

# Developmental Cascades: Linking Academic Achievement and Externalizing and Internalizing Symptoms Over 20 Years

Ann S. Masten  
University of Minnesota, Twin Cities

Glenn I. Roisman  
University of Illinois at Urbana–Champaign

Jeffrey D. Long, Keith B. Burt, Jelena Obradović, Jennifer R. Riley,  
Kristen Boelcke-Stennes, and Auke Tellegen  
University of Minnesota, Twin Cities

A developmental cascade model linking competence and symptoms was tested in a study of a normative, urban school sample of 205 children (initially 8 to 12 years old). Internalizing and externalizing symptoms and academic competence were assessed by multiple methods at the study outset and after 7, 10, and 20 years. A series of nested cascade models was tested through structural equation modeling. The final model indicated 2 hypothesized cascade effects: Externalizing problems evident in childhood appeared to undermine academic competence by adolescence, which subsequently showed a negative effect on internalizing problems in young adulthood. A significant exploratory effect was consistent with internalizing symptoms containing or lowering the net risk for externalizing problems under some conditions. These 3 cascade effects did not differ by gender and were not attributable to effects of IQ, parenting quality, or socioeconomic differences. Implications are discussed for developmental models of cascades, progressions, and preventive interventions.

*Keywords:* competence, cascade, internalizing, externalizing, academic

More than 30 years ago, Kohlberg, LaCrosse, and Ricks (1972) concluded from a comprehensive review of extant research that the best and broadest predictors of adult adjustment from childhood were measures of social and cognitive adaptation that reflected cumulative cognitive development and socialization. In contrast, they noted that emotional problems were neither broad nor robust as predictors of adult adjustment, even though dimensions of emotion and temperament showed stability over time. At the same time, Kohlberg et al. lamented the paucity of longitudinal data in the field. Since this classic article was published, the emergence of developmental psychopathology has underscored the importance of understanding linkages among various forms of competence and symptoms, particularly the transactional and progressive associa-

tions that can be detected only in longitudinal studies (Hinshaw, 2002; Masten, Burt, & Coatsworth, in press; Masten & Curtis, 2000; Rutter & Sroufe, 2000). Nonetheless, there remain surprisingly few longitudinal studies that control for preexisting and ongoing concurrent associations so that models of bidirectional influences and progressive effects from one domain of adaptation to another can be evaluated in a developmental perspective. This study focused on linkages among externalizing behaviors, internalizing symptoms, and academic achievement over multiple assessments spanning 20 years in order to test a cascade model of externalizing behavior and academic achievement in relation to each other and internalizing symptoms over time.

Traditional measures of “competence” and “symptoms” may be linked within and across time for a number of reasons (Hinshaw, 1992; Masten et al., in press; Masten & Curtis, 2000). One set of possibilities is methodological, stemming from overlapping constructs, items, or informants that may produce spurious associations. In addition, there are at least three major substantive reasons why domains of competence and psychopathology may become linked across time:

1. Symptoms undermine adaptive functioning.

Aggressive or disruptive behavior, for example, could interfere with learning in a classroom and alienate peers or teachers.

2. Failures in adaptive functioning contribute to symptoms.

By definition, salient developmental tasks constitute major criteria by which children are judged in society, by others, and by themselves, and failure in these tasks could have many negative con-

---

Ann S. Masten, Keith B. Burt, Jelena Obradović, Jennifer R. Riley, and Kristen Boelcke-Stennes, Institute of Child Development, University of Minnesota, Twin Cities; Glenn I. Roisman, Department of Psychology, University of Illinois at Urbana–Champaign; Jeffrey D. Long, Department of Educational Psychology, University of Minnesota, Twin Cities; Auke Tellegen, Department of Psychology, University of Minnesota, Twin Cities.

This article is based on data collected as part of the Project Competence longitudinal study, which has been supported through grants to Ann S. Masten, Auke Tellegen, and Norman Garmezy from the William T. Grant Foundation, the National Science Foundation (SBR-9729111), the National Institute of Mental Health (R01MH33222), and the University of Minnesota. The authors also express their deep appreciation to the participants for their many contributions to this endeavor over more than 20 years.

Correspondence concerning this article should be addressed to Ann S. Masten, Institute of Child Development, University of Minnesota, Twin Cities, 51 East River Road, Minneapolis, MN 55455. E-mail: amasten@umn.edu

sequences on self-perceptions or judgments of others that lead to increased internalizing or externalizing symptoms over time. We posit that competence in age-salient developmental tasks plays a central role in the long-term risks for development associated with emotional and behavioral problems.

These two substantive ways that competence and symptoms may influence each other could occur simultaneously or in various combinations over time, producing phenomena variously described in developmental psychopathology theory in terms of amplification, snowballing, transactional, cascade, or progressive effects, depending on the nature of the domains and processes presumed to be involved (Cicchetti & Tucker, 1994; Dodge & Pettit, 2003; Hinshaw & Anderson, 1996; Masten & Coatsworth, 1998; Patterson, Reid, & Dishion, 1992; Sameroff, 2000). Such progressions would account for what appear to be spreading or diffusing effects over time, including those long ago noted by Kohlberg et al. (1972) for antisocial behavior.

Although the first two possibilities emphasize the causal connections of competence and symptoms to the exclusion of other factors, it is important to point out a third major possibility. Competence and symptoms could become linked when

3. some other cause contributes to both competence and symptoms,

creating a spurious effect, the illusion of a causal link in either direction that is actually related to unmeasured variables and the causal processes or continuity they represent (Masten et al., in press; Masten & Curtis, 2000).

In terms of cascade effects and continuity, externalizing behavior has shown considerable stability from quite early in childhood, and there are indications of transactional and spreading effects in relation to other domains of adaptation, particularly academic achievement (Dodge & Pettit, 2003; Hinshaw, 1992; Maguin & Loeber, 1996). The evidence available suggests that antisocial behaviors and academic skills are linked even before school begins (Hinshaw & Anderson, 1996). Nonetheless, antisocial behavior appears to undermine academic achievement throughout the school years (Bardone, Moffitt, Caspi, Dickson, & Silva, 1996; Chen, Rubin, & Li, 1997; Hawkins et al., 2003; Masten et al., 1995; Risi, Gerhardstein, & Kistner, 2003; Williams & McGee, 1994). The evidence is not as clear in the other direction, particularly during the early school years. However, by secondary school, academic failure does appear to contribute to worsening antisocial symptoms, perhaps as a result of disaffection from normative schoolmates and activities and association with deviant peers (e.g., Deater-Deckard, 2001; Dishion, Patterson, Stoolmiller, & Skinner, 1991; Patterson, Forgatch, Yoerger, & Stoolmiller, 1998; Williams & McGee, 1994). Conversely, it has also been noted in the developmental literature that higher levels of academic performance are associated with desistance from law-breaking behavior (Maguin & Loeber, 1996; Thornberry, Lizotte, Krohn, Smith, & Porter, 2003). Elder and Conger (2000), in summarizing conclusions from their comprehensive study of Iowa farm families, noted the salience of academic success in "minimizing problem behavior of all kinds" (p. 215), particularly antisocial and risk-taking behavior. Moreover, preventive interventions that boost competence at school have shown corresponding reductions in the risk for developing problem behaviors (e.g., Hawkins, Catalano, Kosterman, Abbot, & Hill, 1999), though it is

not clear whether such interventions work by reducing the corrosive effects of externalizing behavior on classroom success or by improving academic skills.

Evidence linking internalizing symptoms to academic achievement over time is sparser and less consistent by comparison, although internalizing symptoms have shown more stability and predictive validity than Kohlberg et al. (1972) and other early reviewers anticipated. Anxiety, depression, and general internalizing symptoms have predictive significance for a spectrum of emotional disorders and problems and also have shown signs of reciprocal linkages over time with peer social adjustment (Farrington & Clark, 1998; Lewinsohn, Rohde, Klein, & Seeley, 1999; Masten et al., in press; Masten & Coatsworth, 1995; Pine, Cohen, Gurley, Brook, & Ma, 1998; Rubin, Bukowski, & Parker, 1998; Rubin, Chen, McDougall, Bowker, & McKinnon, 1995). The evidence linking internalizing problems with academic achievement suggests that objective and perceived academic failures are related to change in internalizing symptoms and, conversely, that achievement gains predict changes in depressive symptoms, although the evidence is somewhat inconsistent with respect to time intervals and gender (Chen, Rubin, & Li, 1995; Cole, Martin, & Powers, 1997; Kellam, Rebok, Mayer, Ialongo, & Kalodner, 1994; Maughan, Rowe, Loeber, & Stouthamer-Loeber, 2003).

With regard to the academic consequences of internalizing problems, evidence is limited and mixed. For youth who meet criteria for psychiatric diagnoses of anxiety disorders and depression (i.e., those above diagnostic thresholds), serious academic problems have been noted both currently and in the future (Bardone et al., 1996; Bernstein & Borchardt, 1991; Kovacs & Devlin, 1998). For broader studies of the predictive significance of scores on a continuously distributed internalizing symptom dimension, there are few studies testing whether internalizing symptoms predict changes in the course of academic achievement, and results are inconsistent (e.g., Cole, Martin, Powers, & Truglio, 1996; Roeser, Eccles, & Sameroff, 2000).

Given that externalizing symptoms could also be viewed as indicating poor competence in the domain of rule-governed behavior, a widely expected developmental task faced by children, it is also important to consider how externalizing and internalizing symptoms might influence each other over time. Longitudinal data in the literature present a complex picture (see Angold, Costello, & Erkanli, 1999; Cicchetti & Toth, 1991; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002; Rubin, Hymel, Mills, & Rose-Krasnor, 1991). Some data implicate externalizing symptoms as a predictor of changes in internalizing symptoms, as expected on the basis of failure models (Capaldi, 1992; Garber, Quiggle, Panak, & Dodge, 1991; Kiesner, 2002; Lahey et al., 2002; Loeber & Keenan, 1994; McGee, Feehan, Williams, & Anderson, 1992; Robins, 1986). Moreover, some studies suggest that peer rejection or academic achievement (or both) could play a mediating role in linkages between externalizing behaviors and internalizing symptoms, though relevant data are limited and inconsistent (Kiesner, 2002; Panak & Garber, 1992; Rubin et al., 1991, 1998).

In regard to the possibility that internalizing symptoms may influence externalizing symptoms over time, findings again are somewhat mixed, though data are mounting to suggest that internalizing symptoms may constrain the development of antisocial or risk-taking behavior, providing a kind of braking system that may be related to inhibition, withdrawal, or the protection afforded by self-isolating behavior when peers are deviant (Farrington, 1995;

Kellam, 1990; Loeber & Keenan, 1994; Mesman, Bongers, & Koot, 2001; Moffitt, Caspi, Harrington, & Milne, 2002; Verhulst, Eussen, Berden, Sanders-Woudstra, & Van Der Ende, 1993). Thus, even as internalizing symptoms index a higher risk for future depression and anxiety, they could, in some situations, index lower risk for externalizing problems.

The risk literature for externalizing and internalizing symptoms and for academic achievement also provides clues about potential common causes that could underlie associations among these domains of adaptation, converging on intellectual ability, parenting quality, and socioeconomic status (SES) as three salient risk markers (Cicchetti & Toth, 1991; Farrington, 1995; Hinshaw, 1992; Loeber, 1990; Masten & Coatsworth, 1998; Masten & Curtis, 2000; McLoyd, 1998). Numerous other risk factors and more differentiated aspects of these global markers of psychosocial advantage and disadvantage could be delineated (e.g., executive functioning, harsh parenting, residential mobility related to poverty); however, this trio represents a strong set of broad psychosocial risk indicators. These risk factors tend to covary with each other as well as with past, present, and future child achievement and symptoms. On the lower end, intellectual functioning, parenting, and SES have been implicated as risk factors for externalizing symptoms and academic problems; on the higher end, these factors have been implicated as assets for good conduct and academic success (Bradley & Corwyn, 2002; Elder & Conger, 2000; Farrington, 1995; Hinshaw, 1992; Maguin & Loeber, 1996; Masten et al., 1988, 1999; Tremblay & Craig, 1995). Psychosocial disadvantage and low quality of parenting and parent-child relationships have been noted as risk factors for internalizing symptoms and disorders as well (Cicchetti & Toth, 1991; Harrington & Clark, 1998; Lewinsohn, Clarke, Seeley, & Rohde, 1994). Nonetheless, it is rare for these salient predictors of competence and symptoms to be controlled when causal models about cascades and progressions are tested.

Taken together, the literature linking broad externalizing, internalizing, and academic behavior domains over time suggests that there may be developmental cascades by which functioning in one domain of adaptive behavior spills over to influence functioning in other domains in a lasting way. Capaldi, Dishion, Patterson, Reid, and their colleagues at the Oregon Social Learning Center (Eugene, OR) have argued for such progressions in their coercion-failure models of how antisocial behavior leads to academic and social problems that in turn contribute to depression and other internalizing symptoms (Capaldi, 1992; Patterson, 1986; Patterson, Reid, & Dishion, 1992). Similarly, numerous investigators have noted the heterotypic, negative, and broad implications of antisocial behavior in childhood for later adaptation (Moffitt et al., 2002). In the internalizing spectrum of problems, Cicchetti and Schneider-Rosen (1986) were early proponents of a developmental theory of depression in which failure to master the social, cognitive, and emotional tasks in one era of development creates vulnerabilities for future failure and depression as individuals face new challenges.

In dynamic systems theory, more generally, changes in one area of functioning can trigger a sequence of consequences that ultimately have large developmental effects (Sameroff, 2000; Thelen, 1989). Describing such developmental cascades, Thelen (1989) noted, "Changes in any one domain therefore may become amplified and have system-wide reverberations" (p. 94). Implicit in all theories of development that focus on the transactions among

individuals and other systems is the possibility of spreading effects that result from dynamic interactions over time. Interventions to prevent or contain such progressions of behavior along maladaptive pathways in development require better understanding of positive and negative cascades in development.

This study tested a cascade model in which externalizing behavior undermines academic achievement, which in turn not only increases subsequent externalizing behavior but also raises the risk for later internalizing symptoms. Data to test this model were drawn from a longitudinal study of a normative school cohort of 205 children who have been followed up three times, after approximately 7, 10, and 20 years, to early adulthood. This study was unusual in its focus on competence, defined as success in salient developmental tasks, with multiple methods and informants of multiple competence domains as well as internalizing and externalizing symptoms. Earlier examinations of the structure and coherence of competence in this longitudinal study have indicated that the competence domain of conduct (rule-abiding or compliant vs. rule-breaking or antisocial behavior) predicted changes in academic achievement across the first 10 years of the study, although the reverse was not found (Masten et al., 1995). Traditional symptom measures of internalizing and externalizing problems were not included in these prior analyses.

This article includes four assessments of symptoms and academic competence available to date in this 20-year study, in order to test a cascade model linking externalizing symptoms, internalizing symptoms, and academic achievement over time from childhood to adulthood. Overall, the analytic strategy, using structural equation modeling, was designed to conduct a long-term, longitudinal, and robust test of cascade effects.

The conceptual model is presented in Figure 1 (represented as Model 2 in the nested comparison models presented below). Concurrent associations in time are not shown, though all three domains were expected to covary within time. Across time, we expected stability within each domain of functioning, beyond any stability related to covariance with other domains. In other words, we expected coherence within these broad aspects of adaptive functioning. Given the literature and earlier analyses from this study, we expected strong coherence for externalizing and academic achievement across each follow-up, particularly once the cohort reached the high school years and beyond. Moreover, academic attainment is cumulative in nature, which means that stability would be expected to increase over time. More modest stability was expected for internalizing symptoms because this domain of behavior appears to have less cumulative accretion over time than externalizing and academic domains of behavior and less coherence over long periods of time in the limited longitudinal data available that spans childhood to adulthood.

The cascade aspect of this model is based on two broad hypotheses. First, externalizing symptoms were expected to undermine academic attainment across time, beginning in childhood. Second, given the extant literature, academic achievement in adolescence and beyond was expected to influence both externalizing and internalizing symptoms over time. As a result of these two general expectations, externalizing symptoms were expected to cascade to academic achievement and then indirectly via academic achievement to internalizing symptoms. Transactional effects were expected between academic and externalizing symptoms across time, particularly during the school years. We viewed these two broad

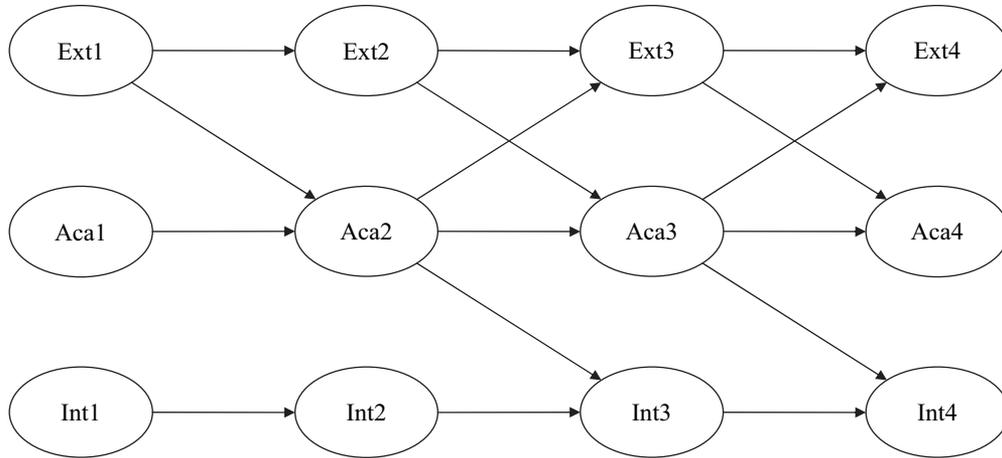


Figure 1. Conceptual presentation of hypothesized cascade model (Model 2). Within-time correlations among constructs are included but not shown. Numbers denote time point of data collection. Ext = externalizing problems; Aca = academic competence; Int = internalizing problems.

hypotheses as providing the most parsimonious cascade model based on the current literature.

All other cross-domain longitudinal linkages were viewed as exploratory, though some held particular interest. Given the growing number of studies indicating that social inhibition or anxiety may contain the growth of antisocial behavior in adolescence, internalizing scores could show a negative predictive relation to change in externalizing symptoms scores, even though these two kinds of symptom scores usually covary positively, particularly within time. As described earlier, however, the longitudinal evidence in this regard, though intriguing, is not consistent. The effects of externalizing behavior on internalizing symptoms were also examined in exploratory analyses.

To test the conceptual model, we considered a series of five conceptually based, nested models. In addition to the hypothesized model, four alternatives were considered, one model that was more parsimonious than the hypothesized cascade model (reflecting no cascades) and three other alternative models that were less parsimonious (reflecting additional cascades). The most parsimonious alternative model allowed only the paths reflecting continuity within the three domains of interest over time (externalizing, academic, internalizing). The model shown in Figure 1 represents the conceptual model, which was the most parsimonious cascade model considered. Three additional hierarchically nested models included additional exploratory cascade effects, reflecting cascade possibilities described above. First, earlier academic to externalizing and internalizing cascade paths were added. Next, externalizing by internalizing cascades were added. Finally, paths from internalizing to academic competence were added in the most comprehensive cascade model tested.

Once the most plausible model among these five alternative models was identified, the effects of gender and key control variables were examined. Gender differences in cascade and continuity effects were tested in a systematic set of nested models. Finally, significant cascade effects were specifically put to the further test of including latent variables and paths to control for IQ, parenting, and SES pertinent to those cascades.

## Method

### Sample and Procedure

Participants were drawn from a sample of 205 children (91 boys and 114 girls) whose families have participated in a longitudinal study of competence and resilience (Garmezy & Tellegen, 1984; Masten et al., 1988, 1995, 1999; Roisman, Masten, Coatsworth, & Tellegen, 2004). This cohort was recruited when the children were 8 to 12 years old, attending third through sixth grade in two elementary schools in the same catchment area, a diverse urban neighborhood in Minneapolis, Minnesota. The original cohort was followed up after 7, 10, and 20 years, with high retention rates (e.g., 90% participated in the 20-year follow-up, when the cohort was around age 30).

The participants' schools were located in a lower- to middle-class area of Minneapolis; SES among the children's families ranged from 7 to 92.3 on the 100-point Duncan Socioeconomic Index, with a sample mean of 43 (the equivalent of skilled labor or clerical positions). Twenty-nine percent of the sample was composed of ethnic-racial minorities, including biracial children (18% African American, 7% American Indian, 3% Hispanic, and 1% Asian). The sample also included 26 sibling pairs.

Extensive multimethod, multi-informant data were collected on the cohort at the outset of this longitudinal project (T1), with unusually thorough data on competence and symptoms of psychopathology, family history and activities, and many other attributes of child and family. There was a less extensive assessment about 7 years after the study began (T2), conducted primarily by mail, including adolescent and parent reports, plus school records, and resulting in follow-up data for 88% of the cohort. The 10-year follow-up (T3) was again extensive, including interviews, self-report questionnaires, and test sessions with the participant as well as the parent or guardian who was part of the study. Follow-up information was obtained for nearly the entire cohort (98%) at T3. The most recent follow-up at around age 30 (T4) was designed to be conducted by mail, including many of the same questionnaires as the assessment around age 20 (10-year follow-up), with some modification to be developmentally appropriate. In some cases, at the preference of participants, these questionnaires were completed in person or by telephone. Five of the original cohort members could not be located, and 2 had died. Of the known living original cohort of 203, 183 of the young adults (90%) participated. Nonparticipants at Time 4 (for any reason, including death) were more likely to be male,  $\chi^2(1, N = 205) = 8.02, p < .01$ .

For most assessments, there were multiple informants, including the target child and the participating parent or guardian. For example, at T2, for

176 adolescents who provided self-reports, 100% of their parents also provided data about them. At T3, when 189 of the original 205 target youth provided self-report data, 95% of their parents also provided data. At T4, parent-informant data were available for 86% of the 183 young adult participants.

For each assessment of this study, an effort was made to assess multiple domains of competence reflecting important developmental tasks of the present, past, and future as well as externalizing and internalizing problems. Analyses for the current study made use of multimethod, multi-informant data on academic competence, externalizing problems, and internalizing distress from each of the four assessments of this long-term longitudinal research project (T1 to T4). Measures are described below by domain, with descriptions of how variables were developmentally tailored to participants as they aged.

Procedures during all phases of this 20-year investigation were reviewed and approved by the local institutional review board. When the members of the longitudinal cohort were children, permission from a parent or guardian was obtained for a child to participate; the child also was provided an opportunity to assent or decline participating in each aspect of the data collection after the procedures were explained in age-appropriate language. For parents and also for the participants in adulthood, adults were informed and consented to their own participation.

### Measures

**Academic competence.** T1 academic competence (Aca1) was assessed by four indicators: the total score on the Peabody Individual Achievement Test (Dunn & Markwardt, 1970), grade point average from the school record in the 1st year of the study, a teacher rating from the Devereux Elementary School Behavior Rating Scale (Spivack & Swift, 1967), and a composite variable based on three structured questions from the parent interview (e.g., "How is X doing in school?";  $\alpha = .80$ ). Standardized total scores on the Peabody Individual Achievement Test were consistent with the normative nature of the sample ( $M = 97.0$ ,  $SD = 12.3$ ). During middle adolescence, T2 academic competence (Aca2) was assessed by using six sources of information. These included the following: self-reported grade point average, grade point average as gleaned from official school records, clinical ratings based on participant and parent versions of a Status Questionnaire (SQ) item tapping level of educational success (e.g., "How well is X doing in school?"; rater intraclass correlation coefficient [ICC] = .97 for parent and .94 for adolescent SQs), and two additional scores based on items from adolescent or parent Competence Rating Scales (CRS) that were adapted from the Perceived Competence Scales developed by Harter (1982), in consultation with her (see Masten et al., 1995). The adolescent score was based on one self-report item ("some teenagers do very well in their classwork"), and the score from the parent-reported measure was a composite of two corresponding CRS items ratings ( $\alpha = .93$ ). The T3 academic competence (Aca3) construct around age 20 was based on four indicators: clinical ratings of achievement based on adolescent self-report SQs (rater ICC = .93), parallel but independent ratings based on parent SQ reports (rater ICC = .85), interviewer's ratings of grades and attainment based on an interview with the adolescent (rater ICC = .85), and interviewer ratings of academic performance based on parent interview (rater ICC = .84). The indicators used to assess participants' level and quality of T4 academic competence (Aca4) included a clinical rating of educational success based on participants' descriptions of their educational experiences (rater ICC = .90) and parallel two-item SQ composites from participant ( $\alpha = .66$ ) and parent ( $\alpha = .62$ ), tapping level of educational attainment and educational success. For additional information about the assessment of academic competence in this study, the reader is referred to Masten et al. (1995, 1999); Neemann, Hubbard, and Masten (1995); and Roisman et al. (2004).

**Externalizing problems.** T1 externalizing problems (Ext1) were assessed via parental report. Parents filled out the Developmental Questionnaire, a symptom checklist used in psychiatric assessments at clinics in Minneapolis prior to publication of the Child Behavior Checklist (CBCL;

Achenbach & Edelbrock, 1983) that nonetheless contained much overlap with the CBCL, using a similar three-category response format. Two indicators of externalizing problems—aggression and delinquency—were computed from items closely paralleling items on the CBCL. Aggression consisted of the following items: demands a lot of attention, suddenly changes from happy to sad, bullies other children, showing off, and stubborn ( $\alpha = .76$ ). Delinquency consisted of the following items: has run away, vandalism, fire-setting, stealing, drug/alcohol use, swearing, lying, sniffing glue, and truancy ( $\alpha = .62$ ). For T2 externalizing (Ext2), Achenbach's CBCL (Achenbach, 1991a; Achenbach & Edelbrock, 1983) and Youth Self-Report (YSR; Achenbach, 1991b; Achenbach & Edelbrock, 1987) measures were available to assess broadband externalizing problems, and aggression and delinquency scores were available for both parent and self-report. At T3, the cohort was too old for the Achenbach measures available at the time, and externalizing problems (Ext3) were assessed by using six broad indicators, including two variables derived from independent clinical ratings of "seriousness of trouble with the law" based on the parent and adolescent SQs (rater ICC = .77 for parent and .92 for adolescent), a composite of antisocial ratings based on a parent interview ( $\alpha = .80$ ), a composite of aggressive-disruptive interactions with peers based on the adolescent interview ( $\alpha = .83$ ), and composite scores on two aggression items from the T3 versions of the CRS (see Masten et al., 1995;  $\alpha = .60$ , for parent report;  $\alpha = .54$  for self-report). At T4, around age 30, externalizing problems (Ext4) were assessed by the recently published adult versions of Achenbach's (1997) CBCL and YSR, namely, the Young Adult Behavior Checklist (YABCL) for parental informants and the Young Adult Self-Report (YASR). Scores on the externalizing subscales of Aggression, Delinquency, and Intrusive were taken from this measure. Standardized (T scores) means for externalizing (the broadband total score) on the YSR and the YASR were consistent with the normative nature of the sample: 54.1 ( $SD = 10.0$ ) for the YSR, and 49.3 ( $SD = 9.3$ ) for the YASR.

**Internalizing symptoms.** At T1, symptoms of internalizing problems (Int1) were identified by parental informants, who filled out a symptom checklist containing much overlap with the CBCL, as described earlier for Ext1. Three indicators of internalizing problems were computed to parallel Achenbach's factor structure: Anxious/Depressed (tense, fearful, worries, cries easily, perfectionistic, depressed, feeling unloved, feelings of inferiority, and feeling lonely;  $\alpha = .80$ ), Withdrawn (depressed, slow or lacking energy, and shyness;  $\alpha = .42$ ), and Somatic Complaints (body aches, headaches, and stomach problems;  $\alpha = .78$ ). At T2, for internalizing symptoms (Int2), CBCL and YSR measures were available. Self- and parent-report subscales of Anxious/Depressed, Withdrawn, and Somatic Complaints were taken from this measure. At T3, internalizing symptoms (Int3) were assessed by using the commonly used and well-validated Symptoms Checklist-90—Revised (SCL-90-R), a self-report measure of distress with diverse internalizing symptoms (Derogatis, 1977/1983). Three indicators were derived from subscales representing the broad internalizing dimension: Anxiety ( $\alpha = .88$ ), Depression ( $\alpha = .89$ ), and Somatization ( $\alpha = .82$ ). At age 30 (Time 4), Achenbach's (1997) YABCL for parental informants and the YASR were administered to assess internalizing symptoms (Int4); scores on the Anxious/Depressed and Withdrawn subscales were used in accordance with the hierarchical factor structure of this measure. Again, the broadband T scores for the Achenbach measure suggested a sample with a generally normative level of symptoms and distribution on this measure: Internalizing (T score) means were 51.5 ( $SD = 9.4$ ) for the YSR and 49.5 ( $SD = 9.9$ ) for the YASR.

**Control variables.** In childhood and at the 10-year follow-up, general intellectual functioning (IQ1) was estimated on the basis of the two subtests of Wechsler scales that have shown the highest correlation with the full-scale IQ: Vocabulary and Block Design. At T1, two subtests of the Wechsler Intelligence Scale for Children—Revised (Wechsler, 1974) were administered; at T3, the comparable subtests of the Wechsler Adult Intelligence Scale—Revised (Wechsler, 1981) were administered (IQ3). Parenting quality was estimated on the basis of global parenting composite scores derived from independent interviews of parent and child or adoles-

cent at Times 1 and 2, which included many questions about the nature of their relationship and other aspects of parenting (see Masten et al., 1988, 1999). At Time 1, two global parenting quality scores, each capturing closeness, warmth, and structure, were derived from the parent interview (12 ratings;  $\alpha = .94$ ) and child interview (10 ratings;  $\alpha = .89$ ). The quality of parenting in late adolescence (T3) focused on closeness, because structure and discipline were no longer age-appropriate indicators of parenting quality. Four composite variables were used as indicators of parenting quality at T3; these were derived from (a) a composite of eight clinical ratings of relationship quality based on the parent interview ( $\alpha = .95$ ), (b) a global rating of closeness based on the adolescent interview ( $ICC = .87$ ), (c) a composite score derived from ratings of SQs completed by participants ( $\alpha = .86$ ), and (d) a composite score derived from ratings of SQs completed by parents ( $\alpha = .84$ ) (see Masten et al., 1999).

SES was indexed by a single indicator, the Duncan Socioeconomic Index (Hauser & Warren, 1997), utilizing values available for the most pertinent U.S. Census at the time of a particular assessment. This score was calculated for the occupation of head of household (whichever stable parenting adult in the household had a higher index), both at the outset of the study (SES1) and at the 10-year assessment (SES3).

### Statistical Analysis

The main statistical analyses for this study were carried out with Mplus Version 3.01 (Muthén & Muthén, 2004). There were three data issues to consider in this analysis: (a) missing data, (b) nonnormality of some indicators, and (c) dependence of observations among siblings. Descriptive statistics (not presented) showed that the percentage of missing data varied by indicator and time, ranging from 0% to 16% with a mean of 8% over all indicators and times. In order to maintain relatively high power, the missing data were treated as ignorable (i.e., missing at random) and a variant of maximum likelihood estimation was used that allowed for the total sample of 205 to be analyzed. Descriptive statistics also indicated that several of the indicators were skewed (usually positively). To account for the nonnormality, we used a robust maximum likelihood estimator (MLR in Mplus; see chapter 15 in Muthén & Muthén, 2004). Dependency of observations among the 26 sibling pairs was addressed by an embedded cluster model in each structural model. Under this scenario, the MLR estimator is robust to nonindependence of observations.

To determine acceptable absolute fit of the models, the standardized root-mean-square residual (SRMR) was used in conjunction with the comparative fit index (CFI), though two other indices were included for comparison: the Tucker–Lewis Index and the root-mean-square error of approximation. For fit to be judged acceptable, SRMR had to be less than .08 and the CFI had to be greater than .90 (simultaneously). However, it should be noted that these criteria were admittedly arbitrary as it is unclear what the absolute fit reference standard should be when a robust estimator is used with the sample size of this study (Hu & Bentler, 1998, 1999; Marsh, Hau, & Wen, 2004). Relative fit was evaluated with a scaled chi-square difference test for nested models (Satorra, 2000). Each of the more parsimonious models was compared with the next most complex model.

**Measurement models.** The main analysis consisted of testing a series of nested cascade models (see below). Prior to this, the measurement models were evaluated for each construct at each time point. Initially, disaggregated indicators were used for each construct. Based on preliminary analyses not presented, good model fits were obtained at Times 1 and 3 but not at Times 2 and 4. The misfit at the latter time points was largely due to the CBCL items, which was remedied by taking composites within informant (parent and target) for those two time points and allowing common informant composites to have correlated residuals. The final indicators, including such aggregation, are shown in Table 1, listing informant, standardized loadings, and  $R^2$  values based on the most plausible model from the cascade analysis discussed below (Model 4).

**Cascade analysis.** A series of theoretically determined nested models were fit by using the robust methods described above to determine the most

plausible model. Table 2 shows the important directed paths of the models. Model 1 is the continuity model consisting of first-lag directed arrows within constructs.<sup>1</sup> All the remaining models have the same continuity structure as Model 1 but also add diagonal-directed arrows specifying various types of cascade effects. Thus, Model 1 is the most parsimonious, and Model 5 is the least parsimonious. In addition to the continuity paths, all the models in Table 2 had within-time cross-sectional construct correlations; for example, Ext1, Aca1, and Int1 were all correlated with each other. When the same measures were used at different times, their residuals were allowed to correlate—for example, parent report on the CBCL at T2 and on the YABCL at T4. Standardized results were considered for all models because different indicators were used at different time points.

Model 2 (“hypothesized cascades”) added seven cross-domain paths to the basic continuity model, representing our key cascade hypotheses noted above. Model 3 (“academic cascades beginning earlier”) added an additional two paths from academic competence at T1, representing a potentially earlier time frame for effects of school performance. Model 4 (“adding Ext  $\times$  Int links”) added an additional six paths describing the exploratory direct links between externalizing and internalizing problems for each time interval. Finally, Model 5 (“full cascade model”) added an additional three paths from internalizing problems to academic competence and thus included all possible cross-domain paths with a single time lag.

**Gender analysis.** Subsequent to the cascade analysis, we wanted to assess to what extent the most plausible model (Model 4, see below) was invariant across gender. Gender differences were tested by constraining different parameters across groups for the most plausible model. Similar to the cascade analysis, a series of three nested models were tested, beginning with the most parsimonious. The most constrained model (Model A)<sup>2</sup> had the following paths equal across gender groups: the measurement model paths (37 paths, not shown), the cascade paths (15 paths, see Model 4 in Table 2), and the continuity paths (9 paths, see Model 1 in Table 2). To ensure convergence, we allowed the cross-sectional correlation paths, the repeated measures paths, and the residual paths to vary. The next model (Model B) allowed the continuity paths to vary across gender groups, so only the measurement model paths and the cascade paths were constrained to be equal. The final and least constrained (i.e., least parsimonious) model (Model C) allowed all the paths to vary across groups, except for the measurement model paths.

**Control variable analysis.** A final goal of the analysis was to determine whether the significant cascade paths of the most plausible model (Model 4, see below) would persist when intellectual functioning, parenting quality, and SES were introduced into the model. That is, we wanted to test whether significant directed cascade paths between two latent variables might be explained by common dependency on the control variables. As noted above, latent variable models were used for IQ and parenting quality because multiple indicators were available for both. SES was specified as a manifest variable because there was only one indicator. The control variables were embedded in the larger most plausible cascade model to create spurious association or “third variable” models for each cascade path. If a directed cascade path was significant in the cascade analysis (without the control variables), then the control variables had directional paths to the two latent variables on each side of the path. Figure 2 shows an example of such a model for one cascade path. T1 indicators of control variables were used for T1 to T2 and T2 to T3 cascades, and T3 indicators were used as controls for T3 to T4.

<sup>1</sup> More complex second- and third-lag continuity models were also tested but did not have significantly better fit.

<sup>2</sup> Letters are used to denote the gender models to distinguish them from the cascade models, which use numerals.

Table 1  
 Descriptions, Informants, Factor Loadings, and Variance Explained for Indicators Used in the Final Cascade Model (Model 4)

Factor and Indicator	Informant	$\lambda$	$R^2$
Externalizing—Time 1			
DQ—Aggression subscale	Parent	.78	.60
DQ—Delinquency subscale	Parent	.71	.51
Academic—Time 1			
School records (GPA)	Teacher	.89	.79
Devereux—knows class material (1 item)	Teacher	.69	.48
PI—academic competence (3 items)	Parent	.78	.61
PIAT total score	Test	.88	.77
Internalizing—Time 1			
DQ—Anxious/Depressed subscale	Parent	.99	.98
DQ—Withdrawn subscale	Parent	.60	.36
DQ—Somatic Problems subscale	Parent	.40	.16
Externalizing—Time 2			
CBCL—Aggression & Delinquency subscale composite	Parent	.79	.62
YSR—Aggression & Delinquency subscale composite	Self	.61	.37
Academic—Time 2			
GPA at graduation or dropout	Teacher	.89	.79
Composite—CRS Academic and SQ how well doing in school	Parent & Rater-P	.86	.73
Composite—CRS Academic, SQ how well doing in school, self-report GPA	Self & Rater-S	.84	.70
Internalizing—Time 2			
CBCL—Anxious/Depressed, Withdrawn, and Somatic subscale composite	Parent	.64	.41
YSR—Anxious/Depressed, Withdrawn, and Somatic subscale composite	Self	.63	.39
Externalizing—Time 3			
PI rating—antisocial	Rater-P	.81	.66
CRS Aggression composite (2 items)	Parent	.45	.20
SQ—trouble with the law	Rater-P	.71	.50
AI rating—aggressive/disruptive	Rater-S	.76	.58
CRS Aggression subscale composite (2 items)	Self	.58	.34
SQ—trouble with the law	Rater-S	.61	.38
Academic—Time 3			
PI—academic achievement	Rater-P	.77	.59
SQ—how well doing in school	Rater-P	.86	.74
AI rating—grades/attainment	Rater-S	.85	.73
SQ—how well doing in school	Rater-S	.88	.78
Internalizing—Time 3			
SCL-90 Anxiety subscale	Self	.94	.89
SCL-90 Depression subscale	Self	.82	.67
SCL-90 Somatization subscale	Self	.74	.55
Externalizing—Time 4			
YABCL Aggression, Delinquency, & Intrusive subscale composite	Parent	.67	.45
YASR Aggression, Delinquency, & Intrusive subscale composite	Self	.68	.46
Academic—Time 4			
Clinical ratings—educational success	Rater-S	.95	.91
SQ academic attainment/success (2 items)	Parent	.84	.70
SQ academic attainment/success (2 items)	Self	.87	.75
Internalizing—Time 4			
YABCL Anxious/Depressed & Withdrawn subscale composite	Parent	.62	.39
YASR Anxious/Depressed & Withdrawn subscale composite	Self	.54	.29

Note. DQ = Developmental Questionnaire; GPA = grade point average; PI = Parent Interview; PIAT = Peabody Individual Achievement Test; CBCL = Child Behavior Checklist; YSR = Youth Self-Report; CRS = Competence Ratings Scales; SQ = Status Questionnaire; Rater-P = rating based on parent information; Rater-S = rating based on target information; AI = Adolescent Interview; SCL-90 = Symptom Checklist-90—Revised; YABCL = Young Adult Behavior Checklist; YASR = Young Adult Self-Report.

## Results

### Cascade Analysis

Table 3 shows the results for relative and absolute model fit for the cascade analysis. The SRMR and CFI values indicate that Model 1 had unacceptable fit (CFI = .896, SRMR = .113), as did Model 2 (CFI = .905, SRMR = .082). Model 3 had marginal fit (CFI = .908, SRMR = .077). Model 4 had acceptable fit (CFI = .914, SRMR = .073), as did Model 5 (CFI = .915, SRMR = .071). The results for relative fit are in the left-hand columns of

Table 3. The  $c$  coefficient in the table is the scaling constant used in the chi-square difference tests (see Satorra, 2000). Recall that when the chi-square difference test is significant, the more parsimonious model is rejected in favor of the model with more parameters. The chi-square difference tests show that Model 4 fits significantly better than the three more parsimonious nested models (Models 1 to 3) but fits equally well as Model 5.

The totality of the absolute and relative fit results argues for the adoption of Model 4 as the most plausible model among those tested. Model 4 was the most parsimonious model to have accept-

Table 2  
*Hierarchically Nested SEM Models Tested in the Cascade Analysis*

T1 to T2 cascade path	T2 to T3 cascade path	T3 to T4 cascade path
Model 1—Continuity model (included in all subsequent models)		
Ext1 → Ext2	Ext2 → Ext3	Ext3 → Ext4
Aca1 → Aca2	Aca2 → Aca3	Aca3 → Aca4
Int1 → Int2	Int2 → Int3	Int3 → Int4
Model 2—Hypothesized cascades (total of 7 cross-domain paths)		
Ext1 → Aca2	Ext2 → Aca3	Ext3 → Aca4
	Aca2 → Ext3	Aca3 → Ext4
	Aca2 → Int3	Aca3 → Int4
Model 3—Academic cascades beginning earlier (total of 9 cross-domain paths)		
Ext1 → Aca2	Ext2 → Aca3	Ext3 → Aca4
Aca1 → Ext2	Aca2 → Ext3	Aca3 → Ext4
Aca1 → Int2	Aca2 → Int3	Aca3 → Int4
Model 4—Adding Ext×Int links (total of 15 cross-domain paths)		
Ext1 → Aca2	Ext2 → Aca3	Ext3 → Aca4
Ext1 → Int2	Ext2 → Int3	Ext3 → Int4
Aca1 → Ext2	Aca2 → Ext3	Aca3 → Ext4
Aca1 → Int2	Aca2 → Int3	Aca3 → Int4
Int1 → Ext2	Int2 → Ext3	Int3 → Ext4
Model 5—Full cascade model across each time span (total of 18 cross-domain paths)		
Ext1 → Aca2	Ext2 → Aca3	Ext3 → Aca4
Ext1 → Int2	Ext2 → Int3	Ext3 → Int4
Aca1 → Ext2	Aca2 → Ext3	Aca3 → Ext4
Aca1 → Int2	Aca2 → Int3	Aca3 → Int4
Int1 → Ext2	Int2 → Ext3	Int3 → Ext4
Int1 → Aca2	Int2 → Aca3	Int3 → Aca4

*Note.* Numbers denote time point of data collection. Arrows designate estimated paths. All models also include concurrent correlations between the constructs of interest. SEM = structural equation modeling; Ext = externalizing problems; Aca = academic competence; Int = internalizing problems.

able absolute fit, and it had significantly better fit than the simpler models but equally as good a fit as the more complex model (i.e., Model 5). Figure 3 shows the standardized path coefficients for the significant paths of Model 4. Omitted from the figure are the indicators and their factor loadings, which are listed in Table 1 (all factor loadings were significant). Figure 3 shows that all the continuity paths were positive and significant, with the exception of the path between Int3 and Int4, which was marginally significant ( $p < .06$ ). Three of the directed cascade paths were significant and negative: Ext1 to Aca2, Int2 to Ext3, and Aca3 to Int4. In addition, there was a significant positive correlation between Ext and Int at T1 and T3 and negative correlations of Ext and Aca at T1 and T2. Path coefficients (and standard errors) for all of the cascade paths included in Model 4 are provided in Table 4.

### Gender Analysis

Table 5 shows the results of relative and absolute fit for the gender analysis. As indicated by the CFI and SRMR columns, none of the models had acceptable absolute fit. However, the goal here was to assess gender differences, so the relative fit of the models was most important. The chi-square difference tests of relative fit indicate that Model B was significantly better fitting

than Model A but equally good fitting as Model C. That is, Model B had significantly better fit than the more constrained model but equal fit to the most unconstrained model. Thus, Model B is the most plausible model. Recall that Model B constrained the measurement model paths and the cascade paths to be equal across the gender groups, but the continuity paths and cross-sectional correlations were allowed to vary. Inspection of the individual paths for both gender groups indicated differences in certain continuity and cross-sectional correlations. These differences are noted in Figure 3 (the *G* superscript). The continuity path of Int3 to Int4 was significant and positive for males but not significant for females. The cross-sectional correlations of Ext with Aca at T1 and T2 were both significant and negative for females but not significant for males. Finally, the cross-sectional correlation of Ext2 and Int2 was significant and positive for females but not significant for males. The significant cascade paths (Ext1 to Aca2, Int2 to Ext3, and Aca3 to Int4) did not differ by gender.

### Control Variable Analysis

The goal of the control variable analysis was to examine the sensitivity of the significant cascade paths in Model 4. Recall that in Model 4, there were three significant cascade paths, Ext1 to

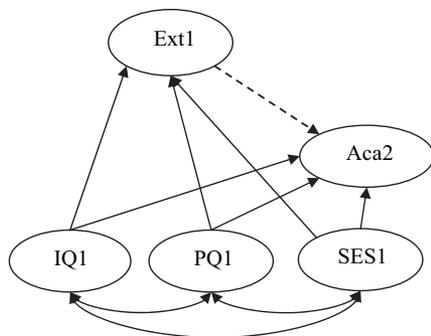


Figure 2. Example of control variable spurious association model for one cascade path. The dashed line indicates the cascade path. Numbers denote time point of data collection. Ext = externalizing problems; Aca = academic competence; PQ = parenting quality; SES = socioeconomic status.

Aca2, Int2 to Ext3, and Aca3 to Int4. The spurious association models based on the control variables were embedded in Model 4. Figure 2 shows an example of the spurious association model for the Ext1-to-Aca2 cascade path. The Time 1 control variables pointed to Ext1 and Aca2 and to Int2 and Ext3. The Time 3 control variables pointed to Aca3 and Int4. The control variables were allowed to correlate within time and between times.

To simplify the presentation, we do not report fits indices for the overall models but focus on the three cascade paths with and without the control variables. The main finding is that when the control variables were incorporated into Model 4, the previously significant cascade paths were still significant. In fact, the standardized regression weights were slightly larger in absolute value with the control variables in the model. On the other hand, certain continuity paths, such as Aca1 to Aca2, were no longer significant with the control variables in the model, in this case likely reflecting the strength of IQ scores as reliable markers of academic achievement. A full set of results pertaining to these analyses is available from the authors upon request.

## Discussion

Results of this study are consistent with a broad cascade model by which functioning in one domain of behavior spreads to other domains, both directly and indirectly from childhood into adulthood. The general pattern observed in this study suggests that externalizing problems evident at the outset of the study undermined academic achievement by adolescence, which in turn contributed to internalizing problems in young adulthood. Thus, over and above whatever cascades and bidirectional influences may have already occurred by the outset of this study, externalizing problems evident in childhood appeared to forecast problems in all three domains by young adulthood, progressing from externalizing to academic to internalizing domains of adaptation. This pattern held for both genders and also with potential “common cause” variables (IQ, parenting, SES) controlled.

Expected reciprocal effects between externalizing symptoms and academic achievement were not significant across time, although the pattern of results was consistent with this possibility. The modest sample size may have affected the ability to detect some nonzero cascade paths; some of the paths between external-

izing and academic achievement were close to significant with relatively large standardized coefficients (e.g., Ext3 to Aca4; see Table 4). Additionally, a negative correlation between externalizing and academic achievement was found within Times 1 and 2. This concurrent correlation could reflect transactional or unidirectional influences within a time frame too short for this study to capture. Similarly, externalizing and academic domains were already associated at the outset of the study, which again could reflect earlier unidirectional or bidirectional effects between these two major domains of adaptive functioning.

These results are congruent with recent and growing longitudinal literature suggesting influences over time across domains of adaptive functioning and also with Kohlberg et al.’s (1972) assertion decades ago that externalizing behavior problems and indicators of cumulative cognitive skills in childhood broadly forecast adult adjustment. In contrast, internalizing symptoms demonstrated little in the way of negative cascades over time to academic achievement in this normative sample. It is possible that internalizing symptoms have a shorter time window of influence than could be identified in this study as a result of the relatively long lag between assessments. It is also conceivable that negative cascades in the academic domain occur for subgroups that fall in the clinical range on internalizing problems. In addition, we surmise that the academic domain is not where the cascade effects for internalizing symptoms are likely to be most prominent. Social functioning has been most closely tied in the literature to internalizing symptoms, and the study of cascades between social competence and internalizing symptoms may reveal a different picture.

The linkages of internalizing and externalizing symptoms appear to be complex. These symptom domains were concurrently and positively linked from the outset of the study and, particularly for girls, in the emerging adulthood years. It is conceivable that these associations also reflect unidirectional or bidirectional influences of externalizing by internalizing symptoms occurring in short time intervals embedded within the concurrent associations of this study.

Results also suggest that internalizing symptoms predict a relative decline in externalizing problems from adolescence into emerging adulthood. This finding is consistent with the possibility that internalizing symptoms counteract growth in externalizing problems or that less internalizing (less inhibited) youth are more likely to increase (or decline more slowly) in externalizing problems than are their more inhibited counterparts. This result joins growing evidence that internalizing problems may index a process or personality trait that influences risk for externalizing behavior during adolescence and emerging adulthood, such as inhibition (Kerr, Tremblay, Pagani, & Vitaro, 1997). It also underscores the complexity of designating a particular domain of behavior as pervasively good or bad, risky or protective. What are termed internalizing symptoms may reflect behaviors that serve adaptive purposes under some conditions or for some outcomes, at the same time as they promote risk in other circumstances or for other outcomes. As noted above, effects also could differ by level of internalizing behavior, which we did not study.

The expected continuity over time within domains of adaptation was found. In the case of internalizing symptoms, spanning the 10-year interval from emerging adulthood to young adulthood, continuity was stronger for males, whereas females showed little coherence in this symptom domain over the transition to adulthood represented by this interval. This could be due to inadequate

Table 3  
Fit Statistics and Model Comparisons for Proposed Nested Models

Model	SEM analyses				Difference test of relative fit					Absolute fit statistics			
	# c.p.	df	c	$\chi^2$	Comp.	cd	$\Delta\chi^2$	$\Delta df$	p	CFI	TLI	RMSEA	SRMR
1	0	552	1.044	945.15	2 vs. 1	1.278	36.48	7	.000	.896	.881	.059	.113
2	7	545	1.041	903.10	3 vs. 2	0.769	14.61	2	.001	.905	.890	.057	.082
3	9	543	1.042	891.45	4 vs. 3	1.400	25.67	6	.000	.908	.893	.056	.077
4	15	537	1.038	860.26	5 vs. 4	1.394	4.84	3	.184	.914	.899	.054	.073
5	18	534	1.036	855.40						.915	.899	.054	.071

Note. SEM = structural equation modeling; # c.p. = number of cascade paths; c = weighting constant for computing the chi-square statistic using the robust estimation method; Comp. = model comparison; cd = weighting constant for the difference between two chi-square statistics using the robust estimation method; CFI = comparative fit index; TLI = Tucker–Lewis Index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.

measurement of internalizing symptoms, as well as to greater change within and across individual females over the transition from adolescence to adulthood.

Implications

The likelihood that one kind of problem may lead to another has important implications. Conceptually, such findings underscore the importance of models that encompass cascade as well as transactional effects and additional ways that co-occurring or sequential problems could arise (Angold, Costello, & Erkanli, 1999; Caron & Rutter, 1991; Masten et al., in press; Masten & Curtis, 2000). Once patterns of cross-domain influence and timing are identified and replicated, the processes by which they occur can be more specifically examined. Methodologically, such findings emphasize the importance of assessing multiple domains of behavior from the outset of a study and then repeatedly over time, in order to differentiate cascades from associations among competence and symptom domains present at the outset of a study and carried forward in time.

From the perspective of intervention, and particularly prevention, the possibility of developmental cascades and progressive adaptation problems spreading across domains of functioning has profound implications. It becomes critically important to study the processes, timing, and conditions of spreading and amplifying effects and to learn when to do what to interrupt negative progressions. This observation is not new. For example, Patterson and his colleagues at the Oregon Social Learning Center have argued this case for many years in the coercion model (Patterson, 1986; Patterson et al., 1992), as did Kellam and his collaborators in their developmental epidemiological model and prevention trials (Kellam & Rebok, 1992; Kellam et al., 1994). Many of the best intervention studies of our time were designed with such considerations in mind, either explicitly or implicitly (e.g., Fast Track [Dodge & Pettit, 2003]; Seattle Social Development Project [Hawkins et al., 2003]). Our point is simply that a far more systematic approach may be needed to fully address the issues raised by the possibility of cascades and transactions and that our prevention science and practice will be the better for it. It is quite

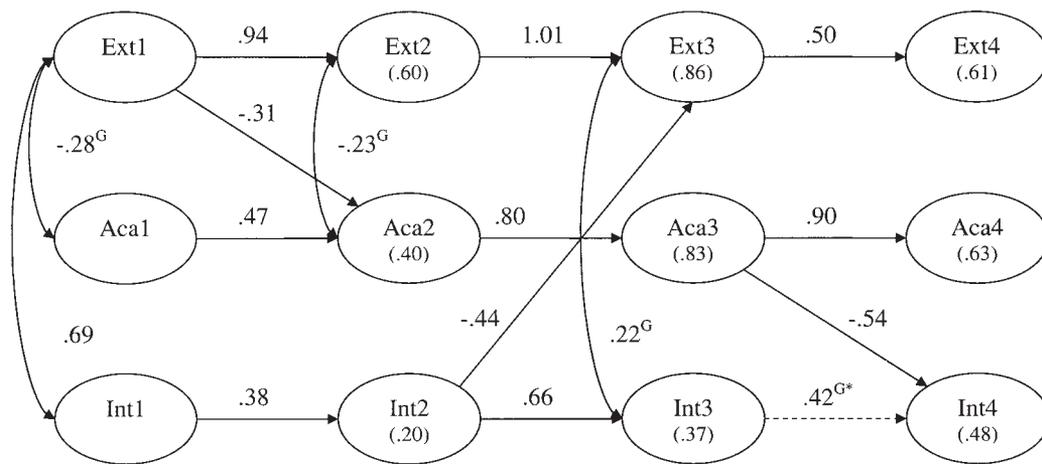


Figure 3. Standardized path coefficients for significant paths of Model 4. R<sup>2</sup> values are in parentheses.  $\chi^2(537, N = 205) = 860.26$ ;  $\Delta\chi^2(3, N = 205) = 4.84, ns$ ; comparative fit index = .914; Tucker–Lewis Index = .899; root-mean-square error of approximation = .054; standardized root-mean-square residual = .073. Numbers denote time point of data collection. Ext = externalizing problems; G = significant gender difference; Aca = academic competence; Int = internalizing problems. All numeric paths are significant at  $p < .05$ , except  $*p < .06$ .

Table 4  
Path Coefficients for All Cascade Paths Included in Model 4

Cascade path	$\hat{\beta}^*$	$\hat{\beta}$	SE	<i>p</i>
Ext1 → Aca2	-.31	-0.81	0.21	.0001
Ext1 → Int2	-.02	-0.28	3.20	.9299
Aca1 → Ext2	.06	0.34	0.55	.5386
Aca1 → Int2	-.24	-1.39	0.75	.0629
Int1 → Ext2	-.25	-3.44	3.11	.2683
Ext2 → Aca3	-.18	-0.03	0.02	.0777
Ext2 → Int3	-.24	-0.28	0.22	.2037
Aca2 → Ext3	-.16	-0.14	0.09	.1080
Aca2 → Int3	-.20	-1.24	0.79	.1162
Int2 → Ext3	-.44	-0.07	0.02	.0039
Ext3 → Aca4	.18	0.22	0.14	.1150
Ext3 → Int4	-.11	-0.59	1.22	.6312
Aca3 → Ext4	-.29	-1.28	0.68	.0608
Aca3 → Int4	-.54	-2.66	0.92	.0040
Int3 → Ext4	.15	0.10	0.09	.2983

Note.  $\hat{\beta}^*$  = standardized path coefficient;  $\hat{\beta}$  = unstandardized path coefficient; Ext = externalizing problems; Aca = academic competence; Int = internalizing problems; numbers denote time point of data collection.

conceivable that the best way to prevent one kind of problem is to intervene earlier in another domain. Better knowledge of what, when, and how cascades occur will facilitate more strategic intervention.

It is also conceivable that mental health professionals have underestimated or neglected the centrality of academic success and failure in the progression of mental health symptoms, because it falls under the purview of school professionals (Masten, 2003). Compartmentalizing the domains of child functioning in training, funding, research, and social services programs may also be contraindicated. There is growing recognition of this problem in the United States, with calls for more integrated sciences and services for children (e.g., National Advisory Mental Health Council's Workgroup on Child and Adolescent Mental Health Intervention Development and Deployment, 2001; Power, 2003).

### Limitations

This study had a number of limitations. The sample size of this longitudinal study was modest, but the method of analysis was complex. As noted above, some of the hypothesized cascade paths had relatively large standardized path coefficients, but their *p* values were just above alpha and thus were judged as inconclusive. Replication with a larger sample size might show additional sig-

nificant paths. An additional limitation was that the sample, though diverse and similar to the local school district population of the time, was not a representative one. Thus, caution is in order about generalizing from this study. The intervals between assessments were long, varied, and not well suited to pinpointing when particular cascades may normatively occur or the precise processes by which they occur. This was a "big picture" study of broad adaptive patterns over time. Moreover, to limit the scope of this article, we focused this study on two major symptom domains and only one major developmental task domain (academic competence). Other major domains of developmental task competence, particularly peer social competence, have been strongly implicated in the cascade-transaction literature linking symptoms and adaptive behavior in age-salient developmental tasks (Dodge & Pettit, 2003; Masten, 2005; Masten & Curtis, 2000). The longitudinal literature on peer relationships strongly suggests cross-domain effects among peer acceptance or friendship, externalizing and internalizing symptoms that need to be examined further from the perspective of developmental cascades. Finally, this study focused on a normative cohort with a dimensional and variable-focused approach. Thus, these findings may not pertain to comorbidity issues in clinical samples. For example, internalizing behavior may demonstrate containment effects on externalizing behavior only in the normal range of functioning and not at the extremely high end or for youth with psychiatric disorders. Our sample was too small to examine this question, which is an important topic for future consideration in larger studies.

### Conclusion

This study represents a rare and rigorous test of cascade effects from childhood into adulthood. Findings illustrate the potential of testing developmental models of cascades and progressions in longitudinal studies of adaptive behavior. The structural equation modeling approach not only afforded tests of alternative theoretical models, but also made it possible to reduce the influence of key confounds and measurement problems that plague the empirical literature linking various domains of adaptation, including informant effects, unreliability, and initial covariance with relevant domains, while also allowing us to control for spurious effects related to covariance with IQ, SES, and parenting quality, important markers of general psychosocial advantages. In future studies, it will be important to replicate our findings in large, representative samples, to extend the study of cascades to other domains of adaptive functioning, and also to investigate whether cascade

Table 5  
Fit Statistics and Model Comparisons for the Gender Analysis

Model	SEM analyses				Difference test of relative fit					Absolute fit statistics			
	Equality constraints	<i>df</i>	<i>c</i>	$\chi^2$	Comp.	<i>cd</i>	$\Delta\chi^2$	$\Delta df$	<i>p</i>	CFI	TLI	RMSEA	SRMR
A	MM + cascades + continuity	1,146	0.994	1,879.14	A vs. B	0.868	31.49	9	.000	.832	.815	.080	.105
B	MM + cascades	1,137	0.995	1,849.80	B vs. C	1.145	19.23	15	.204	.836	.816	.079	.101
C	MM	1,122	0.993	1,831.36						.837	.817	.079	.097

Note. SEM = structural equation modeling; *c* = weighting constant for computing the chi-square statistic using the robust estimation method; Comp. = model comparison; *cd* = weighting constant for the difference between two chi-square statistics using the robust estimation method; CFI = comparative fit index; TLI = Tucker-Lewis Index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; MM = measurement model.

effects differ in the extremely maladaptive range of symptoms or above diagnostic thresholds. Gender differences in the timing and nature of progressions also warrant closer examination in larger samples.

In future models and studies of cascades and transactions, it will be important to consider the developmental processes involved in the timing and significance of adaptive successes and failures. Developmental cascades undoubtedly reflect many processes by which individual functioning and context shape the course of development. However, we hypothesize that the significance of cascades across major domains of adaptive functioning is fundamentally related to the nature, salience, and timing of developmental tasks in human societies. Thus, for example, as peer relations become a salient domain of social adjustment, certainly by early in elementary school, the potential influence of peer rejection on internalizing symptoms would be expected to rise. The immediate impact of failure in an age-salient developmental task on the psychological well-being of individuals would be expected to peak when success in that domain is most salient to the individual, family, or society, although the cumulative developmental costs could continue to mount over time. Symptoms that undermine academic achievement during the school years, for example, could influence perceived success and subjective well-being as academic problems occur and could also be very costly over time in terms of subsequent developmental task attainment in other domains (e.g., see Roisman et al., 2004).

Developmental task expectations in societies may result from the implicit recognition within a given culture of when it is important to achieve what kind of adaptive behavior in order to progress successfully through life in that society. Once they emerge, developmental task expectations are likely to influence the interpretation of adaptive behaviors for all the stakeholders in a child's development, including the child, parents, teachers, and community. Developmental cascades and developmental tasks are integrally related, and the significance of behaviors traditionally described as symptoms of psychopathology will be understood best in the context of the waxing and waning salience of developmental tasks.

## References

- Achenbach, T. M. (1991a). *Integrative guide for the 1991 CBCL/4-18, YSR, and TRF profiles*. Burlington: University of Vermont Department of Psychiatry.
- Achenbach, T. M. (1991b). *Manual for the Child Behavior Checklist/4-18 and 1991 Profile*. Burlington: University of Vermont Department of Psychiatry.
- Achenbach, T. M. (1997). *Manual for the Young Adult Self-Report and Young Adult Behavior Checklist*. Burlington: University of Vermont Department of Psychiatry.
- Achenbach, T. M., & Edelbrock, C. (1983). *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. Burlington: University of Vermont Department of Psychiatry.
- Achenbach, T. M., & Edelbrock, C. (1987). *Manual for the Youth Self-Report*. Burlington: University of Vermont Department of Psychiatry.
- Angold, A., Costello, E. J., & Erkanli, A. (1999). Comorbidity. *Journal of Child Psychology and Psychiatry*, 40, 57-87.
- Bardone, A. M., Moffitt, T. E., Caspi, A., Dickson, N., & Silva, P. A. (1996). Adult mental health and social outcomes of adolescent girls with depression and conduct disorder. *Development and Psychopathology*, 8, 811-829.
- Bernstein, G. A., & Borchardt, C. M. (1991). Anxiety disorders of childhood and adolescence: A critical review. *Journal of the American Academy of Child and Adolescent Psychiatry*, 30, 519-532.
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53, 371-399.
- Capaldi, D. M. (1992). Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: II. A 2-year follow-up at Grade 8. *Development and Psychopathology*, 4, 125-144.
- Caron, C., & Rutter, M. (1991). Comorbidity in child psychopathology: Concepts, issues and research strategies. *Journal of Child Psychology and Psychiatry*, 32, 1063-1080.
- Chen, X., Rubin, K. H., & Li, B. (1995). Depressed mood in Chinese children: Relations with school performance and family environment. *Journal of Consulting and Clinical Psychology*, 63, 938-947.
- Chen, X., Rubin, K. H., & Li, D. (1997). Relation between academic achievement and social adjustment: Evidence from Chinese children. *Developmental Psychology*, 33, 518-525.
- Cicchetti, D., & Schneider-Rosen, K. (1986). An organizational approach to childhood depression. In M. Rutter, C. Izard, & P. Read (Eds.), *Depression in young people: Clinical and developmental perspectives* (pp. 71-134). New York: Guilford Press.
- Cicchetti, D., & Toth, S. L. (1991). A developmental perspective on internalizing and externalizing disorders of childhood. In D. Cicchetti (Ed.), *Rochester Symposium on developmental psychopathology: Vol. 2. Internalizing and externalizing expressions of dysfunction* (pp. 1-19). Hillsdale, NJ: Erlbaum.
- Cicchetti, D., & Tucker, D. (1994). Development and self-regulatory structures of the mind. *Development and Psychopathology*, 6, 533-549.
- Cole, D. A., Martin, J. M., & Powers, B. (1997). A competency-based model of child depression: A longitudinal study of peer, parent, teacher, and self-evaluations. *Journal of Child Psychology and Psychiatry*, 38, 505-514.
- Cole, D. A., Martin, J. M., Powers, B., & Truglio, R. (1996). Modeling causal relations between academic and social competence and depression: A multitrait-multimethod longitudinal study of children. *Journal of Abnormal Psychology*, 105, 258-270.
- Deater-Deckard, K. (2001). Annotation: Recent research examining the role of peer relationships in the development of psychopathology. *Journal of Child Psychology and Psychiatry*, 42, 565-579.
- Derogatis, L. R. (1983). *SCL-90-R administration, scoring and procedures. Manual I*. Baltimore: Clinical Psychometric Research. (Original work published 1977)
- Dishion, T. J., Patterson, G. R., Stoolmiller, M., & Skinner, M. L. (1991). Family, school, and behavioral antecedents to early adolescent involvement with antisocial peers. *Developmental Psychology*, 27, 172-180.
- Dodge, K. A., & Pettit, G. S. (2003). A biopsychosocial model of the development of chronic conduct problems in adolescence. *Developmental Psychology*, 39, 349-371.
- Dunn, L. M., & Markwardt, F. C. (1970). *Peabody Individual Achievement Test*. Circle Pines, MN: American Guidance Service.
- Elder, G. H., Jr., & Conger, R. D. (2000). *Children of the land: Adversity and success in rural America*. Chicago: University of Chicago Press.
- Farrington, D. P. (1995). The development of offending and antisocial behaviour from childhood: Key findings from the Cambridge Study in Delinquent Development. *Journal of Child Psychology and Psychiatry*, 36, 929-964.
- Garber, J., Quiggle, N. L., Panak, W., & Dodge, K. A. (1991). Aggression and depression in children: Comorbidity, specificity, and social cognitive processing. In D. Cicchetti & S. L. Toth (Eds.), *Internalizing and externalizing expressions of dysfunction. Rochester Symposium on Developmental Psychopathology* (Vol. 2, pp. 225-264). Hillsdale, NJ: Erlbaum.
- Garmezy, N., & Tellegen, A. (1984). Studies of stress-resistant children: Methods, variables, and preliminary findings. In F. Morrison, C. Lord, & D. Keating (Eds.), *Advances in applied developmental psychology* (Vol. 1, pp. 231-287). New York: Academic Press.

- Harrington, R., & Clark, A. (1998). Prevention and early intervention for depression in adolescence and early adult life. *European Archives of Psychiatry and Clinical Neuroscience*, *248*, 32–45.
- Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development*, *53*, 87–97.
- Hauser, R. M., & Warren, J. R. (1997). Socioeconomic indexes for occupations: A review, update, and critique. *Sociological Methodology*, *27*, 177–298.
- Hawkins, J. D., Catalano, R. F., Kosterman, R., Abott, R. D., & Hill, K. G. (1999). Preventing adolescent health-risk behavior by strengthening protection during childhood. *Archives of Pediatrics and Adolescent Medicine*, *153*, 226–234.
- Hawkins, J. D., Smith, B. H., Hill, K. G., Kosterman, R. F. C., Catalano, R. F. C., & Abbott, R. D. (2003). Understanding and preventing crime and violence: Findings from the Seattle Social Development Project. In T. P. Thornberry & M. D. Krohn (Eds.), *Taking stock of delinquency: An overview of findings from contemporary longitudinal studies* (pp. 255–312). New York: Kluwer Academic/Plenum Press.
- Hinshaw, S. P. (1992). Externalizing behavior problems and academic underachievement in childhood and adolescence: Causal relationships and underlying mechanisms. *Psychological Bulletin*, *111*, 127–155.
- Hinshaw, S. P. (2002). Process, mechanism, and explanation related to externalizing behavior in developmental psychopathology. *Journal of Abnormal Child Psychology*, *30*, 431–446.
- Hinshaw, S. P., & Anderson, C. A. (1996). Conduct and oppositional defiant disorders. In E. J. Mash & R. A. Barkley (Eds.), *Child psychopathology* (pp. 113–149). New York: Guilford Press.
- Hu, L.-T., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, *3*, 424–453.
- Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.
- Kellam, S. G. (1990). Developmental epidemiological framework for family research on depression and aggression. In G. R. Patterson (Ed.), *Depression and aggression in family interaction* (pp. 11–48). Hillsdale, NJ: Erlbaum.
- Kellam, S. G., & Rebok, G. W. (1992). Building developmental and etiological theory through epidemiologically based preventive intervention trials. In J. McCord & R. E. Tremblay (Eds.), *Preventing antisocial behavior: Interventions from birth through adolescence* (pp. 162–194). New York: Guilford Press.
- Kellam, S. G., Rebok, G. W., Mayer, L. S., Ialongo, N., & Kalodner, C. R. (1994). Depressive symptoms over first grade and their response to a developmental epidemiologically based preventive trial aimed at improving achievement. *Development and Psychopathology*, *6*, 463–481.
- Kerr, M., Tremblay, R. E., Pagani, L., & Vitaro, F. (1997). Boys' behavioral inhibition and the risk of later delinquency. *Archives of General Psychiatry*, *54*, 809–816.
- Kiesner, J. (2002). Depressive symptoms in early adolescence: Their relations with classroom problem behavior and peer status. *Journal of Research on Adolescence*, *12*, 463–478.
- Kohlberg, L., LaCrosse, J., & Ricks, D. (1972). The predictability of adult mental health from childhood behavior. In B. B. Wolman (Ed.), *Manual of child psychopathology* (pp. 1217–1284). New York: McGraw-Hill.
- Kovacs, M., & Devlin, B. (1998). Internalizing disorders in childhood. *Journal of Child Psychology and Psychiatry*, *39*, 47–63.
- Lahey, B. B., Loeber, R., Burke, J., Rathouz, P. J., & McBurnett, K. (2002). Waxing and waning in concert: Dynamic comorbidity of conduct disorder with other disruptive and emotional problems over 7 years among clinic-referred boys. *Journal of Abnormal Psychology*, *111*, 556–567.
- Lewinsohn, P. M., Clarke, G. N., Seeley, J. R., & Rohde, P. (1994). Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *33*, 809–818.
- Lewinsohn, P. M., Rohde, P., Klein, D. N., & Seeley, J. R. (1999). Natural course of adolescent major depressive disorder: I. Continuity into young adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry*, *38*, 56–63.
- Loeber, R. (1990). Development and risk factors of juvenile antisocial behavior and delinquency. *Clinical Psychology Review*, *10*, 1–41.
- Loeber, R., & Keenan, K. (1994). Interaction between conduct disorder and its comorbid conditions: Effects of age and gender. *Clinical Psychology Review*, *14*, 497–523.
- Maguin, E., & Loeber, R. (1996). Academic performance and delinquency. *Crime and Justice: A Review of Research*, *20*, 145–264.
- Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and danger in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, *11*, 320–341.
- Masten, A. S. (2003). Commentary: Developmental psychopathology as a unifying context for mental health and education models, research, and practice in schools. *School Psychology Review*, *32*, 170–174.
- Masten, A. S. (2005). Peer relationships and psychopathology in developmental perspective: Reflections on progress and promise. *Journal of Clinical Child and Adolescent Psychology*, *34*, 87–92.
- Masten, A. S., Burt, K. B., & Coatsworth, J. D. (in press). Competence and psychopathology in development. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Vol. 3. Risk, disorder, and adaptation* (2nd ed.). New York: Wiley.
- Masten, A. S., & Coatsworth, J. D. (1995). Competence, resilience, and psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Vol. 2. Risk, disorder, and adaptation* (pp. 715–752). New York: Wiley.
- Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist*, *53*, 205–220.
- Masten, A. S., Coatsworth, J. D., Neemann, J., Gest, S. D., Tellegen, A., & Garmezny, N. (1995). The structure and coherence of competence from childhood through adolescence. *Child Development*, *66*, 1635–1659.
- Masten, A. S., & Curtis, W. J. (2000). Integrating competence and psychopathology: Pathways toward a comprehensive science of adaptation in development. *Development and Psychopathology*, *12*, 529–550.
- Masten, A. S., Garmezny, N., Tellegen, A., Pellegrini, D. S., Larkin, K., & Larsen, A. (1988). Competence and stress in school children: The moderating effects of individual and family qualities. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *29*, 745–764.
- Masten, A. S., Hubbard, J., Gest, S. D., Tellegen, A., Garmezny, N., & Ramirez, M. (1999). Adversity, resources and resilience: Pathways to competence from childhood to late adolescence. *Development and Psychopathology*, *11*, 143–169.
- Maughan, B., Rowe, R., Loeber, R., & Stouthamer-Loeber, M. (2003). Reading problems and depressed mood. *Journal of Abnormal Child Psychology*, *31*, 219–229.
- McGee, R., Feehan, M., Williams, S., & Anderson, J. (1992). DSM-III disorders from age 11 to age 15 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, *31*, 50–59.
- McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist*, *53*, 185–204.
- Mesman, J., Bongers, I. L., & Koot, H. M. (2001). Preschool developmental pathways to preadolescent internalizing and externalizing problems. *Journal of Child Psychology and Psychiatry*, *42*, 679–689.
- Moffitt, T. E., Caspi, A., Harrington, H., & Milne, B. J. (2002). Males on the life-course-persistent and adolescence-limited antisocial pathways: Follow-up at age 26 years. *Development and Psychopathology*, *14*, 179–207.
- Muthén, L. K., & Muthén, B. O. (2004). *Mplus user's guide* (3rd ed.). Los Angeles: Muthén & Muthén.

- National Advisory Mental Health Council's Workgroup on Child and Adolescent Mental Health Intervention Development and Deployment. (2001). *Blueprint for change: Research on child and adolescent mental health* (NIH Publication 01-4985). Rockville, MD: National Institute of Mental Health.
- Neemann, J., Hubbard, J., & Masten, A. S. (1995). The changing importance of romantic relationship involvement to competence from late childhood to late adolescence. *Development and Psychopathology, 7*, 727-750.
- Panak, W. F., & Garber, J. (1992). Role of aggression, rejection, and attributions in the prediction of depression in children. *Development and Psychopathology, 4*, 145-165.
- Patterson, G. R. (1986). Performance models for antisocial boys. *American Psychologist, 41*, 432-444.
- Patterson, G. R., Forgatch, M. S., Yoerger, K. L., & Stoolmiller, M. (1998). Variables that initiate and maintain an early-onset trajectory for juvenile offending. *Development and Psychopathology, 10*, 531-547.
- Patterson, G. R., Reid, J. B., & Dishion, T. J. (1992). *A social interactional approach: Vol. 4. Antisocial boys*. Eugene, OR: Castalia.
- Pine, D. S., Cohen, P., Gurley, D., Brook, J., & Ma, Y. (1998). The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *Archives of General Psychiatry, 55*, 56-64.
- Power, T. J. (2003). Special topic: Emerging models for promoting children's mental health: Linking systems for prevention and intervention—II [Special series]. *School Psychology Review, 32*(1).
- Risi, S., Gerhardtstein, R., & Kistner, J. (2003). Children's classroom peer relationships and subsequent educational outcomes. *Journal of Child and Adolescent Psychology, 32*, 351-361.
- Robins, L. N. (1986). The consequences of conduct disorders in girls. In D. Olweus, J. Block, & M. Radke-Yarrow (Eds.), *Development of antisocial and prosocial behavior: Research, theories, and issues* (pp. 385-414). Orlando, FL: Harcourt Brace Jovanovich.
- Roeser, R. W., Eccles, J. S., & Sameroff, A. J. (2000). School as a context of early adolescents' academic and social-emotional development: A summary of research findings. *The Elementary School Journal, 100*, 443-471.
- Roisman, G. I., Masten, A. S., Coatsworth, J. D., & Tellegen, A. (2004). Salient and emerging developmental tasks in the transition to adulthood. *Child Development, 75*, 123-133.
- Rubin, K. H., Bukowski, W., & Parker, J. G. (1998). Peer interactions, relationships, and groups. In N. Eisenberg (Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 619-700). New York: Wiley.
- Rubin, K. H., Chen, X., McDougall, P., Bowker, A., & McKinnon, J. (1995). The Waterloo Longitudinal Project: Predicting internalizing and externalizing problems in adolescence. *Development and Psychopathology, 7*, 751-764.
- Rubin, K. H., Hymel, S., Mills, R. S. L., & Rose-Krasnor, L. (1991). Conceptualizing different developmental pathways to and from social isolation in childhood. In D. Cicchetti & S. L. Toth (Eds.), *Rochester Symposium on Developmental Psychopathology* (Vol. 2, pp. 91-122). Hillsdale, NJ: Erlbaum.
- Rutter, M., & Sroufe, L. A. (2000). Developmental psychopathology: Concepts and challenges. *Developmental Psychopathology, 12*, 265-296.
- Sameroff, A. J. (2000). Developmental systems and psychopathology. *Development and Psychopathology, 12*, 297-312.
- Satorra, A. (2000). Scaled and adjusted restricted tests in multi-sample analysis of moment structures. In R. D. H. Heijmans, D. S. G. Pollock, & A. Satorra, (Eds.), *Innovations in multivariate statistical analysis. A Festschrift for Heinz Neudecker* (pp. 233-247). London: Kluwer Academic Publishers.
- Spivack, G., & Swift, M. (1967). *Devereux Elementary School Behavior Rating Scale manual*. Devon, PA: Devereux Foundation.
- Thelen, E. (1989). Self-organization in developmental processes: Can systems approaches work? In M. R. Gunnar & E. Thelen (Eds.), *Systems and development: The Minnesota Symposia on Child Psychology* (Vol. 22, pp. 77-117). Hillsdale, NJ: Erlbaum.
- Thornberry, T. P., Lizotte, A. J., Krohn, M. D., Smith, C. A., & Porter, P. K. (2003). Causes and consequences of delinquency: Findings from the Rochester Youth Development Study. In T. P. Thornberry & M. D. Krohn (Eds.), *Taking stock of delinquency: An overview of findings from contemporary longitudinal studies* (pp. 11-46). New York: Kluwer Academic/Plenum Press.
- Tremblay, R. E., & Craig, W. M. (1995). Developmental crime prevention. In M. Tonry & D. P. Farrington (Eds.), *Building a safer society: Strategic approaches to crime prevention* (Vol. 19, pp. 151-236). Chicago: University of Chicago Press.
- Verhulst, F. C., Eussen, M. L. J. M., Berden, G. F. M. G., 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.
- Wechsler, D. (1974). *Wechsler Intelligence Scale for Children—Revised*. San Antonio, TX: Psychological Corporation.
- Wechsler, D. (1981). *Wechsler Adult Intelligence Scale—Revised*. San Antonio, TX: Psychological Corporation.
- Williams, S., & McGee, R. (1994). Reading attainment and juvenile delinquency. *Journal of Child Psychology and Psychiatry, 35*, 441-459.

Received March 2, 2004

Revision received October 18, 2004

Accepted March 10, 2005 ■

### Instructions to Authors

For Instructions to Authors, please consult the March 2005 issue of the volume or visit [www.apa.org/journals/dev](http://www.apa.org/journals/dev) and click on the "Instructions to authors" link in the Journal Info box on the right.