-reports of mental health problems and parents completed a brief phone interview (no longer than 20 minutes) which included demographic questions and measures of their child's mental health. With parental consent, academic information including days absent, teacher ratings of mean learning

skills, and grades was obtained from the students' OSR in the third term of fifth grade (Time 1) and again in sixth grade (Time 2).

Internalizing behaviours. Children reported on their depression and anxiety symptoms using the depression and anxiety clinical subscales from the well-validated Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2004). The depression clinical subscale measured common feelings associated with depression such as loneliness, sadness, and anhedonia. The items reflected a sense of hopelessness, pessimism, and dread. Of the 13 items, children responded “true” = 2 or “false” = 0 to nine statements such as “Nothing ever goes right for me”. For the remaining items, children rated the frequency of statements such as “I feel like my life is getting worse and worse” on a 4-point scale (0 = never, 1 = sometimes, 2 = often, 3 = almost always). A composite depression score was created for each participant by summing over the 13 items allowing for up to two items to be missing as indicated in the BASC-2 manual; the scale had excellent internal consistency, $\alpha = .89$.

The anxiety clinical subscale assessed generalized fears, nervousness, and irrational worries. High scores indicated higher anxiety and a tendency to be overwhelmed by problems. We used 12 of the 13 items from the anxiety subscale, omitting the question “I am bothered by thoughts about death” as requested by the school board. Of these 12 items, two items were statements such as “I worry about little things” to which students answered “true” = 2 and “false” = 0”. The other items included statements such as “I get so nervous I can't breathe” to which participants rated the frequency on a 4-point scale (0 = never, 1 = sometimes, 2 = often, and 3 = almost always). A composite score for anxiety was derived by summing across the 12 items, allowing for two out of the original 13 items to be missing. Because we omitted one of the items

(“I am bothered by thoughts of death”), one was added to all scores and an additional one was added to scores with a single missing value. The scale had good internal consistency, $\alpha = .88$.

Externalizing behaviours. Parent-reports of symptoms related to externalizing disorders (ADHD and CD) were measured using the psychometrically sound Brief Child and Family Phone Interview (BCFPI-3; Cunningham, Pettinglill, & Boyle, 2004). Symptoms of ADHD were measured using the regulation of attention, impulsivity, and activity level subscale from the BCFPI-3, which has been shown to be a valid indicator of ADHD (Boyle et al., 2009). Three items measured inattentiveness (e.g., “Do you notice your child is distractible or has trouble sticking to an activity?”) and three items measured hyperactivity-impulsivity (e.g., “Do you notice your child is impulsive or acts without stopping to think?”). Parents reported on the frequency of these behaviours on a 3-point scale (0 = never, 1 = sometimes, and 2 = often). A composite score was derived using both the inattentiveness and hyperactivity-impulsivity items. Internal consistency was good for the current sample ($\alpha = .83$).

Symptoms related to CD were measured using the conduct subscale from the BCFPI-3, a valid indicator of CD (Boyle et al., 2009). A composite score was derived from the 6-item scale using questions such as “Has the child broken into a house, building, or car?” and “Does your child physically attack people?” Parents indicated the frequency of their child’s behaviour based on a 3-point scale (0 = never, 1 = sometimes, and 2 = often). The scale had adequate internal consistency, $\alpha = .67$.

All mental health scores were continuous and reflect individual differences as opposed to clinical cut-offs. This approach is in line with Achenbach’s (1990) normative-developmental view of child psychopathology and reduces Type I error (Royston, Altman, & Sauerbrei, 2006).

Academic achievement. In accordance with the two-part definition of academic achievement adopted by the Ontario Ministry of Education, we examined both mastery of learning skills and grades. Although the Ontario Ministry of Education uses nine learning skills, we excluded two of these (conflict resolution and cooperation with others) because they were not pure indicators of academic achievement and we did not want to confound academic achievement with social skills and symptoms of ADHD and CD. Teachers rated students using a 4-point Likert scale (0 = needs improvement, 1 = satisfactory, 2 = good, 3 = excellent) on the remaining seven learning skills including class participation, initiative, homework completion, independent work, problem solving, goal setting, and use of information in the third term of fifth grade (Time 1) and again in sixth grade (Time 2). These seven learning skills were moderately to highly correlated ($r = .57 - .81, p < .001$) and accounted for 73.6% of the variance in a one factor solution using Principal Components Analysis. Thus, a mean learning skills score was calculated for each student; the internal consistency for the current sample was excellent, $\alpha = .94$.

Teachers evaluated the students' academic performance in English, French, Math, and Science and Technology using a 12-point grading scale (0 = fail and 12 = A+) in the third term of fifth grade (Time 1 GPA) and again in sixth grade (Time 2 GPA). Students' GPA was calculated by taking the mean score from the above four subjects; reliability for GPA was good, $\alpha = .88$.

Results

First, the bivariate correlations between our covariates (child's sex, days absent, maternal education, and household income) and symptoms of depression, anxiety, ADHD, and CD were examined. Second, we looked at the bivariate relationships between our predictor variables and academic achievement both concurrently (Time 1) and longitudinally (Time 2). Third, we

examined these bivariate relationships by sex (see Table 1). There was a strong positive correlation between our measures of academic achievement (mean learning skills and GPA) at Time 1 ($r = .81, p < .001$) and at Time 2 ($r = .74, p < .001$). Furthermore, Time 1 and Time 2 mean learning skills were highly correlated ($r = .67, p < .001$), as were Time 1 and Time 2 GPA ($r = .70, p < .001$).

Time 1 symptoms of child depression were significantly associated with higher Time 1 anxiety ($r = .61, p < .001$), Time 1 ADHD ($r = .24, p < .001$), Time 1 CD ($r = .17, p < .001$), lower Time 1 ($r = -.26, p < .001$) and Time 2 ($r = -.17, p < .001$) learning skills and lower Time 1 ($r = -.28, p < .001$) and Time 2 ($r = -.20, p < .001$) GPA.

Time 1 symptoms of child anxiety were significantly associated with higher Time 1 ADHD ($r = .12, p = .001$), Time 1 CD ($r = .10, p = .008$), Time 1 ($r = -.11, p = .003$) and Time 2 ($r = -.09, p = .021$) learning skills and Time 1 ($r = -.16, p < .001$) and Time 2 ($r = -.09, p = .026$) GPA.

Time 1 symptoms of child ADHD were significantly associated with higher Time 1 CD ($r = .33, p < .001$), Time 1 ($r = -.43, p < .001$) and Time 2 ($r = -.42, p < .001$) learning skills and Time 1 ($r = -.42, p < .001$) and Time 2 ($r = -.39, p < .001$) GPA.

Finally, Time 1 symptoms of CD were significantly associated with lower mean learning skills at Time 1 ($r = -.22, p < .001$) and Time 2 ($r = -.23, p < .001$), and lower GPA at Time 1 ($r = -.25, p < .001$) and Time 2 ($r = -.20, p < .001$).

The possible moderating role of the child's sex was also examined using Fisher's r -to- z transformation (Preacher, 2002) and no significant sex differences were found.

Next we ran four hierarchical multiple regression models with mean learning skills at Time 1 and Time 2 and GPA at Time 1 and Time 2 as the outcome variables. When examining

the concurrent relationship between children's mental health and achievement at Time 1, maternal education, household income, days absent, and child's sex were entered on Step 1 as control variables. Symptoms of depression, anxiety, ADHD, and CD were entered on Step 2. When examining the longitudinal relationship between children's mental health at Time 1 and mean learning skills at Time 2, days absent at Time 2 and Time 1 mean learning skills were added as control variables in Step 1 (in addition to maternal education, household income, days absent at Time 1, and child's sex). Similarly, when examining Time 2 GPA as an outcome variable, Time 1 GPA and days absent at Time 2 were entered as control variables in Step 1 (again in addition to maternal education, household income, days absent at Time 1, and child's sex). Results of the regression analyses are summarized in Table 2 (mean learning skills) and Table 3 (GPA).

Time 1 mean learning skills. The model with the covariates alone accounted for 24.7% of the variance in mean learning skills at Time 1 (R^2_{adj}). Adding symptoms of depression, anxiety, ADHD, and CD in the model statistically accounted for an additional 12% of the variability in teacher's mean ratings of children's learning skills at Time 1 ($\Delta R^2 = .12$) above and beyond the covariates alone, $\Delta F(4, 706) = 33.40, p < .001$. There was a significant negative association between symptoms of depression and mean learning skills at Time 1, $b = -.02, sr^2 = .01, p < .001$. There was a significant negative association between symptoms of ADHD and mean learning skills at Time 1, $b = -.07, sr^2 = .07, p < .001$. As predicted, of the four disorders examined, symptoms of ADHD were the strongest predictor of academic achievement, uniquely accounting for 7% of the variance in mean learning skills at Time 1. Symptoms of depression uniquely accounted for 1% of the variance in mean learning skills at Time 1. Contrary to expectations, symptoms of anxiety and symptoms of CD did not significantly predict mean

learning skills at Time 1. The overall model accounted for 36.3% of the variance in children's learning skills at Time 1 (R^2_{adj}).

Time 2 mean learning skills. Time 1 learning skills were the strongest predictor of Time 2 learning skills, uniquely accounting for 16% of the variance, $b = .50$, $p < .001$, $sr^2 = .16$. By adding Time 1 learning skills as a covariate, 47.3% of the variance in mean learning skills at Time 2 was explained (R^2_{adj}). Adding symptoms of depression, anxiety, ADHD, and CD in the model uniquely accounted for 2% of the variability in mean learning skills at Time 2 ($\Delta R^2 = .02$) above and beyond the covariates alone, $\Delta F(4, 616) = 5.11$, $p < .001$. There was a significant negative association between symptoms of ADHD and mean learning skills at Time 2, $b = -.03$, $p < .001$, $sr^2 = .01$. As predicted, of the four disorders examined, symptoms of ADHD were the strongest predictor of academic achievement, uniquely accounting for 1% of the variance at Time 2 above and beyond that of known correlates. Contrary to expectations, symptoms of depression, anxiety and CD did not significantly predict mean learning skills at Time 2. The overall model accounted for 48.7% of the variance in mean learning skills at Time 2 (R^2_{adj}).

Time 1 GPA. The model with the covariates alone accounted for 28.5% of the variance in GPA at Time 1 (R^2_{adj}). Adding symptoms of depression, anxiety, ADHD, and CD in the model uniquely accounted for 11% of the variability in children's GPA at Time 1 ($\Delta R^2 = .11$) above and beyond that of the covariates alone, $\Delta F(4, 706) = 32.60$, $p < .001$. There was a significant negative association between symptoms of depression and GPA at Time 1, $b = -.03$, $sr^2 = .01$, $p = .002$. There was a significant negative association between symptoms of ADHD and GPA at Time 1, $b = -.16$, $p < .001$, $sr^2 = .06$. As predicted, of the four disorders examined, symptoms of ADHD were the strongest predictor of academic achievement, uniquely accounting for 6% of the variance in students' GPA at Time 1. Symptoms of depression also contributed in

uniquely predicting 1% of the variance in Time 1 GPA above and beyond that of ADHD and other known correlates. Contrary to expectations, symptoms of anxiety and CD were not significant predictors of GPA at Time 1. The overall model accounted for 39.3% of the variance in GPA at Time 1 (R^2_{adj}).

Time 2 GPA. Time 1 GPA was the strongest predictor of Time 2 GPA, uniquely accounting for 22% of the variance, $b = .54$, $p < .001$, $sr^2 = .22$. By adding Time 1 GPA as a covariate, 50% of the variance in GPA at Time 2 was explained by the covariates alone (R^2_{adj}). Adding symptoms of depression, anxiety, ADHD, and CD in the model did not significantly add to the variance accounted for in GPA at Time 2 ($\Delta R^2 = .01$) above and beyond that explained by the covariates alone, $\Delta F(4, 617) = 2.20$, $p = .068$. There was a significant negative association between symptoms of ADHD and GPA at Time 2, $b = -.05$, $p = .007$, $sr^2 = .01$. As predicted, of the four disorders examined, symptoms of ADHD were the strongest predictor of academic achievement, uniquely accounting for 1% of the variance in GPA at Time 2. Contrary to expectations, symptoms of depression, anxiety and CD were not significant predictors of GPA at Time 2. The overall model accounted for 50.8% of the variance in GPA at Time 2 (R^2_{adj}).

Discussion

Given that approximately 1 in 5 children suffer from a mental health disorder and that less than 25% receive treatment for these disorders (Waddell et al., 2005), schools have become the default “treatment facilities” and it is very likely that educators will encounter mental health disorders in the classroom. Educators are the frontline workers and are in an optimal position to help lessen the burden that children with mental health disorders have at school. To date, research in children’s mental health has tended to focus on the social and behavioural outcomes (Jitendra et al., 2008; Wille et al., 2008). When academic achievement has been studied as an

outcome variable, there has been an emphasis on educational attainment (i.e., completion of high school, entrance into college; Fergusson et al., 1997) and performance on standardized tests (Frick et al., 1991; Gresham et al., 2005; Hinshaw, 1992). Although these are important outcome measures, there is a need to investigate other measures of academic achievement in order to identify children at risk for poor achievement earlier in their developmental trajectory and to provide them with the necessary resources to succeed in school. In the present study we examined the relationship between symptoms related to four of the most common children's mental health disorders (depression, anxiety, ADHD, and CD) and early indicators of academic achievement (ratings of learning skills and grades) in a large school-based sample of Canadian children both concurrently and prospectively.

After establishing that increased symptoms of depression, anxiety, ADHD, and CD were indeed significantly associated with poorer ratings of mean learning skills and grades, we controlled for other risk factors (i.e., child's sex, days absent, household income, maternal education, prior achievement) and examined the unique contribution of mental health problems in explaining academic achievement. Increases in symptoms of depression and ADHD uniquely predicted poorer ratings of learning skills at Time 1, and symptoms of ADHD predicted poorer learning skills at Time 2. This finding is consistent with previous published reports linking depression to poorer ratings of academic competence (Cole, 1990; Cole, Martin, Peeke, Seroczynski, & Fier, 1999). Other studies have focused on specific learning skills, such as homework completion and goal-setting, and their impact on student achievement (Ames & Archer, 1988; Keith, Diamond-Hallam, & Fine, 2004). The process of goal-setting is considered an essential component for student learning as it establishes expectations and motivates students to work toward meeting those expectations, while the lack thereof elevates students' risks for

later academic difficulties (Ames & Archer, 1988). The current findings show that having elevated symptoms of depression or ADHD predicts poorer ratings of concurrent learning skills and symptoms of ADHD predict future difficulties with learning skills one year later. These findings are consistent with previous literature that has shown that after controlling for prior achievement, children with ADHD show decreased motivation which in turn affects their study skills (Volpe et al., 2006). Moreover, the type of goals that students set for themselves matter, such that high achieving students tend to form task-oriented goals (Duda & Nicholls, 1992), or goals related to knowledge, study skills, school, and promoting good relationships (Carroll, Hattie, Durkin, & Houghton, 1997). Others (Cooper, Robinson, & Patall, 2006; Keith, Diamond-Hallam, & Fine, 2004; Trautwein, 2007) have found that homework completion is linked to higher levels of academic achievement, more specifically, students who completed homework outperformed their peers who did not complete homework on standardized test scores and grades (Cooper, 1989). Children with mental health disorders (in particular ADHD) have difficulty completing their homework (Power, Werba, Watkins, Angelucci, & Eiraldi, 2006), and the current study shows that in addition to having difficulty with homework, children with increased symptoms of ADHD also experience difficulty across a broad range of learning skills including class participation, initiative, independent work, problem solving, goal setting, and use of information. These difficulties can affect their performance in class and ability to concentrate on the task at hand which in turn can have a negative impact on their academic achievement as measured by test scores and grades. Taken together, the existing research lends support to our position that learning skills are important indicators of academic achievement in addition to grades. An immediate implication of these findings is that educators can help children with mental health problems improve their academic achievement by targeting their learning skills,

for example encouraging homework completion and setting specific, task-oriented goals.

Merriman and Coddling (2008) have shown that interventions that include goal-setting and self-monitoring can improve homework completion in children with ADHD.

Consistent with the results for ratings of learning skills, when controlling for other risk factors (i.e., child's sex, days absent, maternal education, household income, prior achievement), symptoms of depression and ADHD uniquely predicted poor GPA concurrently at Time 1 and only symptoms of ADHD predicted poor GPA prospectively at Time 2. This finding is consistent with previous studies that have looked at the relationship between depression and grades (Fauber et al., 1987; Slotkin et al., 1988). Other studies that have found a negative relationship between ADHD and achievement have relied on achievement test scores (Barry et al., 2002; Gresham et al., 2005). Other longitudinal studies that have found a negative relationship between mental health problems and grades in this age group (grades 3-6) have relied on measures of self-worth as a proxy for mental health (Roeser et al., 1999). In the present study we add to the literature by showing that in addition to elevated symptoms of ADHD, elevated symptoms of depression uniquely contribute in predicting poor grades in fifth grade students.

Contrary to expectations, symptoms of anxiety did not uniquely predict poor ratings of learning skills or GPA. It is difficult to put this finding in context because of the lack of studies that have examined the relationship between anxiety and academic achievement (Ialongo et al., 1995). One explanation is that anxiety and academic achievement does not follow a linear pattern. According to the Yerkes-Dodson Law (Yerkes & Dodson, 1908), mild anxiety may be beneficial for performance, but it becomes debilitating at high levels. Given that we examined symptoms of anxiety in the current study and not the disorder per se, the levels of anxiety may have not been severe enough to predict poorer ratings of learning skills or GPA. Alternatively,

we may not have been able to find a relationship because of the specific age group of our sample. Previous studies have either not been able to find a relationship in their sample of fifth grade children (Morgan, Sutton-Smith, & Rosenberg, 1960) or have shown a positive relationship between anxiety and academic performance over time (Luthar, 1995). Given the strong positive relationship between anxiety and school avoidance (Elliott, 1999; Kearney, 2001), controlling for days absent in our model could have attenuated the relationship between anxiety and academic achievement.

Contrary to expectations, symptoms of CD did not predicted poor ratings or learning skills or GPA. In studies that have found a negative relationship between CD and academic achievement, the latter was measured using standardized test scores (Gresham et al., 2005; Hinshaw, 1992). Further research examining both GPA and standardized test scores as outcome variables is warranted. Another reason for this unexpected finding could be because of restricted range of scores. Not many parents identified their children as exhibiting symptoms of CD which may be because CD tends to manifest later in adolescence. Alternatively, parents may have failed to identify children exhibiting CD behaviours outside of the home because it is likely that the child would conceal these behaviours from their parents (Hart, Lahey, Loeber, & Hanson, 1994; Loeber, Green, Lahey, & Stouthamer-Loeber, 1989).

The link between mental health problems and poor achievement is of paramount concern for students who are higher on the continuum of ADHD as the present study found that compared to students with other mental health problems, students with higher symptoms of ADHD are at the highest risk for low GPA and poorer ratings of learning skills. The fact that this relationship holds over time is noteworthy because it provides further evidence for a directional relationship in which it is the symptoms of ADHD that lead to academic difficulty

and not vice versa. These findings are consistent with the literature suggesting that it is ADHD symptoms that affect academic achievement above and beyond other symptoms of mental health disorders (Clark et al., 2002; Fergusson et al., 1993; Karustis et al., 2000). It may be that the attention deficit behaviours associated with ADHD impede the student's acquisition of learning skills, which are necessary for their immediate and future academic success. Future research should examine whether increased ratings of mean learning skills mediate the relationship between symptoms of ADHD and poor grades.

Strengths, Limitations, and Future Directions

The present study adds to the literature in several ways. First, we studied a large sample of Canadian school-aged children which allows us to generalize our findings beyond those of clinical samples and to provide more targeted recommendations for children at risk of mental health problems. Second, we examined children at a critical time period in their development; a time when the prevalence of mental health disorders tends to peak (Feldman & Elliot, 1990) and motivation for school achievement tends to decrease (Eccles et al., 1993). Third, we examined symptoms of four of the most common children's mental health disorders both concurrently and prospectively and related it to two aspects of academic achievement which have largely been overlooked in the literature: grades and learning skills. Fourth, we examined the unique contribution of mental health problems in explaining academic achievement after controlling for other known predictors of achievement (child's sex, days absent, maternal education, household income).

Despite its strengths, this study is not without limitations. First, our model implies a directional relationship between mental health problems and academic achievement such that elevated symptoms of mental health are risk factors for concurrent and prospective academic

achievement. However, there is also longitudinal evidence to suggest that this relationship is bidirectional such that poor achievement motivation, poor grades, and low reading and verbal skills are risk factors for poor mental health (Ford, Collishaw, Meltzer, & Goodman, 2007; Roeser et al., 1999). More longitudinal studies are needed to make a stronger case for directionality. Second, because of the longitudinal design of this study, our findings are limited to fifth and sixth grade children. Future research should examine the prevalence and stability of children's mental health problems and academic achievement across a broader age range and over a more extended period of time. Another area for future research could be to provide targeted help to at-risk children aimed at improving their learning skills and to assess whether this intervention improves their GPA (and perhaps mental health issues, in particular internalizing symptoms) compared to controls.

A major implication of the current findings is that early symptoms of both internalizing and externalizing disorders need to be addressed by educators as they have a significant impact on academic achievement. As a result, teachers need to be educated about common symptoms related to children's mental health so that they can identify at-risk children and refer them to proper resources. Mental health education in the classroom is also needed to inform students about warning signs and symptoms and where to get help before their symptoms progress to a full-blown mental illness. Talking about mental health with students also reduces stigma and stereotypes which can act as barriers to help-seeking behaviours. There also needs to be greater communication and co-operation between schools, social services, and the health sector in order to combine resources and promote healthy child development.

Conclusion. These findings highlight the unique contribution of mental health problems in predicting academic achievement both concurrently and longitudinally, above and beyond

known sociodemographic variables. In order to help our children succeed academically, educators need to learn about early identification and prevention of mental health symptoms.

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Table 1

Descriptive statistics and bivariate correlations for Time 1 (n = 715) and Time 2 (n = 627).

	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Sex	-	-	-	.06	-.01	.01	.11**	.11**	-.14**	-.03	.24**	.22**	.15**	.17**
2. Days absent	2.38	2.73		-	-.13**	-.14**	.11**	.08*	.07	.04	-.18**	-.19**	-.18**	-.15**
3. Maternal education	3.06	1.04			-	.42**	-.13**	-.06	-.16**	-.16**	.36**	.35**	.44**	.35**
4. Family income	5.99	2.37				-	-.21**	-.10**	-.17**	-.16**	.35**	.32**	.41**	.32**
5. Depression	6.25	6.65					-	.61**	.24**	.17**	-.26**	-.17**	-.28**	-.20**
6. Anxiety	10.70	6.62						-	.12**	.10**	-.11**	-.09*	-.16**	-.09*
7. ADHD	4.37	3.06							-	.33**	-.43**	-.42**	-.42**	-.39**
8. CD	0.34	0.91								-	-.22**	-.23**	-.25**	-.20**
9. Time 1 mean learning skills	3.01	0.74									-	.67**	.81**	.64**
10. Time 2 mean learning skills	3.11	0.72										-	.66**	.74**
11. Time 1 GPA	8.15	1.78											-	.70**
12. Time 2 GPA	8.00	1.57												-

Note. * $p < .05$. ** $p < .01$.

Table 2

Hierarchical Multiple Regression Analyses Predicting Mean Learning Skills at Time 1 and Time 2.

Predictor		Time 1 learning skills ($N = 715$)				Time 2 learning skills ($N = 627$)			
		b	SE b	b*	sr ²	b	SE b	b*	sr ²
Step 1	Sex	.16**	.02	.22	.04	.07**	.02	.10	.01
	Days absent at Time 1	-.03**	.01	-.11	.01	-.01	.01	-.05	.00
	Maternal education	.15**	.02	.21	.04	.08**	.02	.11	.01
	Household income	.05**	.01	.16	.02	.02	.01	.06	.00
	Time 1 learning skills					.50**	.04	.51	.16
	Days absent at Time 2					-.01	.01	-.06	.00
				R ² (adj)	.25**			R ² (adj)	.47**
Step 2	Depression	-.02**	.00	-.15	.01	.01	.00	.04	.00
	Anxiety	.00	.00	.03	.00	.00	.01	-.03	.00
	ADHD	-.07**	.01	-.29	.07	-.03**	.01	-.13	.01
	CD	-.03	.03	-.03	.00	-.03	.03	-.04	.00
					ΔR^2	.12**			ΔR^2

Note. * $p < .05$. ** $p < .01$.

Table 3

Hierarchical Multiple Regression Analyses Predicting GPA at Time 1 and Time 2

Predictor		Time 1 GPA ($N = 715$)				Time 2 GPA ($N = 627$)			
		b	SE b	b*	sr ²	b	SE b	b*	sr ²
Step 1	Sex	.24**	.05	.13	.02	.14**	.05	.09	.01
	Days absent at Time 1	-.06**	.02	-.09	.01	.00	.02	.01	.00
	Maternal education	.49**	.06	.29	.07	.08	.05	.05	.00
	Household income	.14**	.03	.19	.03	.02	.02	.03	.00
	Time 1 GPA	-				.54**	.03	.61	.22
	Days absent at Time 2					-.03	.01	-.08	.00
				R ² (adj)	.29**			R ² (adj)	.50**
Step 2	Depression	-.03**	.01	-.12	.01	.00	.01	-.01	.00
	Anxiety	-.01	.01	-.02	.00	.01	.01	.04	.00
	ADHD	-.16**	.02	-.27	.06	-.05**	.02	-.09	.01
	CD	-.10	.06	-.05	.01	.01	.05	.01	.00
					ΔR ²	.11**			ΔR ²

Note. * $p < .05$. ** $p < .01$.