Internalizing Behavior Problems and Scholastic Achievement in Children: Cognitive and Behavioral Pathways as Mediators of Outcome

Mark D. Rapport
Department of Psychology, University of Central Florida

Colin B. Denney
Department of Psychology
Purdue University

Kyong-Mee Chung and Keli Hustace
Department of Psychology, University of Hawaii

Examined a conceptual model in which dual developmental pathways (behavioral and cognitive) are hypothesized to account for the relation among internalizing behavior problems, intelligence, and later scholastic achievement using a cross-sectional sample of 325 children. Classroom behavior and select aspects of cognitive functioning (vigilance, short-term memory) were hypothesized to mediate the relations among internalizing problems, IQ, and long-term scholastic achievement. Hierarchical tests applied to a nested series of models demonstrated that (a) individual differences in measured intelligence among children are associated with variations in classroom performance and cognitive functioning, (b) classroom performance and cognitive functioning make unique contributions to prediction of later achievement over and above the influence of intelligence, (c) anxious/depressive features are correlated but separable constructs, and (d) anxiety/depression and withdrawal contribute to prediction of classroom performance and cognitive functioning over and above the effects of intelligence. Classroom performance and cognitive functioning thus appear to mediate the effects of internalizing behaviors as well as intelligence. Particular attention to the presence and potential impact of social withdrawal on children's functioning, both alone and concomitant with anxiety/depression, appears warranted during the course of clinical evaluations owing to the strong continuity among these variables.

Characterizing the developmental course and correlates of behavior problems is a central devoir of developmental psychopathology (Achenbach, Howell, McConaughy, & Stanger, 1995). To this end, several approaches have been employed for classifying children with maladaptive behavior patterns and studying their developmental trajectories. The most prevalent of these include (a) identifying discrete clinical disorders using structured or semistructured interview, and (b) identifying empirically derived broad- (internalizing/externalizing) and narrow-band (clinical syndromes) dimensions of abnormal behavior by means of continuum scores or ratings (for a review, see Achenbach, 1990). Although these strategies are not mutually exclusive, the dimensional approach has some advantages. It depicts psychopathological manifestations as quantifiable variables as opposed to discrete categories and enables assessment of children's behavior relative to same-sex and age-relevant normative samples (i.e., normative-developmental approach). Moreover, it is consistent with persuasive theoretical and empirical arguments favoring dimensional views of psychopathology (Sonuga-Barke, 1998), as well as recent genetic evidence demonstrating that heritability estimates for both internalizing and externalizing problems are constant across levels of severity in the population (Deater-Deckard, Reiss, Hetherington, & Plomin, 1997).

Developmental outcomes of broadband behavior problems (i.e., externalizing and internalizing dimensions) have been of considerable interest to clinical child researchers owing to the high internal consistency and relative stability of these behavior patterns (Achenbach & Edelbrock, 1989; Verhulst, Koot, & Van der Ende, 1994). Externalizing behavior problems are characterized by difficulties with attention, aggression, conduct, and undersocialization, whereas internalizing problems include withdrawal, anxiety, fearfulness, and depression. The broadband dimensions thus reflect a distinction between fearful, inhibited, overcontrolled behavior and aggressive, antisocial, undercontrolled behavior.

Detailed reviews are available concerning the internal consistency (Brady & Kendall, 1992), predictive validity (Bernstein, Borchardt, & Perwien, 1996), epidemiology (Fleming & Offord, 1990), clinical presentation (Kovacs & Bastiaens, 1995), and correlates (Fleming & Offord, 1990; Zoccolillo, 1992) of internalizing behavior problems in children. Developmental outcomes of internalizing (undercontrolled) behavior problems have also received empirical scrutiny in recent years. Reviews indicate that rates of internalizing problems are subject to developmental trends. They increase as a function of age and place affected children at risk for a variety of later difficulties. These include learning problems, academic underachievement, conduct problems, and deficient social problem-solving skills (for a review, see Kovacs & Devlin, 1998).

Two developmental pathways linking behavior problems associated with the internalizing dimension to later scholastic achievement are suggested by the literature. The first of these involves classroom performance. Moderate to strong correlations between internalizing behavior problems in children and daily classroom performance have been reported in clinical samples (Brumback, Dietz-Schmidt, & Weinberg, 1977; Hodges & Plow, 1990), community samples (Edelsohn, Ialongo, Werthamer-Larsson, Crockett, & Kellam, 1992), and those identified by means of rating scale severity scores (Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1995; Ollendick, Weist, Borden, & Greene, 1992). The stability and directionality of these findings are buttressed by numerous longitudinal studies (Achenbach, & Howell, 1993; Ialongo et al. 1995; Ollendick et al., 1992; Verhulst, Eussen, Berden, Sanders-Woudstra, & van der Ende, 1993).

A second developmental pathway suggested by the literature involves cognitive function. Both general cognitive abilities (e.g., intelligence) and select aspects of cognitive function (e.g., vigilance, memory, information processing) have been implicated as correlates of internalizing symptomatology in children. The literature linking specific clinical internalizing syndromes (i.e., depression, anxiety, social withdrawal) and general cognitive abilities is limited. Extant studies and reviews suggest that general cognitive abilities indexed by intelligence tests and subtests bear a weak or nonsignificant relation with depression (Kaslow, Rehm, & Siegel, 1984; Kovacs & Goldston, 1991) and a small to moderate relation with anxiety (Hodges & Plow, 1990; Kusche, Cook, & Greenberg, 1993) and social withdrawal (Grossberg & Cornell, 1988) in children.

Comparatively few studies have examined relations between select aspects of cognitive function and internalizing behavior problems in children. Collectively, their results indicate relatively consistent albeit small correlations between measures of specific cognitive abilities and depressive symptoms, with a majority of studies suggesting that diminished cognitive performance interacts with severity of depression and task difficulty (Hartlage, Alloy, Vazquez, & Dykman, 1993; Roy-Byrne, Weingartner, Bierer, Thompson, & Post, 1986). Empirical studies concerning the relation between anxiety and cognitive performance have focused almost exclusively on children with test anxiety. These have found performance difficulties among anxious children on evaluative, relatively difficult tasks (Hembree, 1988; Zatz & Chassin, 1983). Finally, the relation between children with social withdrawal and cognitive test performance has not been directly studied. These children, however, appear to perform more poorly in school, on standardized achievement tests (Ollendick et al., 1992), and on tasks requiring social-cognitive problem-solving skills (Rubin, Daniels-Beirness, & Bream, 1984) than their peers.

A dual pathway model, linking internalizing behavior problems to long-term scholastic achievement, was hypothesized based on extant literature and examined using structural equation modeling. At the most general level, we postulated that the relation between internalizing behavior problems and scholastic underachievement suggested by our literature review reflects the impact of internalizing characteristics (anxiety, depression, and withdrawal) on day-to-day behaviors and cognitive processes that contribute to the acquisition of academic skills and retention of information. The model shown in Figure 1 illustrates this view. It suggests that two parallel pathways—one emphasizing classroom academic behavior and the other, select cognitive processes—mediate relations between internalizing behavior problems and long-term scholastic achievement after controlling for the influence of intelligence. For the behavioral pathway, we hypothesized that daily classroom performance on assigned work would mediate relations among concurrently measured internalizing characteristics, intelligence, and later scholastic achievement. A parallel cognitive pathway was also proposed comprising selected cognitive skills (i.e., vigilance and short-term memory) that are presumed to mediate effects of internalizing behavior problems and IQ on later scholastic achievement independently of the behavioral pathway. Measures of vigilance and short-term memory were selected for study based on (a) extant literature implicating them as correlates of internalizing behavior problems in children and (b) their established relation with academic achievement (Kupietz & Richardson, 1978; Stevenson, 1972). In summary, the dual pathway model in Figure 1 implies that internalizing behavior problems are associated with risk for impaired classroom performance and concentration or memory difficulties, which, over time, are presumed to adversely affect children's long-term academic achievement.

Finally, we expected measured intelligence (IQ) to show a significant albeit weak relation with internaliz-
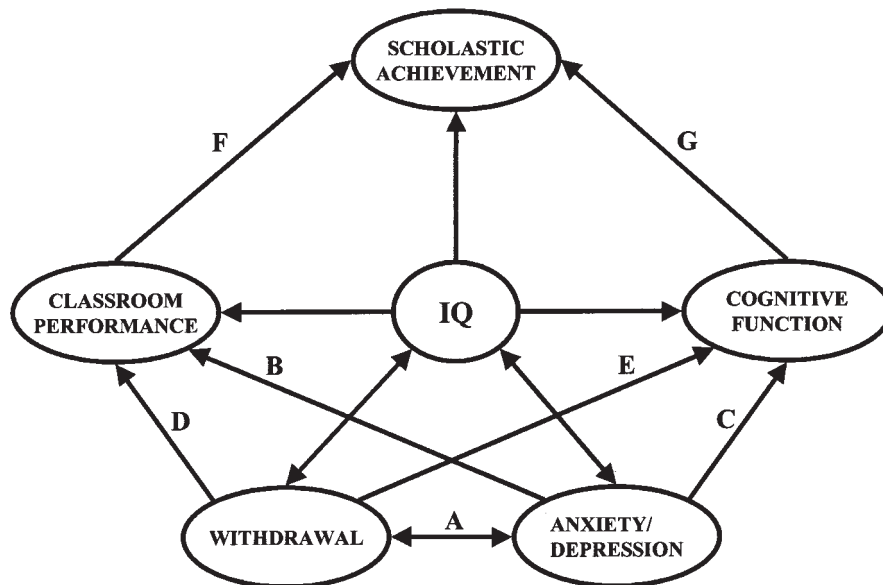
Figure 1. Conceptual model depicting the relations among measures of internalizing behavior (withdrawal, anxiety/depression), intelligence (IQ), classroom performance, cognitive function, and long-term scholastic achievement in children. Withdrawal and anxiety/depression are viewed as correlated but separable dimensions of internalizing behavior whose continuity with long-term scholastic achievement is mediated by classroom performance and cognitive function after controlling for the effects of intelligence (IQ). Upper case letters (A, B, C, D, E, F, G) represent path coefficients used in a hierarchical series of models to examine the dual pathway hypothesis. Specific models, hypotheses, and imposed constraints are described in Table 2.

ing behavior problems, and a more robust relation with classroom performance and cognitive function. A hierarchical series of models was examined to assess the dual pathway hypothesis.

Method

Participants

The sample consisted of 325 children (146 boys, 179 girls) between 7 and 15 years of age (age distribution: 7 to 8 [$n = 76$], 9 to 10 [$n = 74$], 11 to 12 [$n = 82$], 13 to 15 [$n = 93$]; sample mean and $SD = 10.67$ and 2.39, respectively) attending second through ninth grade at a public and private school in Honolulu (Oahu), Hawaii. Approximately 74% of the state's population reside in the city and county of Honolulu (U.S. Bureau of the Census, 1990). Schools were selected based on available data suggesting that their ethnic and sociodemographic composition was a close approximation of children residing in Hawaii (*State of Hawaii Data Book,* 1996).

The public school is a research arm associated with the University of Hawaii whose primary mission is to develop and test curricula suitable for children of differing abilities and sociodemographic backgrounds. Children are admitted to the school based on ethnicity, sex, parental socioeconomic and marital status, residence location, and academic achievement to approximate the state's census.

A private school was selected for participation to obtain a sample reflecting the relatively large number of children (i.e., 19%) attending private schools in the state (*State of Hawaii Data Book,* 1996). The school admits students from throughout the state, although the majority of children reside in the urban Honolulu area.

An informational letter, consent form, and demographic information form were mailed to parents of children attending both schools. The letter provided a basic description of the research project. The latter two forms were used to obtain written consent for children's participation and sociodemographic information (Duncan, 1961) concerning family members, respectively. Parental consent was obtained for 100% and 54% of the children attending the University-affiliated public school (participation is a required condition of admission) and private school, respectively. The obtained consent rate compares favorably with that reported in other school sample studies (e.g., Ialongo et al., 1995). The ethnic composition of the sample was as follows: East Asian (36%), part-Hawaiian (23%), Caucasian (11%), Southeast Asian (4%), Pacific Islander (less than 1%), and mixed (25%). Participants were considered part-Hawaiian if any ethnicities within their ethnic background included Hawaiian and mixed if their ethnic background included multiple ethnicities.

Measures

Child intelligence. The Kaufman Brief Intelligence Test (K–BIT) consists of two subtests (vocabulary and matrices) designed to assess domains parallel

to crystallized and fluid intelligence (Horn & Cattell, 1966). Subtest scores combine to yield a composite IQ ($M = 110.14$, $SD = 11.87$). The psychometric properties of the K–BIT and expected patterns of relations with other measures of intelligence are well established (Kaufman & Kaufman, 1990). A latent variable representing individual differences in IQ corrected for measurement error was derived using the composite score of the K–BIT as an indicator variable and fixing its error term based on its published test–retest reliability coefficient (Kaufman & Kaufman, 1990) as illustrated in Kline (1998).

Early educational achievement. The Kaufman Test of Educational Achievement (K–TEA Brief Form) is an individually administered diagnostic battery that measures mathematics, reading, and spelling skills in children. Its psychometric properties and expected patterns of relations with other measures of educational achievement are well established (Sattler, 1989). Subtest scores combine to yield a composite achievement score. A latent variable representing individual differences in achievement corrected for measurement error was derived using the composite score of the K–TEA as an indicator variable and fixing its error term based on its published test–retest reliability coefficient (Kaufman & Kaufman, 1998).

Early internalizing behavior. The Child Behavior Checklist (CBCL) teacher report form (TRF) is a standardized teacher rating scale that includes eight clinical syndrome scales, as well as composite indexes of externalizing and internalizing broadband dimensions, adaptive functioning, and academic performance. The psychometric properties of the CBCL–TRF are excellent and detailed by Achenbach (1991).

Anxiety/depression and withdrawal are intentionally viewed as continuous behavioral dimensions. This perspective is in accordance with the normative-developmental view of child psychopathology (Achenbach, 1990), recent genetic evidence (Deater-Deckard et al., 1997), and persuasive theoretical arguments favoring the phenomenological view of dimensionality (Sonuga-Barke, 1998). The descriptors anxiety/depression and withdrawal used throughout the study thus refer to individual differences among children with respect to anxiety/depression and social withdrawal (as opposed to categorical diagnoses) as defined by the CBCL–TRF clinical syndrome scales. Scores on the anxious/depressed and socially withdrawn clinical syndrome scales of the CBCL–TRF were used to define latent variables representing these two dimensions of the internalizing behavior construct. They were incorporated into the model-fitting procedure as overlapping but distinct latent variables to empirically test the hypothesis that they are separable but correlated dimensions rather than psychometrically parallel indexes of a single construct.

Classroom performance. The Academic Performance Rating Scale (APRS) is a 19-item teacher rating scale designed to assess children's classroom performance. The psychometric properties of the APRS and expected patterns of relations with other measures of academic performance, classroom behavior, and achievement are well established (DuPaul, Rapport, & Perriello, 1991). Scores from the academic success and academic productivity subscales of the APRS were used to define a latent variable (classroom performance) for purposes of model evaluation.

It can be argued that the distinctions between academic performance, teacher-rated internalizing behavior, and long-term achievement are not distinct measures. Psychometric distinctions between measures of different but related constructs are traditionally evaluated by examining convergent and divergent validity of measures used to define them. Distinctions between the APRS and measures of classroom behavior and achievement are reported by DuPaul and colleagues (1991). Strong evidence of convergent–divergent validity of the instruments is also shown in Table 1. APRS factors correlate more highly with each other than with CBCL–TRF ratings or Stanford Achievement Test (SAT) subscales, and the factor loadings associated with the APRS (depicted in Figure 2) reveal strong internal consistency.

Vigilance. A double letter (BX) version of the Continuous Performance Test (CPT) was programmed for use in this investigation owing to its strong psychometric properties and utility in assessment of children's vigilance (Chung, Denney, & Rapport, 2000). The CPT–BX used in the study requires the child to respond (using the click mechanism of the track ball) whenever a letter of the alphabet occurs twice in succession (i.e., repetitions of the same letter). Visual stimuli consisting of letters of the alphabet are presented in the center of the monitor screen (3.5 cm high, 3.5 cm wide) at 1-sec intervals (.2 sec display, .8 sec intertrial stimulus interval) throughout the 9-min duration of the test. Children completed two CPT–BX tasks that differed in target density but were identical in all other respects. One incorporated a high density of target to nontarget stimuli and the other, a low target density. Fifteen and 60 target stimuli (identical consecutive letters) were programmed to occur within each of the three 3-min time blocks for the low- and high-target density versions, respectively (i.e., a total of 45 and 180 targets

539

Table 1. *Correlation Matrix of IQ, Internalizing Behaviors, Classroom Performance, Cognitive Function (Short-Term Memory and Vigilance), and Long-Term Academic Achievement (SAT)*

	IQ	Internalizing		Classroom Performance		Vigilance		Short-Term Memory			SAT		
	KBIT	W/D	ANX/DEP	AS	AP	BXH	BXL	BLK12	BLK34	BLK56	LANG	MATH	READ
IQ	1.000												
Internalizing behavior													
ANX/DEP	-0.086	1.000											
W/D	-0.070	0.457	1.000										
Class performance													
AS	0.475	-0.243	-0.298	1.000									
AP	0.556	-0.134	-0.239	0.855	1.000								
Vigilance													
BXH	0.276	-0.130	-0.089	0.270	0.250	1.000							
BXL	0.298	-0.118	-0.100	0.255	0.261	0.650	1.000						
Short-term memory													
BLK12	0.319	-0.137	-0.142	0.294	0.286	0.253	0.305	1.000					
BLK34	0.356	-0.122	-0.038	0.310	0.311	0.288	0.293	0.536	1.000				
BLK56	0.393	-0.100	-0.012	0.312	0.328	0.273	0.324	0.489	0.617	1.000			
SAT													
LANG	0.546	-0.191	-0.154	0.538	0.565	0.327	0.339	0.358	0.376	0.402	1.000		
MATH	0.546	-0.211	-0.153	0.612	0.625	0.299	0.302	0.362	0.367	0.401	0.712	1.000	
READ	0.629	-0.112	-0.101	0.529	0.591	0.310	0.309	0.350	0.384	0.463	0.739	0.722	1.000
Raw *M*	110.14	53.63	52.25	40.18	22.83	68.29	77.76	10.10	10.49	10.50	678.05	696.05	677.13
Raw *SD*	11.87	8.79	7.77	7.14	5.23	20.28	19.12	2.77	3.12	3.49	38.95	51.75	45.13

Note: K–BIT = Kaufman Brief Intelligence Test; Internalizing = Internalizing behavior scores derived from the Child Behavior Checklist (CBCL) Withdrawal (W/D) and Anxiety/Depressed (ANX/DEP) subscales; Classroom performance represents scores derived from the Academic Performance Rating Scale (APRS), Academic Success (AS), and Academic Productivity (AP) subscales; BXL and BXH = correct response scores on the low and high target density versions of the double letter model (BX) of the Continuous Performance Test (CPT); BLK12, BLK34, and BLK56 = sequential blocks of correct responses on the Paired Association Learning (PAL) test. SAT = Stanford Achievement Test MATH, Language (LANG), and Reading (READ) total scores.
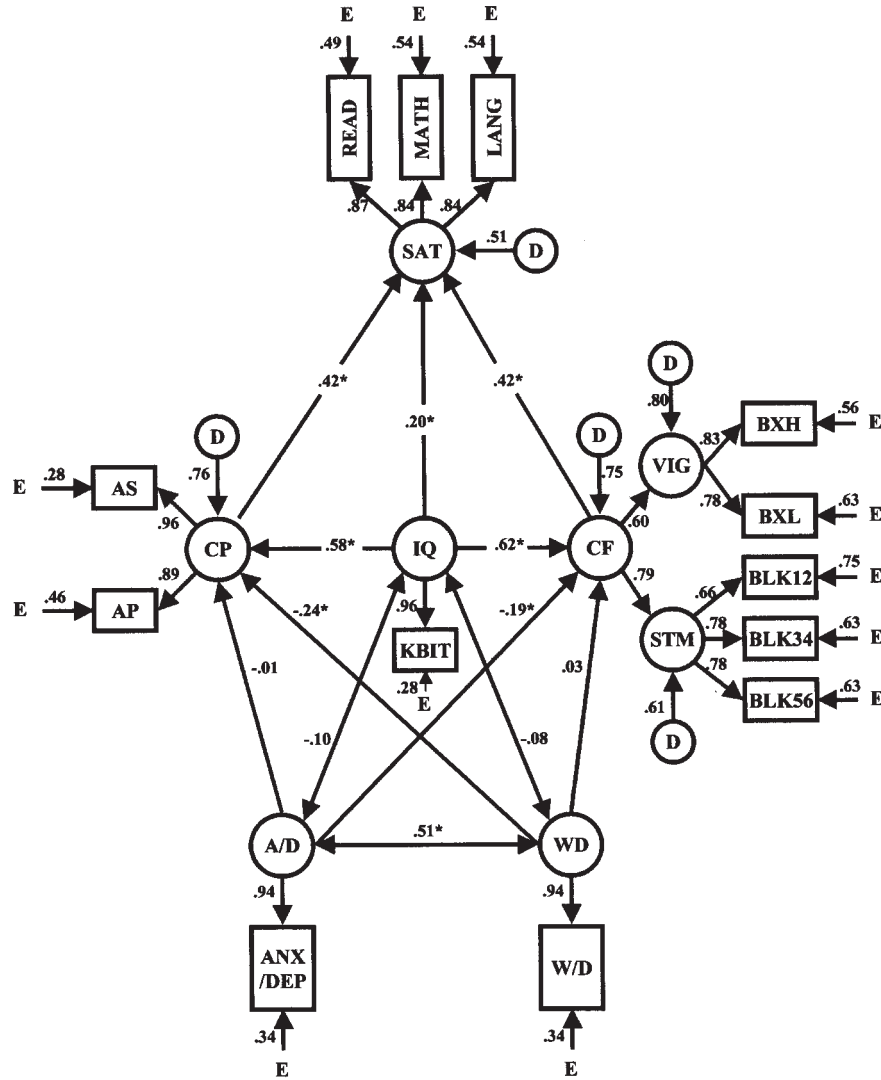
Figure 2. Fitted Dual Pathway Model depicting the relations among internalizing behavior (A/D: anxiety/depression; W/D: withdrawal), intelligence (IQ), and later scholastic achievement (SAT) and the mediating influence of cognitive (CF: cognitive function) and behavioral (CP: classroom performance) variables. Rectangles and ovals represent manifest (measured) and latent variables, respectively. Double-headed arrows represent nondirectional correlations and associated coefficients. Single-headed arrows represent regression pathways and associated standardized coefficients. Single-headed arrows between latent constructs (A/D: anxiety/depression, W/D: withdrawal, SAT: scholastic achievement, CP: classroom performance, CF: cognitive function [includes VIG {vigilance} and STM {short-term memory} as second-order latent variables]) and indicator variables represent confirmatory factor analysis paths and associated factor loadings. E = measurement error. D = disturbance term value and indicates error in the prediction of the latent variable. * = *p* < .05. Measurement of memory was derived using combined two-block trials (BLK12, BLK34, BLK56) from the Paired Associate Learning Task. Measurement of vigilance was derived using the double letter version of the CPT (BX model) administered under low (BXL) and high (BXH) target density conditions. Measurement of classroom performance was derived from two subscales of the Academic Performance Rating Scale (AS = academic success; AP = academic productivity). Measurement of scholastic achievement was derived from three composite indexes of the Stanford Achievement Test (Reading, Math, and Language).

for the two versions). A total of 540 letters were presented during the 9-min continuous testing session in a random sequence. A latent variable labeled *vigilance* (VIG) was derived using percent accuracy scores (i.e., percent hit rate) summed across blocks on the BX low- and high-target density CPTs.

Short-term memory. Paired Associate Learning Tasks (PAL–T) are tests of short- to intermediate-term

memory that are related to classroom learning (Stevenson, 1972). The task requires children to learn arbitrary associations between letter bigrams (e.g., "GJ") and single numerical digits (e.g., "3") in six blocks of five bigram-digit pairs. Bigram-digit stimuli are preprogrammed in a library file and presented on a color monitor. A bigram is presented in the middle of the computer screen with its associate digit below. Children are first required to place an arrow on the digit using a track ball device and then click the trackball's left button. This ensures that children are oriented to stimuli

prior to continuing with the task. Following presentation of five bigram-digit pairs to be learned, a test phase ensues that requires children to correctly identify (using a track ball device) the digit (digits 0 through 9 are shown at the bottom of the screen) that was previously associated with the bigram. Incorrect responses during the test phase are followed by a computer tone and corrective feedback. Bigram-digit pairs are assessed three times in random order during the test phase. Following the test phase, a new block consisting of five bigram-digit associations is presented then tested for recall. The procedure continues until all six blocks of paired associations are presented and assessed for recall. A latent variable labeled "short-term memory" was derived using percent recall-accuracy scores for each of three 2-block combinations (i.e., blocks 1 and 2, 3, and 4, 5 and 6, respectively). A higher order factor termed "cognitive functioning" was defined by the two latent variables representing vigilance and short-term memory.

Scholastic achievement. The SAT (1996) is a national, group-administered test used to assess scholastic achievement across multiple domains in 3rd- to 12th-grade children. It yields total scores on Reading, Math, and Language. Scale scores represent approximately equal units on a continuous scale, using numbers that range from 1 through 999, and are suitable for studying change in performance over time. SAT scores were collected between 3 to 4 years after children were initially tested at the clinic (note that the difference in time frame for collecting SAT data is related to when subsequent testing is conducted by the schools, viz., 3rd, 6th, 9th, 11th, and 12th grades).

SAT scores differ from measures of classroom academic performance (see APRS measure, previously discussed) in several important ways. Classroom performance traditionally refers to children's everyday behavior within a classroom, which entails a variety of behaviors (e.g., motivation, prior learning, concentration) and the completion of assigned academic work (i.e., how well they perform in class). Behaving appropriately and completing assignments accurately and in a timely fashion, however, does not translate directly into improved scholastic achievement (e.g., a child may have poor memory for learning facts or related academic information, and other factors contribute to scholastic achievement such as early schooling, IQ, and parent involvement). Conversely, scholastic achievement as measured by the SAT and similar instruments assess the extent to which children have learned or mastered information and can recall and apply it accurately under standardized test conditions. The two factors are clearly related (share variance) as one would expect. Higher levels of classroom performance account for significant variance in standardized achievement test performance, but other factors also contribute significantly to this measure such as

the ability to pay attention (vigilance) and memory as hypothesized in the dual pathway model. Scores derived from the Reading, Math, and Language scales of the SAT were used to define a latent construct representing long-term scholastic achievement.

Clinical Procedures

Each child was seen once per week over a 2-week time period at the Children's Learning Clinic, and classroom teachers completed the CBCL–TRF and APRS during this time frame. Children's intelligence (K–BIT), current level of academic achievement (K–TEA), vigilance (CPT), and ability to learn arbitrary paired associations (PAL–T) were individually assessed by trained graduate students for approximately 1.5 hr during each of the two clinic visits. Ordering of testing was counterbalanced across the two assessment days. Breaks (5 min) were scheduled between tests to minimize fatigue.

Prior to formal testing, children were required to (a) identify letters of the alphabet to ensure letter recognition and (b) participate in 1-min practice sessions on the CPT and PAL–T. Children were seated such that the computer monitor was approximately 0.5 m from the child with the center of the screen at eye level. An experimenter was present throughout all testing, situated approximately 3 m behind the child during administration of the CPT and PAL–T.

In summary, all teacher ratings and clinical assessment were collected at a single point in time, whereas SAT scores were obtained at 3- to 4-year follow-up.

Statistical Procedures

Control of confounds. Two potentially confounding factors measured concomitantly with internalizing behaviors were considered in the models to control for the associations between early internalizing behavior and later academic outcomes. The socioeconomic status (SES) of each child's family was computed using the Duncan Index (Duncan, 1961). The relations among SES and the various independent and dependent variables were found to be low, and SES made no significant difference in the degree of fit for any of the models tested. Consequently, it was excluded from further analyses.

Age at initial testing was moderately correlated with several variables incorporated into the model. Preliminary analyses failed to suggest any substantial interactions involving age. Consequently, age was residualized from the indicator variables for purposes of simplifying analysis of those more centrally related

to the dual pathway hypothesis. All scores were then subjected to normalization (i.e., scores were ranked and then assigned the standard scores associated with that rank in a normal distribution). This procedure was implemented to place all instruments on a common scale such that unstandardized path coefficients could be directly compared and tested for statistical differences without confounding by differences in units of measurement.

Derivation of measurement model. The measurement component of a structural equation model re-

fers to the relations among specific sets of indicator variables and the latent constructs they are presumed to represent. Six latent constructs (i.e., intelligence, withdrawal, anxiety/depression, classroom performance, cognitive function, and scholastic achievement) are incorporated into the model (see Figures 1, 2, and 3). Latent variables were scaled by fixing the raw regression coefficient of one indicator variable to the value of 1.0. This procedure equates the units of a latent variable to those of the indicator variable whose raw regression weight is fixed (Kline, 1998). Once these unstandardized loadings are fixed, the total and error variance as-
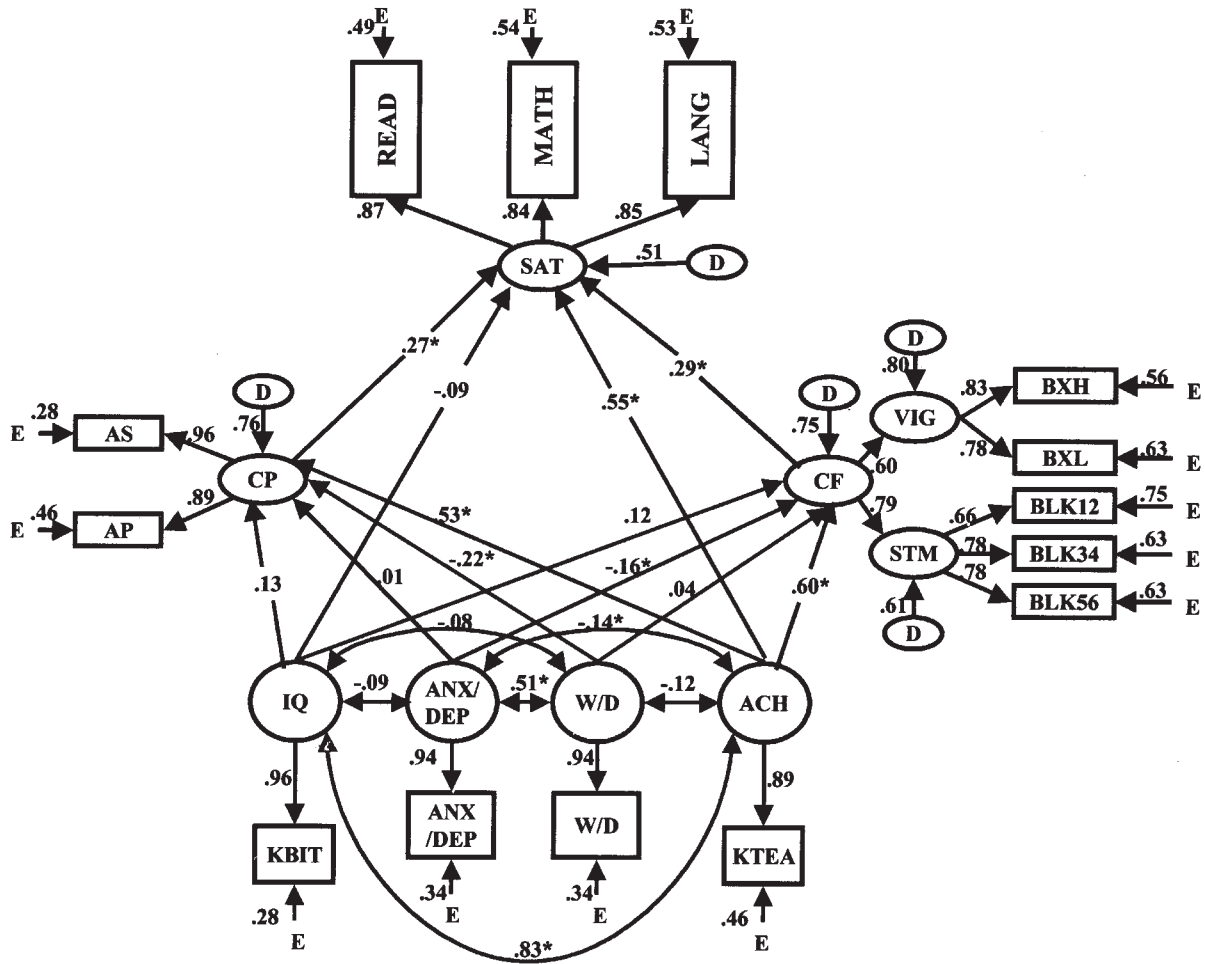

Figure 3. Fitted expanded Dual Pathway Model depicting the relations among internalizing behavior (A/D: anxiety/depression; W/D: withdrawal), intelligence (IQ), early academic achievement (Ach), later scholastic achievement (SAT), and the mediating influence of cognitive (CF: cognitive function) and behavioral (CP: classroom performance) variables to determine whether individual differences in early academic achievement significantly alters the model. Rectangles and ovals represent manifest (measured) and latent variables, respectively. Double-headed arrows represent nondirectional correlations and associated coefficients. Single-headed arrows represent regression pathways and associated standardized coefficients. Single-headed arrows between latent constructs (A/D: anxiety/depression; W/D: withdrawal; SAT: scholastic achievement; Ach: early academic achievement; CP: classroom performance; CF: cognitive function [includes VIG {vigilance} and STM {short-term memory} as second-order latent variables]) and indicator variables represent confirmatory factor analysis paths and associated factor loadings. E = measurement error. D = disturbance term value and indicates error in the prediction of the latent variable. * = *p* < .05. Measurement of memory was derived using combined two-block trials (BLK12, BLK34, BLK56) from the Paired Associate Learning Task. Measurement of vigilance was derived using the double letter version of the CPT (BX model) administered under low (BXL) and high (BXH) target density conditions. Measurement of classroom performance was derived from two subscales of the Academic Performance Rating Scale (AS = academic success; AP = academic productivity). Measurement of scholastic achievement was derived from three composite indices of the SAT (Reading, Math, and Language).

sociated with each indicator can be estimated. A standardized loading is then derived for each indicator by dividing the estimated error variance by total variance and subtracting the result from unity. The resulting coefficients represent the reliability of each indicator as a measure of its underlying latent construct (Kline, 1998).

Structural model testing. The structural component of the model in Figure 1 refers to the relations among latent variables. These are quantified on the basis of path coefficients represented by the letters *a* through *h* in the figure. Raw path coefficients reflect the score difference on a dependent variable associated with a one-unit difference in the predictor variable from which the path originates. Path coefficients can also be expressed in standardized form, in which case the path coefficient represents the difference on a dependent variable measured in standard deviation units associated with a one standard deviation difference on the predictor.

The hypotheses under scrutiny in this investigation were examined by imposing a hierarchical sequence of constraints on the values of the raw path coefficients in the model and assessing the impact of these constraints on the degree of model fit. The models tested and the hypotheses they reflect are outlined in Table 2. The first model (IQ Model) suggests that individual differences in classroom performance, cognitive functioning, and academic achievement are solely dependent on variations in measured intelligence (i.e., their correlations reflect their joint dependence on IQ). In addition, this model posits that the anxiety/depression and withdrawal scales of the CBCL represent parallel indexes of

a single homogeneous construct (i.e., the loading of each indicator may be less than unity but the correlation between the latent anxiety/depression and withdrawal constructs is 1.0).

The Separable Correlates Model (see Table 2) is identical to the IQ Model with one exception. It imposes no constraint on the relation between anxiety/depression and withdrawal and thus permits assessment of whether these measures should be combined into a single latent construct or viewed as separate but correlated entities. Thus, substantial departure of the correlation between these latent variables from 1.0 suggests they are best conceptualized as separate but related domains.

The IQ-Mediated Model further relaxes the constraints represented in the Separable Correlates Model. Specifically, whereas intelligence is still viewed as a predictor of classroom performance, cognitive functioning, and achievement, classroom performance and cognitive functioning are viewed as predictors of long-term scholastic achievement over and above the influence of IQ. Thus, this model implies that classroom performance and cognitive function mediate the impact of IQ on long-term scholastic achievement but are not reducible to the effects of intelligence.

The Parallel Pathway Model proposes that the two internalizing dimensions contribute to classroom performance and cognitive functioning over and above the influence of intelligence. It imposes an assumption, however, concerning the relative contributions of anxiety/depression and withdrawal. Specifically, it posits that variations in classroom performance are related equally to anxiety/depression and withdrawal. Similarly, it suggests that individual differences in cognitive functioning are related equally to variations in anxiety/

Table 2. *Hypotheses Tested Through Evaluation of Nested Models*

Model	Hypothesis	Constraints
1. IQ Model	Relationships among CP, CF, and SAT are due solely to their joint dependence on individual differences in IQ; AD and WD are parallel indexes of a single construct that is correlated with IQ.	A = 1.0; B = C = D = E = F = G = 0
2. Separable Correlates Model	Identical to the IQ Model except that AD and WD are viewed as separate but related correlates of intelligence.	A is freely estimated; B = C = D = E = F = G = 0
3. IQ Mediated Model	Identical to the Separable Correlates Model except that CP and CF are viewed as making unique contributions to prediction of SAT scores over and above the influence of IQ.	A is freely estimated; F and G are freely estimated; B = C = D = E = 0
4. Parallel Pathway Model	Identical to the IQ Mediated Model except that AD and WD are viewed as contributing to prediction of CP and CF over and above the influence of intelligence. The influence of AD on CP is presumed to be equal to the effect of WD on CP. The influence of AD on CF is presumed equal to the effect of WD on CF.	A is freely estimated; F and G are freely estimated; B = D; C = E
5. Dual Pathway Model	Identical to the Parallel Mediator Model except that AD and WD are not constrained to bear equal influence on any specific variable.	Paths A through G are all freely estimated

Note: CP = classroom performance; CF = cognitive functioning; SAT = Stanford Achievement Test; IQ = intelligence quotient derived from the Kaufman Brief Intelligence Test (K–BIT); AD = Child Behavior Checklist (CBCL) anxiety/depression scale scores; WD = CBCL withdrawal scale scores; A, B, C, D, E, F, and G = path coefficients from Figure 1.

depression and withdrawal. This pattern of constraints was chosen as a further test of parallelism between anxiety and withdrawal as measures of a single construct. Specifically, to the extent that these measures operate as similar indexes of a single dimension, then each should demonstrate the same predictive precision as the other with respect to single outcome variables. Conversely, to the extent that withdrawal and anxiety/depression represent separable (i.e., nonparallel) but correlated domains, then they should demonstrate different patterns of relation to endogenous variables.

Finally, the Dual Pathway Model relaxes the assumptions embodied in the Parallel Pathway view. It imposes no restrictions on the contributions of either internalizing dimension to prediction of any endogenous variable. Thus, it suggests that classroom performance and cognitive functioning mediate the impact of internalizing characteristics on long-term academic achievement without requiring that this mediation assume any specific pattern. Specific details regarding its assumptions and structure are outlined in the following.

1. Anxiety/depression, withdrawal, and intelligence are latent, correlated, exogenous, or independent variables.
2. Anxiety/depression and withdrawal behavior problems are related to later scholastic achievement by means of two corresponding pathways—one behavioral (classroom performance) and the other cognitive (vigilance and memory) after controlling for individual differences in IQ.

IQ is expected to exert direct and indirect effects on later scholastic achievement, the latter by means of influencing classroom behavior and cognitive function after controlling for scores on the two clinical syndromes.

It is critical to note that detailed analysis of the relations among internalizing dimensions, classroom performance, cognitive functioning, and later academic achievement are made possible by the sequential evaluation of nested models as outlined previously. The premise that internalizing characteristics contribute to long-term scholastic achievement (SAT) via the mediating influence of classroom performance and cognitive functioning requires a demonstration that they do so uniquely over and above the influence of intelligence.

Quantitative fit indexes. Model fit describes the degree of congruence between patterns of relation implied by a model and those observed among the manifest indicator variables incorporated into it. The nested sequence of models outlined in Table 2 were compared for differences in fit using both absolute and relative indexes of fit chosen on the basis of extensive review of recommendations published in the structural modeling literature (see Bentler, 1992; Kline, 1998; Maruyama, 1998).

Absolute indexes. The Goodness of Fit Index (GFI) indicates the proportion of covariances among observed variables accounted for by model-implied covariances (Kline, 1998). Values range from 0 to 1.0. A value of 1.0 indicates perfect fit. Values >.90 are indicative of adequate fit.

The root mean square error of approximation (RMSEA: Browne & Cudeck, 1993) represents the average difference between correlations expected on the basis of a model's assumptions and those observed among measured variables. This index includes an adjustment for the number of variables incorporated into a model so that parsimony is taken into account. Values falling below 0.10 indicate adequate fit (Kline, 1998). Departure of this index from the desired range can be evaluated for statistical significance (i.e., the magnitude of difference can be evaluated against the range of variation observed under chance conditions).

Incremental indexes. The comparative fit index (CFI; Bentler, 1990) indicates the proportional improvement in the overall fit of a theoretical model relative to a null model in which all the observed variables are assumed to be uncorrelated. An obtained CFI value of .98, for example, indicates that the relative overall fit of the model is 98% better than that of the null model estimated with the same sample data.

The Bentler–Bonnett Nonnormed Fit Index (NNFI) is similar to the CFI but includes an adjustment for model complexity. This adjustment favors parsimonious models over less parsimonious ones.

Ideally, high GFI and low RMSEA values should be observed in conjunction with high CFI and NNFI values. This pattern shows that a proposed model satisfactorily accounts for observed variances and covariances and that the observed variances and covariances are large enough to be meaningful.

Results

Three sets of analyses were employed to evaluate the extent to which classroom performance and cognitive functioning mediate the influence of internalizing features and intelligence on later scholastic achievement. First, the nested series of models outlined in Table 2 was evaluated to assess the plausibility of the Dual Pathway Model. Second, correlations among exogenous variables were examined in conjunction with total and indirect effects to characterize

and illuminate their implications. Finally, an expanded model incorporating initial academic achievement data (i.e., achievement scores collected concurrently with IQ, internalizing, classroom performance, and cognitive functioning measures) was examined to assess its impact on the Dual Pathway hypothesis.

Plausibility of the Dual Pathway Model

Fit indexes and tests of significance for the nested series of models are shown in Table 3. These data reveal that the IQ-Mediated Model yielded an adequate fit to the data, although Parallel Pathway and Dual Pathway models were significantly better. These models were both able to account for 96% of the covariation observed among the manifest variables (see GFI values in Table 3) and yielded average residual correlations of 0.043 and 0.040, respectively, after adjustments for model complexity (see RMSEA values in Table 3). Each represents a 98% improvement over the null model (i.e., model with all variables uncorrelated) and 96% and 97% improvements (see CFI_{IQ} values) over the first nested model (i.e., model assuming all correlations among manifest variables were attributable to joint dependence on IQ scores).

The Dual Pathway Model provided a significantly better fit to the data than the Parallel Pathway Model ($\chi^2_{diff}(2) = 7.36, p < .05$). This suggests that the path coefficient relating anxiety/depression to classroom performance differed from the path coefficient linking withdrawal to classroom performance. Similarly, it indicates differential effects of anxiety/depression and withdrawal on cognitive functioning. This finding was examined more closely by testing whether model fit was degraded by constraining the withdrawal–cognitive functioning and anxiety/depression–classroom performance paths to values of zero. Results indicated no difference in fit ($\chi^2(2) < 1, ns$). Thus, withdrawal did not contribute uniquely to prediction of cognitive functioning after controlling for intelligence and anxiety. Conversely, anxiety did not contribute to the prediction of classroom performance after controlling for intelligence and withdrawal.

The measurement component of all tested models was identical and quite adequate. Reliability coefficients for observed variables linked to first-order factors ranged from .66 (see factor loading for short-term memory blocks 1 and 2 in Figure 2) to .96 (see factor loading for classroom performance, academic success subscale), indicating high internal consistency among the subscales used to define latent constructs.

Collectively, the hierarchical analyses of models as well as the psychometric results associated with the Dual Pathway Model indicate that it provides a satisfactory statistical account of the relations observed among the measured variables. Variations on endogenous variables were generally well explained by the model. Squared multiple correlations ranged from 0.44 and 0.42 for cognitive function and classroom performance to 0.74 for the SAT variable (disturbance term "D" associated with cognitive function, classroom performance, and scholastic achievement squared and subtracted from 1.0).

Correlations Among Exogenous Variables

Correlations between anxiety/depression and withdrawal with intelligence were small in magnitude and failed to reach statistical significance ($r = –0.10, ns; r = –0.08, ns$, respectively). As expected, these variables were correlated with each other ($r = 0.51, p < .001$), although the value departed substantially from unity (95% confidence interval = 0.416 to 0.60). This argues against viewing the withdrawal and anxiety/depression scales as parallel measures of a single domain and instead implies that they are separate albeit correlated constructs.

Standardized Total and Indirect Effects

Total and indirect effects of exogenous variables incorporated into the Dual Pathway Model are shown in Table 4 and reveal several patterns of interest. First, the total effect of children's IQ on SAT scores was quite

Table 3. *Goodness of Fit for Nested Models*

Model	GFI	RMSEA	CFI	NNFI	*df*	χ^2diff	CFI_{IQ}
IQ Model	0.54	0.220***	0.56	0.43	7	905.43***	—
Separable Correlates Model	0.90	0.086***	0.93	0.91	6	123.64***	0.84
IQ Mediated Model	0.95	0.054 *ns*	0.97	0.97	4	30.48***	0.94
Parallel Pathway Model	0.96	0.043 *ns*	0.98	0.98	2	7.36*	0.96
Dual Pathway Model	0.96	0.040 *ns*	0.98	0.98	2	—	0.97

Note: GFI = Goodness of Fit Index; RMSEA = root mean square error of approximation; CFI = comparative fit index; NNFI = Nonnormed Fit Index; χ^2_{diff} = test of degradation in fit relative to the Dual Pathway Model; CFI_{IQ} = proportional improvement in fit relative to the IQ Model. *p < .05. ***p < .001.

Table 4. *Decomposition of Standardized Direct and Indirect Effects for a Dual Pathway Model of Internalizing Behavior Problems*

	Endogenous (Dependent) Variables		
Causal (Independent) Variables	**Classroom Performance (CP)**	**Cognitive Functioning (CF)**	**Scholastic Achievement (SAT)**
Intelligence (IQ)			
Direct effect	.58**	.62**	.20**
Indirect effect via CP	—	—	.24**
Indirect effect via CF	—	—	.26**
Total effect	.58**	.62**	.70**
Withdrawal			
Direct effect	–.24**	.03	.002
Indirect effect via CP	—	—	.10**
Indirect effect via CF	—	—	.01
Total effect	–.24**	.03	–.088
Anxiety/depression			
Direct effect	–.01	–.19**	—
Indirect effect via CP	—	—	–.006
Indirect effect via CF	—	—	–.08*
Total effect	–.01	–.19**	–.086

Note: Standardized direct effects represent the difference on a dependent variable measured in standard deviation units associated with one standard deviation difference on the predictor variable (e.g., a standard deviation unit difference in intelligence is associated with a .20 standard deviation difference in children's long-term scholastic achievement). Indirect effects are interpreted using the same metrics but encompass greater than two variables (e.g., the indirect effects of withdrawal on scholastic achievement are measured through two corresponding pathways involving classroom performance and cognitive function, and estimated by multiplying the coefficients along each pathway).
*p < .05. **p < .01. No asterisk indicates nonsignificance.

substantial (total effect = 0.70, $p < .01$). This indicates that children differing by a standard deviation on measured intelligence differed, on average, by 0.70 standard deviations in later academic achievement. The bulk of this effect, however, was attributable to the indirect impact of intelligence mediated by classroom performance and cognitive functioning (combined [.24, .26] total indirect effect = 0.50, $p < .01$, Table 4). In contrast, anxiety/depression and withdrawal both exerted small, nonsignificant total indirect effects on later achievement (–0.086 and –0.088, both *ns*). These total indirect effects mask the differential mediation of withdrawal and anxiety/depression by classroom performance and cognitive functioning. Specifically, the total indirect effect of anxiety/depression on later achievement was comprised of a small but statistically significant, negative effect mediated by cognitive functioning and a very small, statistically insignificant positive effect mediated by classroom performance. Conversely, the total indirect effect of withdrawal on later achievement reflects a small but significant negative effect mediated by classroom performance (.10, $p < .01$) and a very small, insignificant, positive effect moderated by cognitive functioning. Thus, small indirect effects in one direction countered somewhat larger indirect effects in the other, rendering the total indirect effect statistically nonsignificant.

It could be argued that all of the indirect effects in question were small in magnitude and therefore none should be given any more interpretive weight than any other. The nested model sequence outlined previously, however, suggests that withdrawal is uniquely related to classroom performance but not to cognitive function-

ing, whereas anxiety/depression makes a unique contribution to prediction of cognitive functioning but not classroom performance. This inference is further supported by the observation that model fit was virtually unchanged when these paths were constrained to values of zero and that the direct effects of anxiety/depression and withdrawal on later scholastic achievement were not significant.

Collectively, model comparisons and analyses of indirect effects suggest that (a) features of anxiety and depression are correlated with but separable from behavioral withdrawal and (b) these domains of children's functioning are differentially related to academic functioning and performance on cognitive tests. Because the latter two domains are both positively related to later academic achievement, the consequences of internalizing problems for achievement are likely to be determined by combinations of anxious/depressed and withdrawn features rather than either dimension alone.

The Role of Early Achievement: An Alternative Model

It is plausible to argue that parameters associated with the Dual Pathway Model might be substantially changed by inclusion of individual differences in academic achievement at the time of initial testing. Composite scores derived from a standardized academic achievement test (K–TEA) administered at the time of the initial clinical assessment were used owing to the unavailability of initial SAT scores. The Dual Pathway

Model was thus expanded to include this variable as shown in Figure 3. The latent construct representing variation in early achievement was derived using the same procedure as was applied to the composite intelligence test score (see Method section). The model fit the data well (GFI = .96, RMSEA = .032, CFI = .99, NNFI = .99). The inclusion of early achievement did not alter the general pattern of relations among internalizing characteristics, mediating variables, and long-term achievement. A set of nested comparisons paralleling those described previously yielded the same results. Specifically, anxiety/depression and withdrawal contributed to prediction of classroom performance and cognitive functioning over and above the effects of intelligence and early achievement. In addition, withdrawal remained related to classroom performance after control for its correlations with intelligence, early achievement, and anxiety/depression without contributing uniquely to prediction of cognitive functioning. Conversely, anxiety/depression predicted cognitive functioning after accounting for its correlations with intelligence, early achievement, and withdrawal but bore no unique relation to classroom performance.

Incorporation of early achievement into the model did have two important effects. Early achievement was highly correlated with intelligence ($r = 0.83$, $p < .01$), and its inclusion substantially attenuated the direct and indirect effects of intelligence on later academic achievement. In addition, the direct effects of classroom performance and cognitive functioning were attenuated. Collectively, these observations suggest that the relations among intelligence and other variables in the Dual Pathway Model largely reflect its overlap with early achievement.

Discussion

In this investigation, we assess the hypothesis that dual developmental pathways mediate the relation between internalizing behavior problems and later scholastic achievement. Hierarchical tests applied to a nested series of models demonstrated that (a) individual differences in measured intelligence among children are associated with variations in classroom performance and cognitive functioning, (b) classroom performance and cognitive functioning make unique contributions to prediction of later achievement over and above the influence of intelligence, (c) anxious and depressive features as measured by the CBCL–TRF are correlated but separable constructs, and (d) anxiety/depression and withdrawal contribute to prediction of classroom performance and cognitive functioning over and above the effects of intelligence. Thus, classroom performance and cognitive functioning appear to mediate the effects of internalizing behaviors as well as intelligence. Although no direct effects linking

internalizing features to later academic achievement were incorporated into the model, their exclusion is equivalent to assigning a value of zero to such a path. The observation that the model as shown accounts very well for the observed data indicates that inclusion of such a direct effect is unnecessary. This suggests that the effects of anxiety and withdrawal on concurrently measured academic behavior and cognitive processing mediate any relation between internalizing features and later achievement.

The small direct but strong indirect effect of intelligence on later scholastic achievement is consistent with the growing literature describing linkages among these variables (Kusche et al., 1993). The attenuation of intelligence effects brought about by controlling for individual differences in early achievement, however, suggests that these domains may be conceptually but not empirically separable.

The consistent finding that withdrawal and anxiety/depression were differentially related to classroom performance and cognitive functioning raises the question of whether effects of anxiety are more deleterious than those of withdrawal or visa versa. The answer to the question appears to depend on the domain in which effects are assessed. A few examples serve to illuminate the issue. Consider a pair of children differing in withdrawal but not anxiety. The relations indicated by the Dual Pathway Model suggest that the more withdrawn child will likely show greater impairment in classroom functioning than the other, without exhibiting commensurate difficulty on focused measures of concentration and memorization. In contrast, of two children varying widely in anxiety without concomitant differences in withdrawal, the more anxious child is likely to experience greater impairment on cognitive tests than on typical classroom tasks. Neither the withdrawn nor the anxious child in these two scenarios, however, is likely to experience any greater impairment in later academic achievement than the other. In contrast, a child showing significant levels of anxiety combined with withdrawal is likely to experience difficulties with both classroom tasks and cognitive tests and consequently would be expected to perform more poorly on later measures of achievement than a child exhibiting withdrawal without anxiety or anxious/depressive features without withdrawal.

The foregoing findings are consistent with those reported in several previous investigations. For example, Kohn and Rosman (1972) found that preschoolers rated by teachers as high on apathy–withdrawal (versus interest–participation) received lower academic ratings in the first and second grade. In a similar vein, Green, Forehand, Beck, and Vosk (1980) found that teacher ratings of social withdrawal correlated negatively with scores on standardized achievement tests. And high school students rated in the top 10% on withdrawal had much higher rates of school failure than average and

were more likely to drop out of school prior to graduation (Havighurst, Bowman, Liddle, Matthews, & Pierce, 1962). Finally, a recent study used structural equation modeling to examine the relation between anxious–withdrawn behavior problems and later school achievement (based on grades) in 291 children followed from kindergarten to first grade (Normandeau & Guay, 1998). The results revealed a direct link between anxious–withdrawn behavior problems and later school achievement (based on grades) but accounted for only 10% of the variance in school achievement. The absence of cognitive and classroom performance variables as mediators may have contributed to the relatively large proportion of unexplained variance in the model. Other studies have reported contradictory findings. Ludwig and Lazarus (1983) found no differences between shy and nonshy fourth and fifth graders on measures of academic achievement and grade point average. In a similar vein, Ledingham and Schwartzman (1984) followed 600 children that had previously been identified by peer ratings as either withdrawn, aggressive, withdrawn and aggressive, or experiencing no problems and reported no differences between withdrawn children and no-problem controls in terms of academic adjustment. Children in the combined withdrawn and aggressive group, however, were more likely to have failed a grade or be placed in a special education classroom. Differences in samples (withdrawn vs. shy children) and methodology (teacher ratings vs. peer nominations) may be responsible for the discrepant results among studies.

Although causality cannot be unequivocally demonstrated by structural equation modeling procedures, the strength and patterning of associations, sound fit of the Dual Pathway Model, and causal hypotheses gleaned from previous experimental research provide strong support for the mediating role of classroom performance in explaining the relation between internalizing behavior problems and later scholastic achievement in children. Although the influence of anxious features was more difficult to discern in this investigation, effect magnitudes suggest that such characteristics may place children at risk for difficulty with tests of focused cognitive skills.

The developmental trajectory of children with internalizing behavior problems has been reasonably well established by long-term outcome studies (for a review, see Kovacs & Devlin, 1998). Information concerning the range and specific types of classroom and cognitive difficulties associated with internalizing behavior problems and the means by which they mediate long-term outcome and particularly scholastic achievement, however, remain poorly understood. Particular attention to the presence and potential impact of social withdrawal on children's functioning, both alone and concomitant with anxiety/depression, appears warranted during the course of clinical evaluations owing to the strong continuities among these variables. Children evidencing social withdrawal at school are likely to experience a wide range of difficulties within the classroom owing to their reduced participation. The manner in which these difficulties impair later scholastic achievement awaits empirical study.

The purpose of this study was to identify developmental sequences that may arise from the correlated effects of internalizing behavior problems and intelligence on later scholastic achievement by means of their impact on classroom behavior and select facets of cognitive function. In considering this goal, several caveats are in order. Our study involved a nonclinical, ethnically diverse sample of children residing in Hawaii that varied widely in age, was limited to a 4-year follow-up period of evaluation, and relied exclusively on teacher ratings for identifying internalizing behavior problems and classroom performance (i.e., potential shared method variance). The individual differences in age raise the possibility that the patterns of relation among the observed variables might vary across age groups. Sample size precluded a detailed analysis of this possibility. Nevertheless, the possibility of an interaction between age and the structure of the hypothesized pathways cannot be ruled out and awaits more definitive study.

In general, our results were consistent with those of previous studies examining the developmental progression of early externalizing behavior problems, IQ, and later scholastic achievement and provide a strong fit between the hypothesized model and data while controlling for measurement error. It is important to point out, however, that structural equation modeling (like analyses of variance or regression) cannot be used to specifically test directional hypotheses. Directional associations are distinguished from nondirectional relations either by logic (e.g., SES cannot cause biological gender), theory, or, most persuasively, research design. Thus, the strength of our hypothesized model rests on past research findings that have established relatively clear relations among the proposed variables and constructs but leave open the possibility that alternative models may also account for the observed relations.

References

Achenbach, T. M. (1990). Conceptualization of developmental psychopathology. In M. Lewis & S. M. Miller (Eds.), *Handbook of developmental psychopathology* (pp. 3–14). New York: Plenum.

Achenbach, T. M. (1991). *Manual for the Child Behavior Checklist / 4–18 and 1991 Profile.* Burlington: University of Vermont, Department of Psychiatry.

Achenbach, T. M., & Edelbrock, C. (1989). Diagnostic, taxonomic, and assessment issues. In T. M. Ollendick & M. Hersen (Eds.), *Handbook of child psychopathology* (pp. 53–69). New York: Plenum.

Achenbach, T. M., & Howell, C. T. (1993). Are American children's problems getting worse? A 13-year comparison. *Journal of Consulting and Clinical Psychology, 61,* 839–848.

Achenbach, T. M., Howell, C. T., McConaughy, S. H., & Stanger, C. (1995). Six-year predictors of problems in a national sample: III. Transitions to young adult syndromes. *Journal of the American Academy of Child and Adolescent Psychiatry, 34,* 658–669.

Bentler, P. M. (1990). Fit indexes, Lagrange multipliers, constraint changes and incomplete data in structural models. *Multivariate Behavioral Research, 25,* 163–172.

Bentler, P. M. (1992). *EQS structural equations program manual.* Los Angeles: BMDP Statistical Software.

Bernstein, G. A., Borchardt, C. M., & Perwien, A. R. (1996). Anxiety disorders in children and adolescents: A review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 35,* 1110–1119.

Brady, E. U., & Kendall, P. C. (1992). Comorbidity of anxiety and depression in children and adolescents. *Psychological Bulletin, 111,* 244–255.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Brumback, R. A., Dietz-Schmidt, S. G., & Weinberg, W. A. (1977). Depression in children referred to an educational diagnostic center: Diagnosis and treatment and analysis of criteria and literature review. *Diseases of the Nervous System, 38,* 529–535.

Chung, K. M., Denney, C. B., & Rapport, M. D. (2000).*The continuous performance test: A review, synthesis, meta-analysis, and structural equation model of children's vigilance.* Unpublished manuscript.

Deater-Deckard, K., Reiss, D. Hetherington, M., & Plomin, R. (1997). Dimensions and disorders and adolescent adjustment: A quantitative genetic analysis of unselected samples and selected extremes. *Journal of Child Psychology and Psychiatry, 38,* 515–525.

Duncan, O. D. (1961). A socioeconomic index for all occupations. In A. J. Reiss (Ed.), *Occupations and social strata* (pp. 109–138). New York: Free Press of Glenco.

DuPaul, G. J., Rapport, M. D., & Perriello, L. M. (1991). Teacher ratings of academic skills: The development of the Academic Performance Rating Scale. *School Psychology Review, 20,* 284–300.

Edelsohn, G., Ialongo, N., Werthamer-Larsson, L., Crockett, L., & Kellam, S. (1992). Self-reported depressive symptoms in first-grade children: Developmentally transient phenomena? *Journal of the American Academy of Child and Adolescent Psychiatry, 31,* 282–290.

Fleming, J. E., & Offord, D. R. (1990). Epidemiology of childhood depressive disorders: A critical review. *Journal of the American Academy of Child and Adolescent Psychiatry, 29,* 571–580.

Green, K. D., Forehand, R., Beck, S. J., & Vosk, B. (1980). An assessment of the relationship among measures of children's social competence and children's academic achievement. *Child Development, 51,* 1149–1156.

Grossberg, I. N., & Cornell, D. G. (1988). Relationship between personality adjustment and high intelligence: Terman versus Hollingworth. *Exceptional Children, 55,* 266–272.

Hartlage, S., Alloy, L. B., Vazquez, C., & Dykman, B. (1993). Automatic and effortful processing in depression. *Psychological Bulletin, 113,* 247–278.

Havighurst, R. J., Bowman, P. H., Liddle, G. P., Matthews, C. V., & Pierce, J. V. (1962).*Growing up in River City.* New York: Wiley.

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Educational Research, 58,* 47–77.

Hodges, K., & Plow, J. (1990). Intellectual ability and achievement in psychiatrically hospitalized children with conduct, anxiety, and affective disorders. *Journal of Consulting and Clinical Psychology, 58,* 589–595.

Horn, J. L., & Cattell, R. B. (1966). Refinement and test of the theory of fluid and crystallized general intelligences. *Journal of Educational Psychology, 57,* 253–270.

Ialongo, N., Edelsohn, G., Werthamer-Larsson, L., Crockett, L., & Kellam, S. (1995). The significance of self-reported anxious symptoms in first grade children: Prediction to anxious symptoms and adaptive functioning in fifth grade. *Journal of Child Psychology and Psychiatry, 36,* 427–437.

Kaslow, N. J., Rehm, L. P., & Siegel, A. W. (1984). Social–cognitive and cognitive correlates of depression in children. *Journal of Abnormal Child Psychology, 12,* 605–620.

Kaufman, A. S., & Kaufman, N. L. (1990).*Manual for the Kaufman Brief Intelligence Test (K–BIT).* Circle Pines, MN: American Guidance Service.

Kaufman, A. S., & Kaufman, N. L. (1998).*Manual for the Kaufman Test of Educational Achievement (KTEA).* Circle Pines, MN: American Guidance Service.

Kline, R. B. (1998). *Principles and practice of structural equation modeling.* New York: Guildford.

Kohn, M., & Rosman, B. L. (1972). Relationship of preschool social–emotional functioning to later intellectual achievement. *Developmental Psychology, 6,* 445–452.

Kovacs, M., & Bastiaens, L. J. (1995). The psychotherapeutic management of major depressive and dysthymic disorders in childhood and adolescence: Issues and prospects. In I. M. Goodyer (Ed.), *The depressed child and adolescent: Developmental and clinical perspectives* (pp. 281–310). New York: Cambridge University Press.

Kovacs, M., & Devlin, B. (1998). Internalizing disorders in childhood. *Journal of Child Psychology and Psychiatry, 39,* 47–63.

Kovacs, M., & Goldston, D. (1991). Cognitive and social cognitive development of depressed children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 30,* 388–392.

Kupietz, S. S., & Richardson, E. (1978). Children's vigilance performance and inattentiveness in the classroom. *Journal of Child Psychology and Psychiatry, 19,* 145–154.

Kusche, C. A., Cook, E. T., & Greenberg, M. T. (1993). Neuropsychological and cognitive functioning in children with anxiety, externalizing, and comorbid psychopathology. *Journal of Clinical Child Psychology, 22,* 172–195.

Ledingham, J. E., & Schwartzman, A. E. (1984). A 3-year follow-up of aggressive and withdrawn behavior in childhood: Preliminary findings. *Journal of Abnormal Child Psychology, 12,* 157–169.

Ludwig, R. P., & Lazarus, P. J. (1983). Relationship between shyness in children and constricted cognitive control as measured by the Stroop Color–Word Test. *Journal of Consulting and Clinical Psychology, 51,* 386–389.

Maruyama, G. M. (1998).*Basics of structural equation modeling.* Thousand Oaks, CA: Sage.

Normandeau, S., & Guay, F. (1998). Preschool behavior and first-grade school achievement: The mediational role of cognitive self-control. *Journal of Educational Psychology, 90,* 111–121.

Ollendick, T. H., Weist, M. D., Borden, C., & Greene, R. W. (1992). Sociometric status and academic, behavioral, and psychological adjustment: A five-year longitudinal study. *Journal of Consulting and Clinical Psychology, 60,* 80–87.

Rubin, K. H., Daniels-Beirness, T., & Bream, L. (1984). Social isolation and social problem solving: A longitudinal study. *Journal of Consulting and Clinical Psychology, 52,* 17–25.

Roy-Byrne, P. P., Weingartner, H., Bierer, L. M., Thompson, K., & Post, R. M. (1986). Effortful and automatic cognitive processes in depression. *Archives of General Psychiatry, 43,* 265–267.

Sattler, J. M. (1989). Review of the Kaufman Test of Educational Achievement. In J. C. Conoley & J. J. Kramer (Eds.), *Tenth mental measurements yearbook* (pp. 412–413). Lincoln, NE: Buros Institute of Mental Measurements.

550

Sonuga-Barke, E. J. S. (1998). Categorical models of childhood disorder: A conceptual and empirical analysis. *Journal of Child Psychology and Psychiatry, 39,* 115–133.

Stanford Achievement Test. (8th ed.). (1996). San Antonio, TX: Harcourt Brace Jovanovich.

State of Hawaii Data Book 1996; A statistical abstract. (1996). Honolulu: Department of Business, Economic Development, and Tourism, State of Hawaii.

Stevenson, H. W. (1972).*Children's learning.* New York: Appleton-Century-Crofts.

U.S. Bureau of the Census. (1990). *1990 Census of population characteristics: Hawaii. 1990CP–1–13* (June 1992). Washington, DC: Author.

Verhulst, F. C., Eussen, M. L., Berden, G. F., Sanders-Woudstra, J., & Van der Ende, J. (1993). Pathways of problem behaviors from childhood to adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry, 32,* 388–396.

Verhulst, F. C., Koot, H. M., & van der Ende, J. (1994). Differential predictive value of parents' and teachers' reports of children's problem behaviors: A longitudinal study. *Journal of Abnormal Child Psychology, 22,* 531–546.

Zatz, S., & Chassin, L. (1983). Cognitions of test-anxious children. *Journal of Consulting and Clinical Psychology, 51,* 526–534.

Zoccolillo, M. (1992). Co-occurrence of conduct disorder and its adult outcomes with depressive and anxiety disorders: A review. *Journal of the American Academy of Child and Adolescent Psychiatry, 31,* 547–556.