Academic Pathways between Attention Problems and Depressive Symptoms Among Urban African American Children

Keith C. Herman,
Johns Hopkins University, School of Medicine

Johns Hopkins University, Division of Child And Adolescent Psychiatry, 600 N. Wolfe Street, CMSC 341, Baltimore, Maryland 21287-3325, USA

Sharon F. Lambert,
George Washington University, Washington, USA

Nicholas S. Ialongo, and
Johns Hopkins University, School of Public Health, Baltimore, Maryland, USA

Rick Ostrander
Johns Hopkins University, School of Medicine

Keith C. Herman: kherman6@jhmi.edu

Abstract

The present study investigated the pathways between attention problems and depressive symptoms, particularly the role of academic incompetence, among a community sample of urban African American children. Results supported the hypothesized path models from inattention to depressive symptoms for girls and boys. Academic performance in the spring of first grade mediated the relationship between inattention in fall of first grade and depressive symptoms in spring of 3rd grade. The effects held when controlling for conduct problems and academic competence in first grade suggesting the path was specific to attention problems rather than a more general externalizing or school readiness pathway. Implications for designing interventions and prevention strategies for children with attention problems and depressive symptoms are discussed.

Keywords

Attention problems; Depression; Academic competence; Gender differences

The co-occurrence of attention problems and depression is well-documented (Angold, Costello, & Erkanli, 1999; Jensen, Shervette, Xenakis, & Richters, 1993; Jensen et al., 2001) although little is known about mechanisms underlying their association. The timing of symptom onset may offer a clue to how these conditions are related—severe inattention is generally viewed as a problem of early neurodevelopment that emerges prior to symptoms of depression (American Psychiatric Association, 2000). Understanding processes that mediate the inattention-depression relationship could yield new insights about the nature and etiology of this particular type of comorbidity and lead to treatment and prevention innovations; indeed, some authors have suggested that the study of comorbidity is the most pressing issue in child psychopathology research and practice (Jensen, 2003). Although few studies have examined the mechanisms involved in the co-occurrence of these conditions,

Correspondence to: Keith C. Herman, kherman6@jhmi.edu.

extant theory and research gives reason to suspect that academic incompetence plays a pivotal role.

Several theories of development emphasize the role of academic competence during early childhood in determining social emotional outcomes. For instance, life course/social field theory (Kellam & Rebok, 1982) suggests that a key developmental challenge early in life is successful entrance into and adaptation to the school social field. At school entry, children are confronted with teacher demands for academic achievement, compliance, attention, and participation in classroom and peer activities. Unsuccessful adaptation to the school social field places children at risk for chronic school failure which in turn undermines their psychological well-being.

In line with a life course/social field perspective, Cole, Jacquez, and Maschman (2001) refined traditional cognitive theories of adult depression and proposed a competency-based model to describe the emergence of depressive symptoms in children. Similar to the traditional models, self-perceptions of competence contribute to depressive symptoms in the competency framework. However, according to Cole, these self-perceptions are learned from others' perceptions and represent accurate appraisals of academic and social competence in early childhood. In other words, real performance deficits may precede self-perceptions of incompetence that are linked to depressive symptoms. In later childhood and early adolescence these self-perceptions provide fertile ground for cognitive distortions that are associated with depressive symptoms in adults. Cross-sectional and longitudinal research supports Cole's competency model of depression (Cole, Martin, Powers, & Truglio, 1996; Cole & Turner, 1993; Cole et al., 2001).

Following the logic of Cole's model, factors that place children at risk for academic performance deficits, such as attention problems, may also increase their chances for becoming depressed. Inattention is a significant risk factor for both academic failure and depressive symptoms. The school experiences of children with attention problems are characterized by many negative outcomes including learning problems, teacher conflict, and school dissatisfaction (Barkley, 1998). Attention problems typically precede school maladjustment (Sanson, Prior, & Smart, 1996; Smart, Sanson, & Prior, 1996). Children with attention problems tend to have difficulty completing assignments and meeting the expectations of teachers; for that reason, a number of studies have identified inattention as a proximal cause of school and academic problems (Barkley, 1998).

In turn, children with learning problems are at increased risk for experiencing psychiatric symptoms and disorders including depression (Arnold et al., 2005; Carroll, Maughan, Goodman, & Meltzer, 2005). Several studies have found that reading problems were uniquely associated with depressive symptoms even when controlling for attention problems (Arnold et al., 2005; Willcutt & Pennington, 2000), findings consistent with the hypothesis that academic problems mediate the relationship between attention problems and depression. Unlike its consequent relationship with inattention, learning problems typically precede depressive symptoms. Kellam and colleagues reported that early learning problems predicted later distress including depressive symptoms in boys (Kellam, Brown, Rubin, & Ensminger, 1983), and an intervention that reduced academic risk also lowered subsequent depressive symptoms (Kellam, Rebok, Mayer, Ialongo, & Kalodner, 1994). More recently, analysis of longitudinal data from the Pittsburgh Youth Study (Maughan, Rowe, Loeber, & Southamer-Loeber, 2003) showed that reading problems occurred before the emergence of depressive symptoms for children aged 7–10 years but not for adolescents. The predictive value of reading problems remained strong even when controlling for family variables, conduct problems, and inattention.

On the other hand, available research does not support the reverse, that depression causes learning problems and school maladjustment in the early years of education (Maughan et al., 2003; Rutter et al., 1970). Maughan and colleagues found that depressive symptoms explained less than 1% of the variance of subsequent reading scores when controlling for prior reading scores, background variables, and conduct problems. Additionally, two longitudinal studies failed to find evidence that internalizing disorders served as independent risk factors for academic failure (Anderson, Williams, McGee, & Silva, 1989; Rutter et al., 1970).

Two recent studies have investigated academic pathways linking inattention and depressive symptoms. Herman and Ostrander (2006) found that a composite variable labeled school maladjustment that included teacher ratings of learning problems and student school satisfaction mediated the relationship between inattention and depressive symptoms in a sample of children aged 6–11 years-old. However, Blackman, Herman, and Ostrander (2006) found that academic incompetence alone did not distinguish between children with ADHD versus children with ADHD plus depression. The discrepant findings between these studies may be explained by how study variables were defined. Whereas Herman and Ostrander (2006) used continuous variables, Blackman et al. (2006) focused on diagnostic categories. Additionally, Herman and Ostrander (2006) used an aggregate measure of school maladjustment defined by teacher- and child-reports; Blackman et al. (2006) separately analyzed the effects of teacher-rated, child-rated, and performance based competence.

Equally important, both studies had serious limitations. First, both analyses were based on cross-sectional data. Optimal tests of mediation should include longitudinal data to test the temporal sequence of variables. Second, the children in the study were fairly homogeneous in terms of race and ethnicity. It is unclear if and how these findings apply to other samples of children. Third, neither study considered gender differences in their models because of the high percentage of boys in their samples.

Gender differences in academic self-perceptions may emerge during early and middle childhood. Boys tend to have higher expectations and be more optimistic about their academic potential (Frey & Ruble, 1987) whereas girls tend to underestimate their academic competence (Cole, 1990; Cole et al., 1999; Frome & Eccles, 1995). Girls are also more apt to adopt attributional biases by focusing on their low ability in explaining failure experiences (Frey & Ruble, 1987). Additionally, some studies have found the link between academic difficulties and depressive symptoms was restricted to girls (Willcutt & Pennington, 2000). Given the potential for gender differences to emerge on studied variables we conducted analyses separately for boys and girls.

Additionally, because we were concerned with the unique relationships among inattention, academic competence, and depressive symptoms, we also controlled for a known correlate of all three variables, conduct problems. A prominent theory suggests that the high rate of comorbidity between externalizing disorders, academic problems, and depression may originate with early antisocial behaviors (Patterson, Dishion, & Chamberlain, 1993). Early problems with attention, however, may explain much of the association between school maladjustment and conduct problems during the childhood years. For example, in an integrated review article, Hinshaw (1992) concluded that the apparent link between conduct problems and academic problems could be explained by comorbid attention deficits.

In sum, theory and empirical data gives reason to suspect academic incompetence as a potential mediator of the inattention-depression relationship. Children with attention problems are prone to academic failure which may place them at greater risk for becoming depressed. The present study builds on prior literature by exploring these relationships

among a group of African American children living in an urban context, a population on which inattention-depression mechanisms have not been tested. Although the prevalence of attention problems is similar across ethnic groups, less research has focused on African American children (Bailey & Owens, 2005; Jones, 2005). Additionally, prior studies have not considered the role of gender differences or conduct problems in modifying the relationship between attention problems and depressive symptoms.

Using data from the Baltimore Prevention and Intervention Research Center (PIRC), the present study investigated the relationship between attention problems, academic competence, and depressive symptoms for African American children. We conducted analyses separately for boys and girls and controlled for baseline conduct problems and academic competence. We hypothesized that academic competence would mediate the relationship between attention problems and depressive symptoms for boys and girls when controlling for conduct problems. Given evidence that girls may be more susceptible to internalize academic failure, we expected the mediating role of academic competence to be especially strong for them.

Method

Participants

Data were drawn from a longitudinal study conducted by the PIRC at Johns Hopkins University (JHU). The original study population consisted of a total of 798 children and families, representative of students entering first grade in nine Baltimore City public elementary schools. The children were recruited for participation in two school-based, preventive, intervention trials targeting early learning and aggression (Ialongo et al., 1999). Three first grade classrooms in each of the nine elementary schools were randomly assigned to one of the two intervention conditions or a control condition. The interventions were provided over the first grade year, following a pretest assessment in the early fall.

Six hundred sixty-one children participated in the intervention trial in the Fall of 1993 and completed self reports of depressive symptoms on at least one assessment occasion in grades 1–3. Eighty-nine percent ($n = 585$) of these children were African American. Analyses for this study focused on African American boys ($n = 210$) and girls ($n = 216$) who enrolled in the study in first grade and who completed assessments during the spring of 3rd grade. African American children who completed 3rd grade assessments did not significantly differ from children who did not on measures of self-reported depression, teacher-rated attention problems, or academic achievement scores collected during fall of 1st grade ($ps > .05$). As an indicator of low socioeconomic status, 72.8% of the sample for the present study received free lunch or reduced lunches according to parent report in the fall of 1st grade. This percentage did not significantly differ for those who completed 3rd grade assessments and those who did not ($ps > .05$).

Assessment procedures

Written informed consent was obtained from parents and verbal assent from the youth. Data for this study were obtained in the fall and spring of 1st grade and the spring of 3rd grade. The predictors (attention problems) and covariates (depressive symptoms, conduct problems, and intervention status) were assessed in fall of grade 1. The mediator (academic competence) was assessed in spring of grade 1. The outcome variable (depressive symptoms) was assessed in spring of grade 3. The time lag between measurement of the predictor, mediator, and outcome variables for this study was selected in order to permit conclusions about the influence of attention problems on subsequent academic problems and depressive symptoms. We measured academic competence in the Fall and Spring of 1st

grade because of the rapid acquisition of academic skills that children are expected to master during their first year of school entry. Additionally, as noted in the introduction, developmental experiences during first grade play a central role in future psychosocial development according to life course/social field theory. Finally, evidence that identifiable academic problems during the first grade contribute to child depression could lead to early intervention strategies.

Instruments

Teacher Observation of Classroom Adaptation–Revised (TOCA–R; Werthamer–Larsson, Kellam, & Wheeler, 1991)—Teacher ratings of attention problems and conduct problems were obtained in the fall semester of the first grade using the TOCA-R; Werthamer-Larsson, Kellam, & Wheeler, 1991). The TOCA-R was developed and employed by the JHU PIRC in the evaluation of the 1st and 2nd generation JHU PIRC trials. The TOCA-R requires teachers to respond to 43-items pertaining to the child's adaptation to classroom task demands over the last three weeks. Adaptation is rated by teachers on a six-point frequency scale (1 = almost never to 6 = almost always). Items for the sub-scales were largely drawn from the DSM-III, III-R and IV.

The Attention-Concentration Problems subscale has nine items (e.g., "pays attention," "easily distracted") and reported alphas of .91 and .83 in first grade. In terms of concurrent validity, each single unit of increase in teacher-rated attention/concentration problems was associated with a twofold increase in risk of teacher perception of the need for medication for such problems. In addition, each unit increase in the TOCA-R Attention/Concentration subscale scores in fall of 2st grade is associated with nearly a 60% increase in the likelihood of failing to graduate from high school. Although diagnoses were not used in the present study, teacher-ratings of inattention are considered the gold standard for identifying children with ADHD (Ostrander, Weinfurt, Yarnold, & August, 1998).

The Conduct Problems subscale, measuring aggressive/disruptive behaviors, has nine items including the following: started physical fights with classmates, lied, took other's property, and coerced classmates. The coefficient alpha for the Conduct Problems subscale during 1st grade was .94. The 6-month test-retest intraclass reliability coefficient was .50. Scores on the Conduct Problems subscale have been shown to significantly relate to the incidence of school suspensions (i.e., the higher the score on aggressive behavior, the greater the likelihood of being suspended from school that year).

Depressed Mood—The Baltimore How I Feel-Young Child Version, Child Report (BHIF-YC-C; Ialongo, Kellam, & Poduska, 1999) is a child self-report scale of depressive and anxious symptoms. The BHIF-YC-C was designed to be used as a first stage measure in two-stage epidemiologic investigations of the prevalence of child mood and anxiety disorders as defined in the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (*DSM-III-R*; American Psychiatric Association, 1987); therefore, BHIF-YC-C items map onto *DSM-III-R* criteria for major depression and overanxious and separation anxiety disorders. A pool of items was drawn from existing child self-report measures, including the Children's Depression Inventory (Kovacs, 1992), the Depression Self-Rating Scale (Asarnow & Carlson, 1985), the Hopelessness Scale for Children (Kazdin et al., 1986) and the Revised-Children's Manifest Anxiety Scale (Reynolds & Richmond, 1979).

The BHIF-YC-C was designed to be administered on a classroom-wide basis and to require no reading skills on the part of the children. It is administered by a 3-person team made up of adult lay interviewers. While one team member reads each item aloud twice to the class, the two other team members circulate through the classroom maintaining classroom order

and assisting children who are having difficulties in paying attention or understanding the instructions. All interviewers are trained to follow standardized procedures including minimizing influencing student responses. To further obviate the need for reading skills, pictures of common objects (e.g., a ball, apple, etc.) are used to represent the items and the answer choices in the booklets the children use to record their responses. For each item, children report the frequency of depressive and anxious symptoms over the last two weeks on a three-point scale (0 = Never, 1 = Sometimes, 2 = Almost Always). The typical administration time is approximately 30–35 min.

Two BHIF-YC-C timepoints were used for the present analyses: Fall of 1st grade and Spring of 3rd grade. The internal consistency for the BHIF-YC-C 14-item Depression subscale was .70 in 1st grade, and .75 in 3rd grade. Two-week test-retest reliability coefficients have ranged from .60 in first grade to .70 in middle school (Ialongo, Kellam, & Poduska, 1999). The 6-month, test-retest correlation coefficient in 1st grade for the BHIF-YC-C Depression subscale was .31, reasonable stability given the fluctuating nature of the construct. In terms of concurrent validity, for each standard deviation increase in BHIF-YC-C Depression subscale scores in 1st grade, there was a 3-fold and statistically significant increase in the likelihood of the child's parent reporting that the child was in need of mental health services for "feeling sad, worried or upset." Data from the first generation PIRC datasets revealed that child self-reports on the BHIF Depression subscale during elementary school predicted to an age 19–20 report of a lifetime suicide attempt (O.R. = 2.38 C.I. = 1.30–4.25) and a diagnosis of a lifetime episode of Major Depressive Disorder (O.R. = 1.84, C.I. = 1.16–2.92). More generally, the prognostic power of young children's self-reported depressive symptoms was demonstrated by Ialongo, Edelsohn, and Kellam (2001). In a sample of mostly African American children from low income families in Baltimore, they found that first grade self-reports of depressive symptoms predicted future need for and use of mental health services, future suicidal ideation, and diagnosis of major depressive disorder at age 14.

Academic competence (Comprehensive Test of Basic Skills; CTBS)—The Comprehensive Test of Basic Skills 4 (CTBS; Fourth Edition, 1990). The CTBS represents one of the most frequently used standardized achievement batteries in the U.S. Subtests on the CTBS cover both verbal (word analysis, visual recognition, vocabulary, comprehension, spelling, and language mechanics and expression) and quantitative topics (computation, concepts, and applications). The CTBS was standardized on a nationally representative sample of 323,000 children from kindergarten through grade 12. In the present study, the CTBS was administered during the fall and spring of first grade. The CTBS Total Math and Reading scores for each child collected during the fall and spring of 1st grade were used for all analyses.

Analytic plan

Structural equation modeling was used to examine the hypothesized relationships among the latent constructs and to examine the relations between the predictors, mediators, and outcome variables. Structural equation modeling was conducted using Mplus 4 (Muthen & Muthen, 2005), and maximum likelihood estimates were obtained. All mediation analyses were run using the Cluster feature which adjusts the standard error estimates for the nested effect of the 27 classrooms. Additionally, the analyses described below were repeated with and without the Missing command in MPlus, and the results were essentially unchanged (e.g., model fit indicators were nearly identical and final significant beta weights were within .02 of each other). We report the path coefficients and model fit indicators that were derived with the Missing command. As noted above, all participants completed 3rd grade

assessments of depressive symptoms. Covariance coverage exceeded 0.89 for all variable combinations.

Our measurement model balanced our desire to have 2, or if possible 3, indicators per variable while limiting the number of parameters estimated so as not to exceed conventional parameter to subject ratios. To provide more than one indicator of Time 1 attention problems and Time 3 depression and allow the analyses to consider measurement error for these constructs, we created latent variables in our measurement model by dividing each scale into 3 separate item parcels. Item parcels are often used and preferred over individual items in SEM analyses because they are more likely to meet assumptions of the maximum likelihood procedures used in SEM, provide more precise estimates of parameters, and simplify models by reducing the number of parameters (Nasser & Wisenbaker, 2003).

Structural model fit was evaluated using multiple indicators of fit: Chi-square, the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). Hu and Bentler (1999) suggested that CFI and TLI values above .95 and RMSEA values less than .08 represent acceptable fit; RMSEA values equal or less than .05 represent good fit (Browne & Cudek, 1993).

Mediated effects were tested according to guidelines outlined by Holmbeck (1997). First, the direct effect of the predictor (attention problems) on the outcome (depressive symptoms) was assessed. Next, the fit of a model with paths from the predictor to the mediator (academic problems) and from the mediators to the outcome was tested. In the preceding models, the paths from the predictor to the outcome, the predictor to the mediator, and the mediator to the outcome must be significant and in the hypothesized directions as a prerequisite for mediation. The final step in testing mediation was to compare the full mediational model under two conditions: (a) with the path from the predictor to the outcome constrained to zero (Model 1) and (b) with no constraint on the path from the predictor to the outcome (Model 2). A mediated effect is present if the addition of the direct path (Model 2) does not improve the fit of Model 1. Specifically, the previously significant direct effect of the predictor on the outcome becomes nonsignificant when the mediator is in the model. This sequence of model testing is parallel to the strategy outlined by Baron and Kenny (1986). Models were tested for boys and girls separately consistent with prior literature that suggested that the studied relationships may vary by gender. Intervention status, depressive symptoms, and conduct problems in grade 1 were controlled in all models.

Results

Preliminary analyses

Descriptive statistics and preliminary Pearson correlation analyses were calculated to determine the univariate relations among study variables (see Table 1). Most correlations were similar for boys and girls. Academic competence at Time 2 was significantly correlated with all other variables for both boys and girls, most strongly with Time 1 attention problems ($r = -.73$ and $-.69$, respectively). The significant intercorrelations among key study variables (e.g., Time 1 attention problems with Time 2 academic competence and with Time 3 depression, and Time 2 academic competence with Time 3 depression) provided preliminary support for testing for mediation.

Mediation analyses

Fit indices for each model are summarized in Table 2. For girls, attention problems at Time 1 had a significant direct effect on depressive symptoms ($B = .22$) at Time 3 when controlling for Time 1 depression, conduct problems, and intervention status. Additionally, Time 1 attention problems had a direct negative effect on Time 2 academic competence

(controlling for Time 1 academic competence) ($B = -.39$) which in turn had a direct negative effect on Time 3 depressive symptoms ($B = -.36$). Thus, the models for girls met Holmbeck's first two criteria for a significant mediation effect. The final criterion requires a direct comparison between the full model with the direct path from attention problems to depression constrained to zero (constrained model) and the full model with this path freely estimated (freely estimated model). The constrained model (Model 1) yielded an adequate fit to the data, $\chi^2(52) = 70.07$, *ns*; CFI = .98; TLI = .98; RMSEA = .040. Academic competence had a significant direct effect on depressive symptoms ($B = -.30$), and the total indirect effect of inattention on depression was significant (Indirect = .21). The freely estimated model (Model 2) was tested next. It also yielded an adequate fit to the data, though all fit indices were identical to or lower than the fit for Model 1: $\chi^2(51) = 70.39$, *ns*; CFI = .98; TLI = .97; RMSEA = .042. Academic competence had a significant effect on T3 depression ($B = -.37$) in this model; attention problems did not ($B = .05$). To formally test the mediation effect of academic competence on the inattention-depression relationship, the chi square difference between Model 1 and Model 2 was compared. The freely estimated model did not significantly improve the model fit over the constrained model ($\chi^2(1)$ Difference = 0.032, $p > .05$) suggesting that a direct path between attention problems and depressive symptoms was not needed. The comparison provided strong support for a mediated model for girls.

For boys, attention problems at Time 1 had a significant direct effect on depressive symptoms ($B = .23$) at Time 3 when controlling for Time 1 depression, conduct problems, and intervention status, thus meeting Holmbeck's first criteria. Additionally, the effects from Time 1 attention problems to Time 2 academic competence ($B = -.33$) and from academic competence to Time 3 depression ($B = -.22$) were also significant and in the hypothesized directions (Holmbeck's 2nd criteria). The final step involved a direct comparison between the constrained and freely estimated models. The constrained model (Model 1) yielded an adequate fit to the data, $\chi^2(52) = 75.11$, *ns*; CFI = .98; TLI = .97; RMSEA = .046. Academic competence had a significant direct effect on Time 3 depressive symptoms ($B = -.19$) in this model, and attention problems had a significant indirect effect on Time 3 depression (.06). The freely estimated model (Model 2) was tested next. It yielded a comparable fit for the data as indicated by nearly all fit indices: $\chi^2(51) = 70.21$, *ns*; CFI = .98; TLI = .97; RM-SEA = .046. As with the analysis for girls, the freely estimated model did not significantly improve the model fit over the constrained model ($\chi^2(1)$ Difference = 1.90, $p > .05$) suggesting that a direct path between attention problems and depressive symptoms was not needed. The mediated model (Model 1) was accepted as the best fitting model for boys.

Final path coefficients were derived from final β's in each of the above structural models. These coefficients are depicted in Figs. 1 and 2. Indirect effects were calculated using procedures described by Klem (1995) in which significant mediated paths are multiplied (e.g. for girls, the significant path between inattention and academic competence, −.39, was multiplied by the significant path between academic competence and depression, −.34).

Discussion

The present study investigated the links between attention problems and depressive symptoms, specifically, the role of academic problems in mediating this relationship. Results supported the hypothesized path models from inattention to depression for girls and boys. Academic competence in the spring of first grade mediated the relationship between inattention in fall of first grade and depressive symptoms in spring of 3rd grade. The effects held when controlling for conduct problems and academic competence in first grade

suggesting the path was specific to attention problems rather than a more general externalizing or school readiness pathway.

The findings are consistent with a life course/social field perspective and with Cole's (2000) competency model of depression. Actual academic skill deficits so common among children with attention problems may place children at risk for developing depressive symptoms. Although self- and other-perceptions were not measured in this study, the findings are consistent with the looking glass hypothesis. Cole hypothesized that significant others such as peers and teachers accurately perceive academic incompetencies and communicate these perceptions to children with skill deficits. In turn, these children are more likely to perceive themselves as academically incompetent based on these perceptions of others (the looking glass hypothesis).

Given past evidence that girls are more likely than boys to underestimate their academic abilities and also to attribute failures to their low ability (Frey & Ruble; Willcutt & Pennington, 2000), we expected the hypothesized relationships to be especially strong for girls. The constrained model fit well for both boys and girls, however, and both effect sizes fell in a similar range. The relatively small effect size from academic competence to depression is not surprising. It is likely that depression has multiple causal pathways through other variables not considered in this study including social competence and family relationships (Ostrander & Herman, 2006). Additionally, depressive symptoms at third grade were measured at a single point in time. Future studies using multiple time point assessments of depressive symptoms could improve the reliability of assessment and yield higher effect size estimates between constructs of interest.

The findings have implications for understanding the development of these commonly comorbid conditions and for the design of preventive interventions to disrupt the progression of depressive symptoms in children with attention problems. Specifically, the findings suggest that early identification of attention problems and amelioration of any associated academic problems may reduce risk for subsequent depressive symptoms. Instructional interventions to promote academic skills and success and efforts to increase academic engagement by altering school climate, may help alleviate some of the internalizing symptoms with attention problems.

Additionally, the findings have implications for the identification and treatment of attention problems in African American children. Although the prevalence of attention problems is similar across racial and ethnic groups, African American children are nearly 50 percent less likely to be evaluated, diagnosed, and treated compared to Caucasian children (Bailey & Owens, 2005; Jones, 2005). Failure to identify and treat attention problems may place many African American children at greater risk for academic failure and in turn depressive symptoms. Efforts to improve the identification and treatment of attention problems among African American children could yield the additional benefit of reducing their risk for depressive symptoms.

The present study used a community epidemiologically-defined sample of children which may be viewed an asset. Additionally, the study extended prior research by analyzing longitudinal data for an understudied population. The study relied on continuous measures of key study variables rather than diagnostic data, thus it is unknown if the relationships described apply equally well to children with clinical diagnoses. Although a strength of the present study was its use of independent sources (teacher, student performance, student-report) to define the three key constructs, an alternate strategy would be to include multiple sources for each construct (e.g., parent- and teacher-ratings of attention problems and depression). Moreover, the study relied on statistical demonstration of mediation. Further

evidence of mediation could be derived by prevention science strategies that attempt to demonstrate "malleability through experimental manipulation" (Kellam, Koretz, & Moscicki, 1999); that is, determining whether altering the proposed causal mechanisms (academic incompetence in children with attention problems) produces change in the outcome (risk for depressive symptoms).
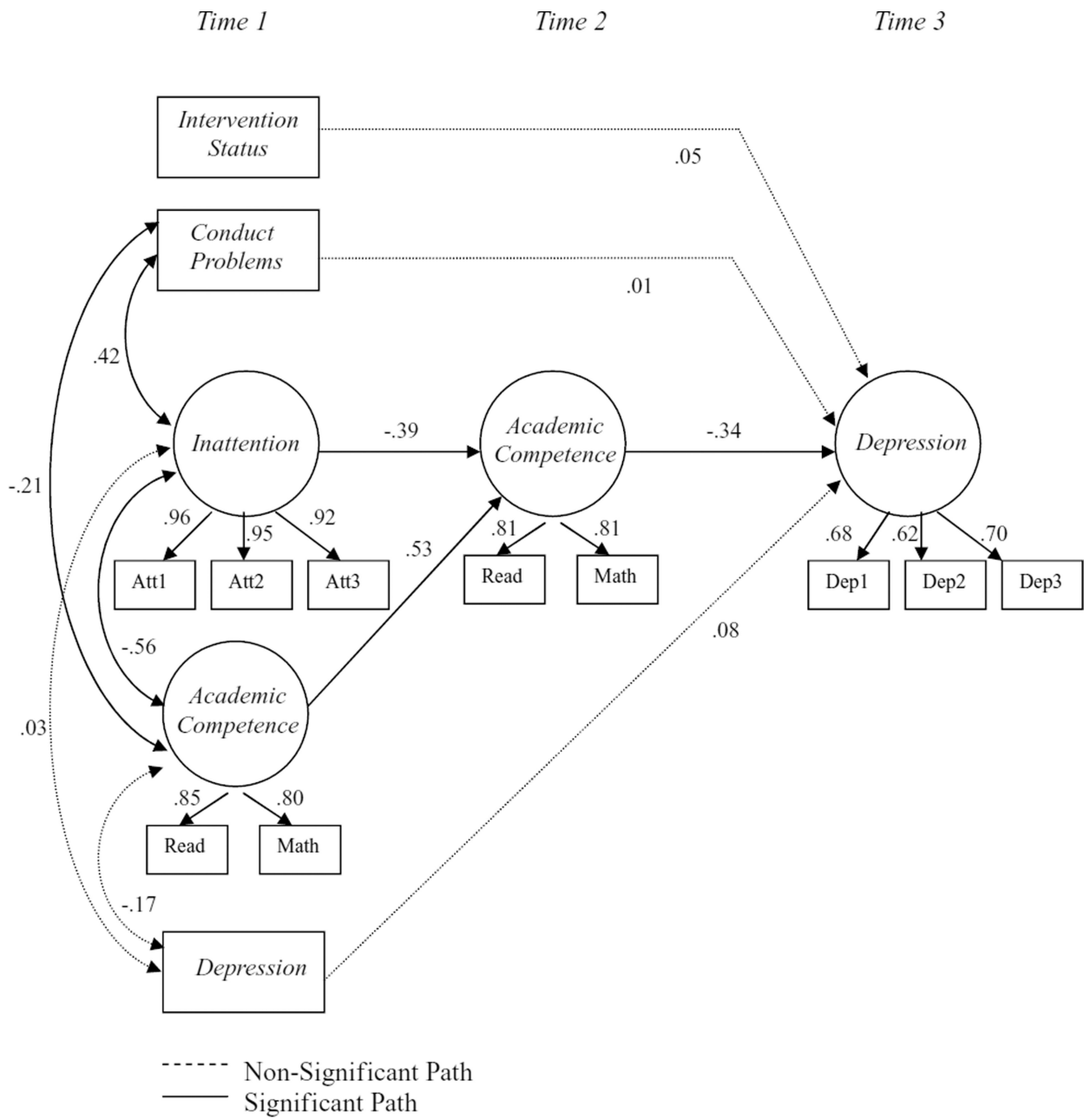
Further studies are needed to examine the relationships between the variables in the present investigation and other related variables including life stressors, social competence, and additional components of attributional style and family environment. Additional studies with older children are needed as well to determine if these relationships persist over time. Studies with children 10 years and older should include measures of child cognitions, especially self-perceptions of academic competence, to fully test Cole's model. Further clarification of the developmental pathway to depression for children with attention or conduct problems may lead to improved prevention and treatment interventions for these children.

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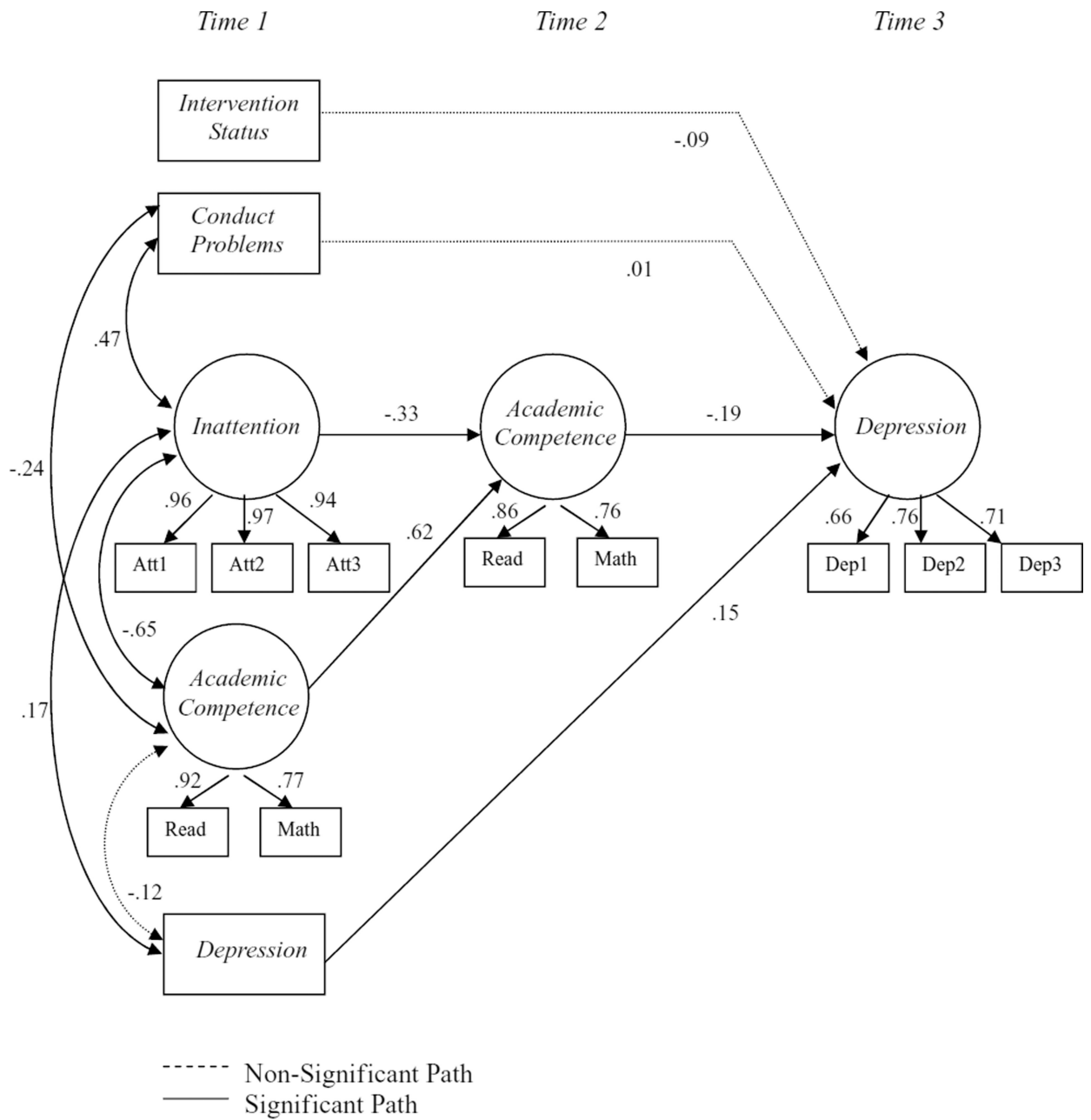
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Fig. 1.
Final structural model from inattention to depression for girls

Fig. 2.
Final structural model from inattention to depression for boys

Table 1

Intercorrelations among study variables for African American girls ($n = 216$) and boys ($n = 210$) and boys

	1	2	3	4	5	6	7
1. T1 Depression	–	.10	.07	.04	–.12	.07	–.17
2. T3 Depression	.18[*]	–	.23[*]	.10	–.33[*]	.11	–.27[*]
3. T1 Attention problems	.17[*]	.22[*]	–	.42[*]	–.69[*]	.14[*]	–.56[*]
4. T1 Conduct problems	.14	.09	.51[*]	–	–.20[*]	.12	–.21
5. T2 Academic competence	–.16[*]	–.20[*]	–.73[*]	–.34[*]	–	–.18[*]	.74[*]
6. Intervention status	.00	.10	.12	.06	.01	–	.10
7. T1 Academic competence	–.12	–.07	–.65[*]	–.24[*]	.75[*]	.08	–

Note. T1 = Fall of First Grade; T2 = Spring of First Grade; T3 = Fall of Third Grade.

[*]
p<.05.

Table 2

Goodness of fit indices for mediation models

Model	χ^2 (*df*)	CFI	TLI	RMSEA	χ^2 (*df*) Difference Model 1 vs. 2
Mediation model for girls					
Model 1: Mediated model, direct path constrained to 0	70.07 (52)	.98	.98	.040	
Model 2: Non-Mediated model, direct path freely estimated	70.39 (51)	.98	.97	.042	0.032 (1), *p*> .05
Mediation model for boys					
Model 1: Mediated model, direct path constrained to 0	75.11 (36)	.98	.97	.046	
Model 2: Non-Mediated model, direct path freely estimated	73.21 (51)	.98	.97	.046	1.90 (1), *p* > .05

Note. CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; RMSEA = Root mean square error of approximation.