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[Currently in press at *The Journal of Early Adolescence*]

Growth and Predictors of Parental Knowledge of Youth Behavior during Early Adolescence

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Acknowledgements

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Abstract

In the current study, we examined latent growth models of parental knowledge of boys' behavior from ages 10 to 15, and whether earlier child or family characteristics were related to intercept and growth in parental knowledge. As part of an ongoing longitudinal study on the precursors of antisocial behavior, 288 boys completed interviews at ages 10, 11, 12, and 15. Boys' reports started low, increased and plateaued at age 12. High levels of maternal responsivity in early childhood were associated with a high initial status in knowledge. Growth was predicted only by high levels of boys' prior externalizing problems. Results are discussed with respect to differences in factors that predict initial status versus growth in parental knowledge during the transition to adolescence.

Keywords: parental knowledge, monitoring, latent growth modeling, externalizing problems, parental responsivity.

Growth and Predictors of Parental Knowledge of Youth Behavior during Early Adolescence

Parental knowledge of their children's activities has been revealed as an important protective factor in the prevention of antisocial behavior in middle childhood and adolescence (Dishion & McMahon, 1998; Pettit, Laird, Dodge, Bates, & Criss, 2001). Despite consistent and robust associations found between parental knowledge and antisocial behavior, surprisingly little is known about how parental knowledge may change over time, or whether its initial levels or growth are linked to other child or family characteristics beginning in earlier periods of childhood. The current study sought to expand understanding of parental knowledge by examining its development during the transition to adolescence. In addition, we examined factors assessed earlier in childhood that might discriminate initial levels and growth from ages 10 to 15. Data on the developmental course and antecedents of parental knowledge are needed to inform basic research, but also for developing targets for preventive interventions (Bell, 1986).

For the purposes of this study, parental knowledge was broadly conceptualized as the degree to which parents are informed about their adolescents' experiences outside of the familial context (e.g., Dishion & McMahon, 1998; Laird, Pettit, Dodge, & Bates, 2003A). Until relatively recently, parental knowledge was equated with parental monitoring, which can be more accurately conceptualized as a surveillance process through which parents gain knowledge about their children's lives (e.g., Kerr & Stattin, 2000). Parents may gain such knowledge through children's spontaneous disclosure, parents' solicitation of information from their children (Kerr & Stattin, 2000) or from alternate informants (e.g., neighbors: Crouter, Bumpus, Davis, & McHale, 2005). Studies of both parental knowledge and monitoring are referenced in support of the current study, as much of this body of research was initiated prior to Kerr and Stattin's (2000) landmark study. When possible, the two are distinguished in this manuscript, but the term "parental monitoring" is substituted for parental knowledge of children's activities or

whereabouts when the focus of a study's measure is unclear or when other dimensions of monitoring in addition to parental knowledge were assessed.

Changes in Parental Knowledge During the Transition to Adolescence

Longitudinal research on the developmental course of parental knowledge is relatively sparse, and variability in the study timing, duration, and the use of disparate research strategies has led to incomplete knowledge on its development. The few studies in this area have generally indicated that parental knowledge is relatively stable but declining throughout adolescence (e.g., Laird et al., 2003A). This pattern has been observed in normative and in at-risk samples, but more information about change is available about normally-developing youth than for youth at higher risk for maladaptive outcomes. Using a community-based sample of 93 middle-class African Americans, Smetana and Daddis (2002) revealed a significant decrease in parent and child reports of parental knowledge between their first and second study waves (ages 11-14 and 13-16, respectively). In one of three studies on change in parental knowledge from the Child Development Project (CDP; e.g., Pettit et al., 2001), boys reported subtle linear declines between the 9th and 12th grades (Laird, Pettit, Bates, & Dodge, 2003B). In the second CDP study, both parents and boys reported linear decreases in parental knowledge between boys' approximate ages 14 and 18 (Laird et al., 2003A). Finally, the third CDP study revealed linear declines in mother-reported monitoring between children's ages 10 to 11 and 16 to 17 (Pettit, Keiley, Laird, Bates, & Dodge, 2007). Although less evidence is available for at-risk youth, existing research indicates that parental knowledge also declines during their transition to adolescence. In a five-year long preventive intervention project, maternal reports of knowledge were stable but declined slightly between boys' ages of 10 to 11 and ages 13 to 14 (Fite, Colder, Lochman, & Wells, 2006; P. Fite, personal communication, September 6, 2006).

While these studies uniformly indicate that there are declines in parental knowledge

about young adolescent boys, more research on this topic is clearly needed, particularly for youth at elevated risk for demonstrating serious levels of antisocial behavior. The differences in the timing of declines across these few studies might be attributable to sample characteristics, study timing, or the use of different informants or data analytic techniques.

Explaining Initial Status in Parental Knowledge

A broad range of correlates of parental knowledge and monitoring have been identified by researchers interested in its protective value during childhood and adolescence (Crouter & Head, 2002), with most focusing on predictors of initial levels rather than change. These have typically included individual child characteristics (e.g., delinquent behavior: Laird et al., 2003A), family factors (e.g., parental mental health: Jones, Forehand, Brody, & Armistead, 2003; proactive parenting: Pettit et al., 2007), and socioeconomic risk factors (e.g., neighborhood poverty: Beyers, Bates, Pettit, & Dodge, 2003). In short, a variety of constructs appear to be associated with levels of parental knowledge, and specific links will be delineated below.

Child Characteristics. Several child characteristics have been associated with reduced levels of parental monitoring or knowledge, most notably symptoms of externalizing problem behavior. Theoretically, disruptive child behaviors (e.g., oppositional behavior, hyperactivity) have been postulated to elicit negative parental affect and to challenge parents' childrearing capacities, ultimately leading parents to view spending time with such children as unpleasant and frustrating (Shaw & Bell, 1993). Over time, parents may disengage from their socialization responsibilities and become passive about supervising their children's daily activities and whereabouts. Simultaneously, boys who engage in higher levels of deviant behavior may be more effective in avoiding parental monitoring, for example, by spending time in settings in which no adults are present , or by failing to disclose accurate information about their plans, activities, or whereabouts (Stoolmiller, 1994). Overall, there is some empirical support for the

notion that higher levels of externalizing symptoms are associated with lower initial levels of parental knowledge (e.g., Jones et al., 2003; Laird et al., 2003A). For example, in one longitudinal study, high levels of externalizing problems in the 6th and 7th grades were contemporaneously associated with low levels of parental knowledge (Fite et al., 2006).

Child's ethnicity has also been examined as a potential predictor of parental knowledge. Although there is limited support for ethnic differences in the degree to which parents are knowledgeable about their children's activities and whereabouts, relatively few studies have investigated this issue. Published studies have been conducted with single-ethnicity samples (e.g., African American mothers and their children: Jones et al., 2003) or have not examined ethnic differences in multiethnic samples (e.g., Pettit et al., 2001). An exception is a large multiethnic sample of 6th grade students in California, in which Latino students ages 11 to 12 reported higher levels of monitoring (defined as knowledge and parental surveillance behaviors) than their Asian classmates (Shakib et al., 2003). White and multiethnic youths reported average levels of monitoring, which did not differ significantly from any other group (Shakib et al., 2003). In the present study, which included a sample of both European American and African American families, we further explored whether there were differences in the rates of monitoring between European American and African American families.

Family Risk Factors. Optimal child and family functioning can be undermined by the presence or absence of a number of processes or events within families (e.g., parental acrimony, divorce). Theoretically, such processes or events that affect the functioning of family or individual family member's functioning could reduce the likelihood that parents will have sufficient knowledge to the point that parental well-being is compromised. In the current study, we included family risk characteristics that have previously been linked to parental knowledge or monitoring, specifically maternal depression and parent-child relationship quality. We also

included an index of prior parenting, specifically early maternal responsivity, which has not been empirically linked to knowledge or monitoring but may represent a developmentally-heterotypical precursor.

Accumulated evidence suggests that mothers with both clinical depression and high levels of depressive symptoms tend to be less optimal parents than healthy mothers (Goodman & Gotlib, 1999). Overall, depressed parents have been shown to be more negative, hostile or critical (e.g., Frye & Garber, 2005), and importantly, more passive in interactions with their children (e.g., Weissman, Paykel, & Klerman, 1972). We suspect that depressed mothers might be generally less involved with their children (Goodman & Gotlib, 1999) and may thus be less likely to follow their activities. This link is supported by two longitudinal studies. In the first, mothers who were clinically depressed when their child was age 6 were disproportionately represented in the lowest quintile on parental monitoring 2 to 4 years later (Chilcoat, Breslau, & Anthony, 1996). In the other study, socioeconomically-disadvantaged, AA single mothers of children ages 7 to 15 who endorsed fewer depressive symptoms reported having better knowledge of their offspring's activities (Jones et al., 2003). We expected that mothers with a greater history of depressive symptoms would have less knowledge about their sons' plans and whereabouts.

A second family risk factor was the quality of mother-son relationships, which is arguably the most important antecedent of parental knowledge and monitoring (Stattin & Kerr, 2000): Mothers who are involved in less acrimonious relationships appear to have greater knowledge of their sons' activities (Dishion & McMahon, 1998). Sons in affectively positive, mutually responsive relationships may be more accepting of maternal socialization efforts, including monitoring (e.g., Kochanska, 1997). Alternately, sons who view their relationship with their mother negatively may be less willing to share the information necessary for mothers to

monitor them adequately or consistently (Kerr & Stattin, 2000; Stattin & Kerr, 2000). This may also be true of mother-son relationships characterized as relatively harmonious. Regardless of the specific mechanism, higher levels of "relationship enjoyment" have been associated with initial status in parental knowledge in previous research (Laird et al., 2003B). During early adolescence, mothers with poor quality relationships (marked by high levels of conflict and low levels of shared openness and warmth) during the school-age period were expected to have less knowledge about their sons lives outside the family context.

Prior maternal responsivity was also included as a predictor, and was assessed when the boys were 2 years old. As noted above, there is reason to suspect that there is heterotypic continuity in parental engagement, such that the underlying parenting style remains stable but the specific parenting practices may evolve to accommodate children's developmental gains (Dallaire & Weinraub, 2005; Holden & Miller, 1999). Responsive parenting may ease the monitoring process by constructing a trusting relationship in which adolescents may freely self-disclose (Kerr & Stattin, 2000; Stattin & Kerr, 2000). Recent studies have revealed correlations between parental knowledge and other manifestations of parenting in adolescence. High initial levels of knowledge have been associated with both parent- and adolescent-reported parental involvement (Laird et al., 2003B) and with proactive parenting in early childhood (Pettit et al., 2007). Likewise, greater maternal and paternal responsiveness has been linked directly to parental knowledge and indirectly to parental knowledge through adolescent self-disclosure (Soenens, Vansteenkiste, Luyckx, & Goossens, 2006). However, no known studies have examined associations between parental responsivity during early childhood and knowledge during late childhood or early adolescence.

Socioeconomic Risk Factors. In addition to the effects of child characteristics and family factors, it also has been suggested that community-level factors might increase or decrease

parents' knowledge of their children's behavior (Pettit et al., 2001). For example, in communities where risk of harm or exposure to deviant peers or adults is minimal, parents may have less motivation to track their children's whereabouts and activities with peers. However, for families living in communities marked by high levels of crime and exposure to deviant peers and adults, individual parents may have reason to be more vigilant about soliciting information from their children (Beyers et al., 2003). Unfortunately, few studies have examined the relationship between community residence and levels of monitoring or parental knowledge. One study revealed that mothers living in urban versus rural communities reported higher levels of knowledge (Jones et al., 2003). Another longitudinal study conducted with a national sample of adolescents and their parents revealed that residence in poorer neighborhoods was associated with higher levels of parental knowledge (Chuang, Ennett, Bauman, & Foshee, 2005). In the current study, within a range of low-income, urban neighborhoods, we investigated whether higher levels of neighborhood disadvantage were associated with higher initial and subsequent levels of parental knowledge as children transitioned to adolescence.

Explaining Growth in Monitoring

A very different picture emerges for factors associated with growth in parental knowledge over time, which is likely due to the relative dearth of longitudinal research. The few existing studies on change in parental knowledge during adolescence have attributed growth to a small number of child, family, and socioeconomic characteristics. Child-level influences have been limited to the child's temperamental characteristics and adolescent beliefs about the appropriateness of parental monitoring. In terms of temperament, high levels of resistance to parental control attempts in early childhood predicted faster declines in monitoring across adolescence (Pettit et al., 2007). Regarding monitoring beliefs, adolescents who strongly believed that parents should track their activities and whereabouts had a higher initial status and

little growth in parental knowledge, while adolescents who believed this less strongly had lower initial status values and more substantial growth in parental knowledge (Laird et al., 2003B).

Only two existing studies examined family characteristics in regard to change in parental knowledge. In the study conducted by Jones and colleagues (2003), high levels of maternal depression predicted decreases in parental knowledge over a fifteen-month period of time. Adolescent- and parent-reported parental involvement and parent-reported relationship enjoyment were included in Laird and colleagues' (2003B) model, but none of these dimensions were associated with positive or negative growth. Likewise, scant attention has also been paid to the influence of socioeconomic risk factors on change in parental knowledge. In this area, increases in monitoring over time have been attributed to higher family income levels and residing in an urban neighborhood (Jones et al., 2003). These modest associations could be due to the inclusion of relatively few predictors in the few existing studies, the subtlety of changes in adolescence, or because there truly are no associations between other risk factors and change in levels of parents' knowledge over time.

The Current Study

The paucity of knowledge on the development and potential antecedents of parental knowledge motivated the initiation of the current study. We addressed two specific research questions. First, is there change or growth in parental knowledge during the transition to adolescence? Second, which early risk factors predict initial status and growth in knowledge? These questions were addressed using data from multiple informants and methods, in which we employed boys' reports of parental knowledge and data from parents, teachers, and trained observers to assess risk factors in early and middle childhood.

Based on the limited research available, we anticipated that boys would indicate stability or modest declines in parental knowledge over time. We also hypothesized that low levels of risk

prior to age 10 would be associated with higher levels of subsequent knowledge. Specifically, we anticipated that low levels of boys' externalizing problems, maternal depression, and neighborhood risk, and high levels of maternal responsivity and better mother-son relationships would predict high initial status and positive growth in parental knowledge. We also explored the possibility that ethnic differences would be present. We did not formulate any *a priori* hypotheses regarding ethnicity, as little work has been conducted comparing base rates or the magnitude of association between European American and African American samples.

The current study enjoys methodological improvements over previous studies on the development of parental knowledge. In particular, most existing studies have relied upon more normative samples (e.g., the CDP's sample is school-based; Laird, et al., 2003B), while the current analyses were conducted with an at-risk community-based sample of families. Furthermore, the current study models parental knowledge beginning at younger ages than have been used in previous studies, which have focused primarily on high school-aged youth (e.g., Laird et al., 2003A). Thus, this is the first study to examine whether these processes start coming into place prior to the mid-adolescent years, complemented by predicting characteristics from earlier in childhood.

Methods

Participants and Procedures

This study used data from a larger project on vulnerability and resiliency in low-socioeconomic status (SES) boys (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). The sample was restricted to boys because the original intent of the study was to examine precursors of antisocial behavior. Funding did not permit recruitment of a sufficiently large sample of girls who were expected to show serious levels of antisocial behavior. Recruitment took place at Women, Infants and Children (WIC) Nutritional Supplement Program clinics throughout the metropolitan

Pittsburgh area. Mothers with male infants 6 to 17 months of age were asked to take part in a longitudinal study on child development. Of 421 mothers approached at the WIC sites, 310 participated in the first assessment at age 1.5 years. At the time of the first assessment, mothers ranged in age from 17 to 43 years (M = 27.82, SD = 5.33). 288 families (85% of the original sample) participated in at least one of the age 10, 11, 12 and 15 assessments. With one exception, attrition analyses indicated that this subsample did not differ from the original study sample on any study variables or demographic characteristics. The exception was observed responsive parenting at the boys' age 24 month assessment: trained study examiners rated mothers of retained boys as more responsive (M = 9.54, SD = 2.14, range = 1-12) than mothers of attritted boys (M = 7.83, SD = 3.47, range = 1-12). Additional information about patterns of missing data within this subsample is provided following the descriptions of measures.

The resulting analytic sample was composed primarily of European American (52%) and African American boys (39%), with a small number of biracial (8.7%) and Hispanic (.4%) participants. As the vast majority of non-European American boys were part or fully African American, we combined the small samples of biracial and Hispanic participants with the larger African American group, and refer to non-European American boys as African American for the duration of this manuscript. Mean yearly family income when boys were age 10 was $28,511 ($SD$ = $18,539), corresponding to a per capita average of $6,431 ($SD$ = $4613). At age 10, 60% of the primary caregivers identified themselves as being married or living with a partner (77% of this group was still married or cohabiting at the age 15 assessment), 22% identified as single (never married; 73% were still single when their sons were 15 years old), and the remaining 18% were separated, divorced or widowed (44% of this group had married or were living with a partner by the age 15 assessment).

Data were collected during home and lab visits. One research assistant interviewed the

primary caregiver (at least 90% of the primary caretakers were mothers at each study timepoint), while another interviewed the target child. Teachers were recruited separately with the permission of the primary caretaker.

Measures

Study constructs were measured using a combination of self-report and observer-reported instruments.

Parental Knowledge of Boys' Behavior (ages 10, 11, 12, and 15). Interviewers asked children a series of questions about parental knowledge and discipline (Dishion, Patterson, Stoolmiller, & Skinner, 1991) at ages 10, 11, 12, and 15. The knowledge factor was based on 5 items focused on the degree to which parents were informed of boys' whereabouts, plans, and interests. Sample items included "How often does at least one of your parents know where you are after school?" and "How often does at least one of your parents have a pretty good idea about your plans for the coming day?" Boys responded to these items on a five-point response scale, ranging from 1 (*Never or almost never*) to 5 (*Always or almost always*). The scale demonstrated low to acceptable internal consistency at each timepoint (age 10 $\alpha = .58$, age 11 $\alpha = .60$, age 12 $\alpha = .71$, age 15 $\alpha = .75$). Scale scores were computed by averaging responses. In all cases, a higher score indicates greater perceived parental knowledge. These scores were moderately correlated (see Table 1).

Prior Externalizing Problems (Composite). Mothers completed the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983) when sons were ages 2, 3.5, 5, 5.5, 6, and 8, and teachers completed the Teacher Report Form (TRF; Achenbach & Rescorla, 2001) when boys were ages 6, 7, 8, and 9. At each timepoint, parents or teachers responded to a series of items corresponding to various facets of child problem behavior. Parents and teachers used a three-point response scale, ranging from 0 (*Not true [as far as you know]*) to 2 (*Very true or*

often true). At ages 2 and 3, the CBCL externalizing factor was created by summing the responses to the 11-item destructive behavior subscale and the 15-item aggressive behavior subscale. At all other time points, the 13-item delinquent behavior and the 20-item aggressive behavior factors were combined to form the externalizing scale score. The TRF externalizing factor was constructed by adding together the 9-item delinquent behavior subscale and the 25-item aggressive behavior subscale. Correlations between the individual externalizing factors were examined prior to averaging to confirm that parent and teacher scores were associated as expected. The externalizing factors from each timepoint and reporter were averaged to complete a composite index of previous externalizing behavior (α range = .88-.90).

Maternal Depressive Symptoms (Composite). Mothers completed the Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979) during study visits when their sons were 1.5, 2, 3.5, 5, 6, and 8 years old. At each timepoint, mothers reported on their depressive symptoms over the past 6 months by selecting the statement that best described them out of sets of four statements. Responses were summed at each assessment point, and higher scores indicate higher levels of depression (α range = .82-.88). Scores were highly correlated over time (*r* range = .42 - .72), and consequently were averaged across time points to generate a composite of maternal depressive symptoms.

Mother-Son Relationship Quality (Composite). Mother-son relationship quality was measured using 15 items adapted from the Student-Teacher Relationship Scale (Pianta & Steinberg, 1991). This measure was selected for adaptation because it taps attachment-related dimensions of relationship quality. It has been used successfully in other studies, and has been related to multiple adjustment difficulties (e.g., Criss & Shaw, 2003; Ingoldsby, Shaw, & Garcia, 2001). Primary caregivers provided responses to the same items at ages 5 and 8 years, resulting in four subscale scores. Openness subscales were calculated by summing participants' responses

to five items (average α = .70; sample item: "It's easy to be in tune with what he is feeling"). Conflict subscales were calculated by summing mothers' responses to 10 items (average α = .85; sample item: "He and I always seem to be struggling with each other"). The response scale ranged from 1 (*Definitely not*) to 5 (*Definitely*). As the factors were moderately negatively correlated (i.e., average $r = -.37$, $p < .001$), the conflict scores were subtracted from the openness scores. Following this transformation, the correlated composites ($r = .62$, $p < .001$) were averaged to form one index of parent-child relationship quality. Higher scores indicate better relationship quality.

Parental Responsivity (age 2). Study examiners completed the 36-item HOME Inventory for Families of Infants and Toddlers (Caldwell & Bradley, 1978) during home-based observations and an interview with the mother at age 2 years. The standard 11-item HOME emotional and verbal responsivity scale was used in analyses (α = .71; sample item: "Parent spontaneously praises child at least twice").

Neighborhood Risk (Composite). Neighborhood risk was ascertained by geocoding addresses according to U.S. census data at the block group level, the smallest unit for which all census data are available. Addresses were collected from 1991 to 2003, and were matched to census block groups at each study wave. Based on methods devised by Wikström and Loeber (2000) and adapted by Winslow (2001) and Schonberg and colleagues (Schonberg, Shaw, Beck, Vanderbilt, & McTeague, 2005), an index of neighborhood poverty was generated using the following census block group level variables: 1) median family income, 2) percent families below poverty level, 3) percent households on public assistance, 4) percent unemployed, 5) percent single-mother households, 6) percent African American, 7) percent with a bachelor's degree and higher. For data from assessments collected between 1990 and 1995, the 1990 census data were used; for data from assessments collected between 1996 and 2003, the 2000 census

data were used. These individual variables were standardized, summed, and then averaged (after reverse scoring median family income and percent with a bachelor's degree) to create an overall neighborhood risk factor score for each block group. Past research demonstrates that these variables correlate highly (Ingoldsby, Shaw, Schonberg, & Flanagan, 2003; Wikström & Loeber, 2000). Neighborhood risk scores were averaged across time points (i.e., ages 1.5, 2, 3.5, 5, 5.5, 6, and 8 years old) to generate a composite index of cumulative childhood neighborhood risk.

Missing Data

We examined patterns of missing data before addressing substantive research questions. The vast majority of families were present for three or more study waves (i.e., 11% participated in one assessments, 10% completed two visits, 17% had three waves and 63% had four waves of knowledge data), and fewer than 20% of cases were missing parental knowledge data at any timepoint. Further examination indicated that the probability of having missing data was attributable only to level of maternal depression, such that boys missing at the age 15 wave had mothers that reported more symptoms of depression (M = 9.40, SD = 5.33) than those who were present at age 15 (M = 7.32, SD = 5.29). As this suggested data were missing at random (MAR), missing scores were estimated using full information maximum likelihood procedures as part of growth modeling analyses (Enders, 2001).

Analysis Plan

Two sets of preliminary analyses were conducted prior to conducting the study's primary analyses. This included an examination of the study variables descriptive statistics and intercorrelations, as well as an investigation of the longitudinal measurement equivalence of the maternal knowledge measure. When latent growth in observed scores is modeled, the statistical assumption is that the scale demonstrates strong factorial invariance (i.e., items' loadings, error variances, and intercepts are equivalent over time). An examination of the current scale's

longitudinal measurement equivalence revealed that the scale displayed weak factorial invariance over time. The factor error variances were equivalent, and the factor loadings of the five items were invariant across the four assessment points. Consequently, growth in observed parental knowledge scores was modeled.

Substantive research questions were addressed in a series of latent growth models. These analyses were based on the multilevel model for change applied within a structural equation modeling (SEM) framework (for more details, see Bollen & Curran, 2006). Latent growth modeling is a constrained version of confirmatory factor analysis (CFA) with mean structure (Figure 1 depicts a latent growth model with quadratic growth). Individuals' scores on a variable assessed repeatedly over time are used to construct latent variables representing their individual growth trajectory. These individual curves are then used to calculate the sample's average growth curve, which is defined by the sample's mean initial status and growth rates (e.g., linear slope, quadratic curvature). To accomplish this, all of the intercept's factor loadings are set to "1" and the slope's loadings correspond to the study's time scale (in this case, "0" for age 10, "1" for age 11, and so forth). When a quadratic factor is specified, squared values of the slope's loadings are used (i.e., "4" for age 12, and "25" for age 15). The intercepts of the repeated measures are set to zero, and typically, the residual variances of the repeated measures are set to be equal. These model constraints "force" specific pieces of information from the repeated measures into the latent factors. Several pieces of information describing the construct's latent growth are obtained through model fitting. The fixed effects are estimates of the sample's average intercept, slope, and quadratic growth. In other words, the fixed effects describe average growth for the sample. The random effects represent sources of variability: The intercept and slope variances indicate whether there is significant variability in the construct of interest (i.e., whether individuals differ in terms of starting points or slopes). The residual variance captures

the "leftover" variance that is not explained by the latent intercept and slope factors. Finally, the covariance between the latent intercept and slope factors can also be interpreted to determine if the speed of growth is associated with initial status values.

Following the procedures recommended by Singer and Willett (2003), we performed three distinct phases of modeling. Unconditional models (i.e., growth models without predictors) were estimated initially to determine whether a linear or quadratic model best fit the data. Preliminary conditional models were computed next (i.e., growth models with predictors), in which each predictor variable was considered separately any other predictors (6 single-variable conditional models). In each model, the latent growth terms were simultaneously regressed upon a single predictor. Lastly, a "final" conditional model was estimated, in which the intercept, linear, and (if warranted) quadratic growth terms were all regressed simultaneously on the risk factors that emerged as significant predictors in the preliminary conditional models. All continuous predictor variables were mean-centered prior to their inclusion in conditional models to facilitate the interpretation of their estimated effects. For all models, time was centered at boys' age 10. All analyses were conducted in M-Plus version 4.0 (Muthén & Muthén, 2004).

The minimal requirements for adequate model fit were a non-significant chi-square statistic (χ^2), and a Root Mean Squared Error of Approximation (RMSEA) ranging from .05 to .10. The decision to retain a linear or quadratic model was based on the Akaike Information Criterion (AIC) and sample-sized adjusted Bayesian Information Criterion (BIC) values (Bollen & Curran, 2006; Singer & Willett, 2003). Models with smaller AIC and BIC values are preferable to models with larger values.

Results

Preliminary Analyses

Before conducting substantive analyses, study variable descriptive statistics and bivariate

correlations were examined (see Table 1). Intercorrelations (two-tailed) among study variables indicated expected patterns of covariation. High levels of parental knowledge at ages 12 and 15 were associated with low levels of prior externalizing problems. Likewise, relationship quality was positively correlated with parental knowledge at ages 11, 12 and 15, and maternal responsivity at age 2 was associated with high levels of parental knowledge at ages 11 and 12. High levels of neighborhood risk were associated with low levels of parental knowledge at age 12 only. Maternal depression was not correlated with parental knowledge at any assessment.

Describing Growth in Parental Knowledge

The first research question, growth of parental knowledge, was addressed through the estimation and examination of two unconditional latent growth models. These provided estimates of the fixed effects (i.e., average intercept and rates of change in knowledge) and the random effects (i.e., intercept, slope, and residual variances) across all respondents. Covariances (i.e., correlations) between the latent growth terms were also estimated.

Fit statistics suggested that a linear model provided relatively poor fit to the data, χ^2 fit (8) = 85.51, $p < .001$, RMSEA = .18, RMSEA 90% C.I. = .15 - .22, AIC = 2079.14, BIC = 2082.09. This prompted the testing of a quadratic model, which fit the data acceptably, χ^2 fit (4) = 4.56, $p > .05$, RMSEA = .02, RMSEA 90% C.I. = .00 - .09, AIC = 2006.19, BIC = 2011.11. Means estimated in these models are depicted in Figure 2.

Examination of the fixed effects of the quadratic model revealed that the average intercept, slope and quadratic growth components of perceived parental knowledge was significantly different from zero (intercept = 3.68, slope = .35, quadratic = -.06; all *p*s < .001). There was relatively rapid positive growth from ages 10 to 12 followed by a modest gradual decline from ages 12 to 15. There was significant individual variability in intercepts ($\sigma_i^2 = .40$), linear slopes ($\sigma_l^2 = .24$), and quadratic curvature ($\sigma_q^2 = .006$; all *p*s < .001). This indicates that

boys' initial levels of parental knowledge varied, as did their rates of growth and curvature over time. Finally, all latent growth terms were significantly correlated. Specifically, higher intercepts corresponded to slower linear growth and (r = -.57, p < .001) and less quadratic curvature (r = .46, p < .01). The quadratic and linear growth components were negatively correlated (r = -.97, p < .001), indicating that faster growth was counterbalanced by greater curvature over time. The quadratic model of growth was retained for all subsequent conditional analyses.

Factors Associated with Initial Levels and Growth in Parental Knowledge

In this section, we focus on the patterns of associations between predictors and growth parameters, which are evaluated in conditional latent growth models (i.e., models with predictors). As a consequence of using centered predictor variables, the unstandardized regression weights were used to interpret the results of these analyses. In any conditional model, with all other predictors in the model held constant, every 1-unit change in the predictor corresponds to a change in parental monitoring equal to the unstandardized regression weight for that predictor. Each of the following predictor variables was examined within a univariate framework to examine associations with boys' initial status (i.e., at age 10) and growth of knowledge from ages 10 to 15: ethnicity, boys' externalizing, maternal depressive symptoms, mother-son relationship quality, and maternal responsivity. When analyses revealed associations between a growth parameter and a predictor, we plotted the regression line for growth in knowledge at one standard deviation above and below that predictor's mean.

Preliminary conditional analyses revealed significant associations between some predictors and model growth components (see Table 2 for regression weights). Prior externalizing was associated with negative linear and positive quadratic growth (see Figure 3a). For boys with fewer externalizing problems, growth in parental monitoring increased relatively rapidly and demonstrated more quadratic curvature over time. In contrast, boys with greater prior

externalizing problems evidenced slower linear growth and less quadratic curvature. Higher levels of observed early responsivity were associated with higher initial status in monitoring (see Figure 3b). No other study constructs emerged as predictors of intercept, linear or quadratic growth in preliminary conditional models.

The final analytic step consisted of testing a final conditional growth model that included only the subset of variables that had already been revealed as significant predictors (i.e., boys' prior externalizing and maternal responsivity). Higher levels of age-2 maternal responsivity continued to be associated with higher levels of initial status in parental monitoring. Boys' prior externalizing was the sole predictor of linear and quadratic growth in monitoring, continuing to be associated with modest negative linear change and slight positive quadratic change. Model fit was acceptable, χ^2 fit (6) = 4.75, $p > .05$, RMSEA = .00, RMSEA 90% C.I. = .00 - .07, AIC = 4659.62, BIC = 4667.49.

Discussion

The current study addressed two primary research questions. First, we examined linear and quadratic models of growth in parental knowledge of boys' behavior during the transition to adolescence. Results indicated that there was quadratic growth in knowledge. Parental knowledge increased from ages 10 to 12, and was relatively stable to age 15. Second, we also examined whether child and family factors predicted initial status and/or growth. Maternal responsivity at age 2 was associated with higher levels of parental knowledge at age 10, and a history of early externalizing problems was linked to slower linear growth and less quadratic curvature from ages 10 to 15.

Describing and Explaining Change in Parental Knowledge

Consistent with prior research, unconditional models of parental knowledge revealed that there was significant change over time (e.g., Jones et al., 2003). Contrary to prior research, which

has suggested that change in monitoring during adolescence is stable and relatively linear (i.e., Laird et al., 2003A; Laird et al., 2003B), a quadratic model fit the data better than a linear model. However, once the disparate methodological features of the studies are considered (i.e., age ranges of youth, different sampling strategies), our results are fairly consistent with prior work. The decline in parental knowledge of boys' behavior after age 12 in the current study corresponds to the nonsignificant linear decline evidenced by boys from lower risk backgrounds at ages 14 to 18 in the CDP study (Laird et al., 2003B), and by boys ages 10 to 14 at comparable levels of risk (Fite et al., 2006).

In addition to distinct research strategies, two additional explanations remain for the discrepancies in growth evidenced between the CDP and the current study. First, it is possible that parental knowledge may have evidenced quadratic growth in the normative CDP sample prior to high school, and these changes were not visible because knowledge was not assessed in the CDP study during the late school-age period. Second, it is possible that the 'precocious' growth in parental knowledge, relative to growth reported in the CDP study, may be related to the current sample's relatively high-risk status. Compared to parents of children in the CDP sample (Laird et al., 2003A; Laird et al., 2003B), parents of children from lower income communities might seek to increase their levels of knowledge at younger ages because of the (accurate) perception of higher risk in the neighborhood (Richters & Martinez, 1993). However, to fully resolve these discrepancies, future studies are needed using families from a broader SES range, similar measures, and study periods spanning from middle childhood through adolescence.

Predictors of Initial Levels and Growth in Parental Knowledge

When child and family factors were examined in univariate models, only high levels of early maternal responsivity predicted high initial status in parental knowledge. That observed

responsivity at age 2 was associated with knowledge at age 10 is consistent with cross-sectional research on the relations between parental knowledge and adolescent self-disclosure (Soenens et al., 2006). At a broader level, this finding is consistent with the notion that there is heterotypic continuity in related dimensions of parenting from toddlerhood to the transition to adolescence. Responsivity may be a logical precursor of parental monitoring processes that are observable in early childhood. Mothers who were responsive to their son's needs at age 2 appear to maintain higher levels of involvement in their son's life at age 10 (Patterson, Reid, & Dishion, 1992). Early responsiveness may foster the development of a mother-son relationship that is low in conflict and high in affective warmth or openness during middle childhood. This notion is supported by the small but significant correlations of relationship quality with early responsivity ($r = .19$; 2-tailed $p < .01$). However, this study revealed no direct associations between relationship quality and intercept or growth in parental knowledge in this smaller-sized sample of at-risk boys. It is possible that this discrepancy is due to the measure of relationship quality employed in this study, which was adapted from a scale of student-teacher relationship qualities (Pianta & Steinberg, 1991). Yet, it remains equally likely that mother-son relationship quality is a less vital antecedent of parental knowledge in at-risk samples than it is in comparatively normative samples (e.g., Laird et al., 2003B; Stattin & Kerr, 2000). This notion warrants further investigation in future studies.

We also examined the associations between the model's growth parameters and the same set of child and family-level predictors. Only one factor, prior externalizing behavior, was associated with the growth components in the univariate models. High levels of prior externalizing problems were associated with slower linear growth and less quadratic curvature (i.e., flatter growth over time). This pattern is consistent with previous longitudinal research suggesting that high levels of externalizing symptoms are linked to low levels of parental

knowledge (e.g., Fite et al., 2006). It is possible that more deviant boys gradually elicit less parental involvement than less deviant boys as mothers come to believe that they have less power in governing their child's disruptive behavior. These parents may become frustrated and either provide children with too much autonomy too soon or disengage from their socialization responsibilities. It is also possible that boys with a history of externalizing problems demonstrate greater skill in evading parental supervision over time (Stoolmiller, 1994). We were not able to determine which mechanism was operative in the current study, but this issue merits attention in future research.

Study Limitations and Future Directions

Despite advancing our understanding of the course of parental knowledge during the transition to adolescence and providing novel data on the early precursors of such patterns, the study has several notable methodological limitations. First, the study sample was comprised entirely of low-income boys from an urban context who were primarily of European American or African American ethnicity; thus, the current results may be less generalizable to girls, children from non-urban settings, or to boys and girls from biracial or other ethnic backgrounds. Prior studies have revealed systematic differences in monitoring by gender (Cottrell et al., 2003), ethnicity (Shakib et al., 2003), family structure and socioeconomic status (Pettit et al., 2001). It would also not be surprising if the results were also different for children living in rural or suburban communities. Thus, replication of the current findings in a more socioeconomically and ethnically diverse sample of boys *and* girls is necessary to determine whether these findings are applicable to both genders and across ethnic, family, socioeconomic and geographic backgrounds.

A second limitation involved the measurement of study constructs. With the exception of interviewer-based observations of early maternal responsivity and census-based data on

neighborhood risk, study data were based on questionnaires or interviews, which could have resulted in inflated correlations between constructs due to common method variance. We were able to limit reporter bias through the use of multiple informants (primary caretakers, teachers, interviewers and youth) and by aggregating measures across informant to generate constructs. Furthermore, the measure used in the current study tapped only the parental knowledge portion of the full parental monitoring construct (see Stattin & Kerr, 2000). It must be noted, however, that this five-item scale demonstrated low to acceptable levels of internal consistency. Cronbach's alphas improved over the course of the study, which may be due to improvements in boys' reading abilities or growing familiarity with study questionnaires. For future longitudinal investigations, researchers are urged to consider alternate reporters, methodologies, and instruments, particularly parental knowledge scales with better internal consistencies.

We focused on sons' perceptions of maternal knowledge in the current study. Undoubtedly fathers also play a critical role in monitoring their children's activities and whereabouts (Waizenhofer, Buchanan, & Jackson-Newsom, 2004); however, many of the study children live in mother-headed, single-parent families, and thus fathers were not available for participation for the majority of study families. Data were collected on fathers when they were available and when they chose to participate, but such limited father participation precluded conducting separate analyses on paternal monitoring as part of the study.

Conclusions

The current findings, if replicated across child gender, ethnicity, and socioeconomic background, could have important implications for early identification and prevention of problem behavior. As parental knowledge during the late school-age period and adolescence has been consistently associated with lower rates of youth problem behavior (e.g., Dishion et al., 1991), identifying targets in early childhood that promote initial levels and growth in parental

knowledge during the transition to adolescence should be a priority. In the current study, early maternal responsivity was found to predict maternal knowledge at age 10, and a history of child externalizing problems from ages 2 to 8 was associated with linear and quadratic growth in knowledge from ages 10 to 15. These findings suggest that resources should be invested in programs that effectively increase parental responsivity in early childhood, as well as other factors that lead to early-starting trajectories of child externalizing problems (Olds, 2002; Shaw et al., 2003).

In summary, the current study extends prior research on the development and precursors of parental knowledge during the transition to adolescence by examining antecedents beginning in early childhood and using a sample of boys at risk for serious antisocial behavior. The study also provides novel information about the course of knowledge for these boys during the transition to adolescence, revealing subtle changes during late childhood and early adolescence. Elements of early parenting and boys' previous externalizing problems appear to contribute to monitoring during the transition to adolescence, which may inform future programs intended to promote parent-child involvement and prevent youth problem behaviors.

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Table 1

Study Variable Descriptive Statistics and Correlations

		M	*SD*	2	3	4	5	6	7	8	9
1	Knowledge – age 10	3.66	.80	.39**	.25**	.14*	.06	-.04	.05	.16*	-.06
2	Knowledge – age 11	3.99	.70		.56**	.30**	-.13	-.13	.18**	.21**	-.06
3	Knowledge – age 12	4.13	.74			.43**	-.20**	-.11	.15*	.14*	-.18**
4	Knowledge – age 15	4.03	.73				-.14*	-.11	.14*	.10	.02
5	Externalizing Problems	13.17	6.18					.42**	-.62**	-.18**	.24**
6	Maternal Depression	7.56	5.32						-.40**	-.03	.23**
7	Relationship Quality	3.92	.57							.18**	-.16**
8	Maternal Responsivity	9.54	2.14								-.26**
9	Neighborhood Risk	.32	.96								

Note. * $p < .05$, ** $p < .01$ (2-tailed).

Table 2

Results of Conditional Analyses Predicting Growth in Parental Knowledge

	Intercept			Linear			Quadratic		
Model / Predictor	B	SE B	R^2	B	SE B	R^2	B	SE B	R^2
Single-Variable Models									
Ethnicity	.04	.10	.00	.14	.09	.02	-.03	.02	.03
Externalizing Problems	.01	.01	.00	-.02**	.01	.09	.01**	.00	.09
Maternal Depression	-.01	.01	.00	-.01	.01	.01	.00	.00	.01
Relationship Quality	.08	.09	.01	.10	.08	.02	-.02	.01	.02
Maternal Responsivity	.07**	.02	.05	-.00	.02	.00	.00	.00	.00
Neighborhood Risk	-.02	.05	.00	-.07	.05	.02	.02	.01	.03
Final Model			.06			.09			.09
Externalizing Problems	.01	.01		-.02**	.01		.01**	.00	
Maternal Responsivity	.07**	.02		-.02	.02		.00	.00	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure Captions

Figure 1. The unconditional model of quadratic growth.

Figure 2. Means estimated in the unconditional linear and quadratic growth models.

Figure 3a. Means estimated in the conditional model for boys' prior externalizing problems.

Figure 3b. Means estimated in the conditional model for early maternal responsivity.

Figure 1

The Unconditional Quadratic Latent Growth Model

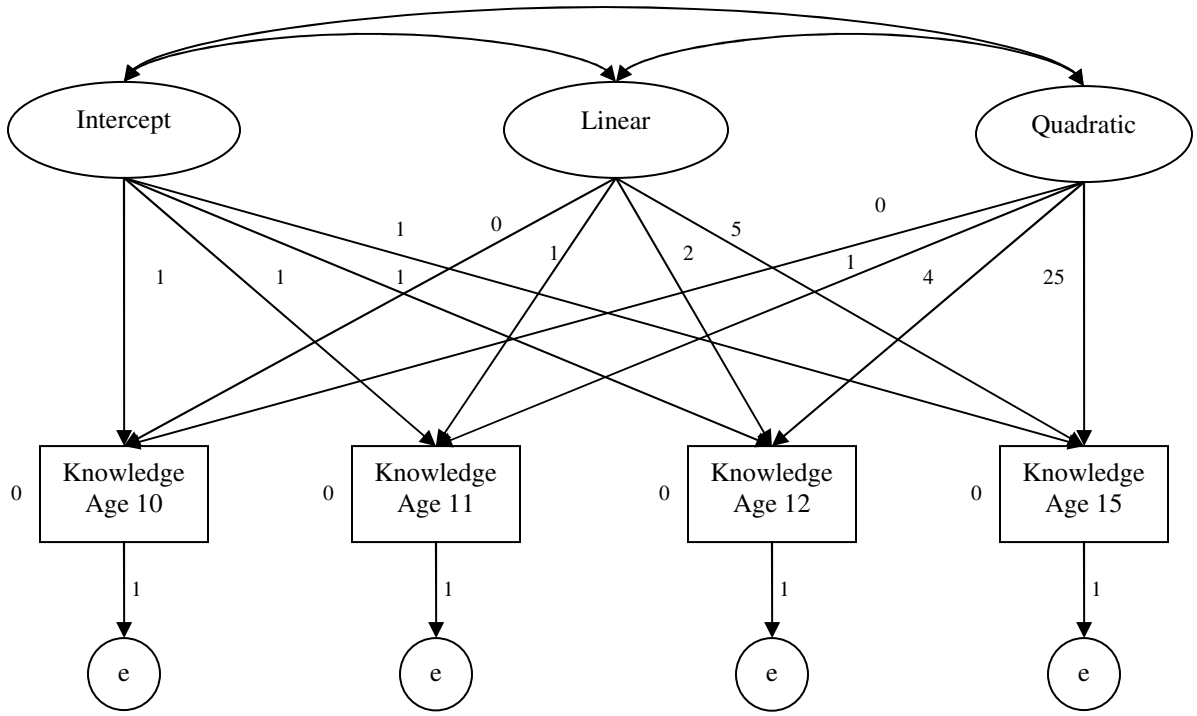

Figure 2

Estimated Linear and Quadratic Growth in Parental Knowledge

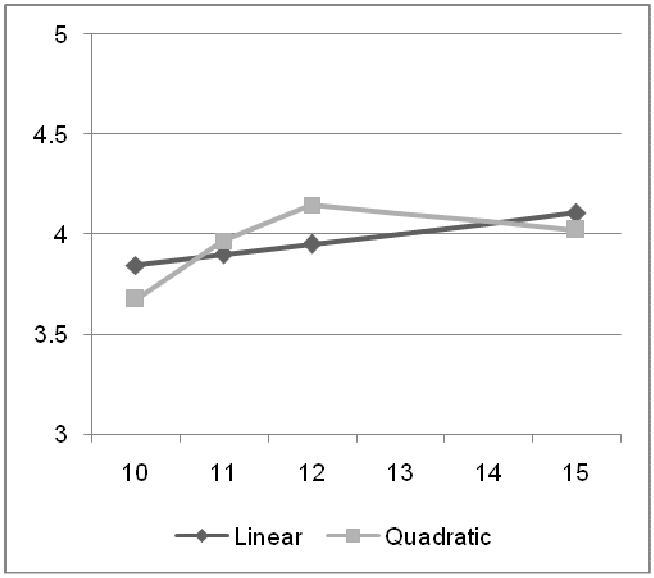

Figure 3

Means Estimated in Conditional Quadratic Models