



Published in final edited form as:

*J Abnorm Child Psychol.* 2008 July ; 36(5): 647–662. doi:10.1007/s10802-007-9162-z.

## **Bidirectional Associations between Parenting Practices and Conduct Problems in Boys from Childhood to Adolescence: The Moderating Effect of Age and African-American Ethnicity**

**Dustin A. Pardini,**

Department of Psychiatry, University of Pittsburgh Medical Center, 201 N. Craig St., Suite 408, Pittsburgh, PA 15213, USA

**Paula J. Fite,** and

Department of Psychology, University of Tennessee, Knoxville, TN, USA

**Jeffrey D. Burke**

Department of Psychiatry, University of Pittsburgh Medical Center, 201 N. Craig St., Suite 408, Pittsburgh, PA 15213, USA

Dustin A. Pardini: dap38@pitt.edu

### **Abstract**

This study examined the bidirectional relationship between parent and teacher reported conduct problems in youth and parenting practices using a longitudinal sample of boys assessed from 6 to 16 years of age. Analyses tested whether these bidirectional associations changed across development and whether the nature of these associations varied across African-American and Caucasian families. Overall, the results supported a bidirectional relationship between conduct problems and all parenting practices examined from childhood to adolescence. The influence of conduct problems on changes in parenting behaviors was as strong as the influence of parenting behaviors on changes in conduct problems across development. Changes in the bidirectional relationship across development were found in some, but not all, models. While corporal punishment was more strongly related to changes in teacher-reported conduct problems for African-American boys compared to Caucasian boys, more similarities than differences were found between the ethnic groups in terms of the bidirectional associations examined.

### **Keywords**

Parenting; Conduct problems; African-American; Bidirectional; Longitudinal; Development; Physical punishment

---

Several theoretical models on the development of conduct problems in youth postulate that parenting practices and conduct problems mutually influence one another across time (e.g., Patterson 1995). However, positive associations between conduct problems and parenting practices in cross-sectional studies have historically been interpreted as evidence that parenting behaviors are a cause, not an effect, of youth conduct problems (McLeod et al. 1994). While intervention studies support the notion that parenting practices influence changes in conduct problems (Pardini in press), the influence of conduct problems on changes in parenting behaviors has largely been ignored (Crouter and Booth 2003). Furthermore, relatively few

longitudinal studies have examined whether the postulated bidirectional associations between youth conduct problems and parenting practices systematically change across development, or whether the nature of these associations varies across different ethnic groups.

## The Bidirectional Parent–Child Relationship

Patterson and colleagues coercion model provides a classic conceptualization of the bidirectional association between child conduct problems and parenting practices (Patterson 1995, 2002; Patterson et al. 1992; Snyder and Stoolmiller 2002). According to this model, children who are oppositional and defiant tend to elicit comparable aversive behaviors, such as hostile verbal reprimands and physical punishment from parents. Once these aversive interchanges are initiated, children with conduct problems tend to actively resist parental attempts at control by increasing the intensity of their problem behavior, fostering a reciprocal pattern of poor parent–child communication. As these coercive exchanges become more entrenched and intense over time, the parent becomes less involved with the child and more timid when enforcing rules as a means of avoiding these aversive exchanges. The child, in turn, learns that requests and attempts at control can be avoided by increasing the intensity and/or duration of aversive behavior, leading to further escalations in conduct problems. Moreover, the child tends to receive less positive reinforcement for prosocial behaviors as the parent withdraws from the aversive relationship. This parental withdraw is often accompanied by reductions in parental monitoring, leaving the child free to affiliate with deviant peers who further reinforce antisocial behaviors and beliefs.

Bell's control system model of socialization also proposes reciprocal parent–child relations. This theory suggests that there are upper and lower limit expectations set by parents and children (Bell 1980). When one participant's behavior exceeds the upper (or lower) expectation threshold of the other participant, the other participant reacts to bring the behavior back to an appropriate level. For example, if a child fails to follow instructions, a parent may remove privileges in order to bring their child's behavior back to the desired level (i.e., compliance). Likewise, an adolescent may refuse to speak to an overly intrusive parent until they back down and respect a minimum level of privacy. According to this model, a failure to change the other participant's behavior can elicit anger/frustration and ultimately an overreaction, including the use of poor parenting practices (e.g., overly harsh physical punishment) and increases in oppositional and aggressive child behavior (Bell 1980).

Although longitudinal studies on the bidirectional association between conduct problems and parenting practices are limited, emerging evidence supports these models. For example, conduct problems have been associated with increases in ineffective/irritable parenting, while ineffective/irritable parenting is associated with increases in conduct problems from kindergarten to 1st grade (Snyder et al. 2005). McLeod et al. (1994) found evidence of a reciprocal association between increases in physical punishment and higher child conduct problems over time in a longitudinal sample of children (mean age=8.3). Similarly, evidence supports a reciprocal relationship between parental discipline and boys' antisocial behavior at 6th grade, with high levels of good parental discipline eliciting low levels of boys' antisocial behavior and low levels of antisocial behavior eliciting higher levels of good parental discipline (Vuchinich et al. 1992). Research with adolescents has found that poor parental monitoring is predictive of increased delinquency, while increased delinquency also predicts higher levels of poor monitoring from 9th to 12th grade (Laird et al. 2003). Thus, theory and emerging empirical work support a bidirectional relation between conduct problems and parenting behaviors from childhood to adolescence.

## Developmental Timing and the Bidirectional Parent–Child Relationship

An issue that has been largely ignored is the influence that developmental timing may have on bidirectional associations between parenting behaviors and conduct problems. Patterson's coercion model posits that parental monitoring and positive parent–child communication become more important for preventing the escalation of conduct problems during adolescence, as youths gain greater independence and begin spending more time with peers outside of the home (Shaw and Bell 1993). In contrast, it is also possible that parenting practices that are unrelated to monitoring dissipate during adolescence as friends become more influential and youth increasingly separate themselves from the family (Pardini et al. 2005). Because adolescence is also a period when youth become more actively involved in initiating and controlling family interactions, the influence of youth conduct problems on parenting practices may actually increase during this period.

There is some limited evidence indicating that developmental timing may influence the bidirectional associations between parenting practices and conduct problems. For example, increased physical punishment has been most consistently associated with increases in detrimental outcomes when used with children ages 7.5 to 10 (for review see Larzelere 2000), but evidence supporting the detrimental effects of physical punishment are less clear for younger children and adolescents (Frick et al. 1999). Similarly, longitudinal evidence indicates that increased family conflict is associated with boys adopting beliefs that are more tolerant of delinquency in late childhood (mean ages 10–12), but not in the teenage years when peers become more influential (Pardini et al. 2005). On the other hand, longitudinal evidence indicates that poor parental monitoring is a particularly robust predictor of increases in conduct problems during adolescence (Laird et al. 2003), and the influence of youth conduct problems on increases in poor parental monitoring seems to strengthen from childhood to adolescence (Fite et al. 2006; Laird et al. 2003). However, we are aware of no longitudinal studies that have directly tested whether the bidirectional association between conduct problems and parenting practices systematically changes from childhood to adolescence.

## Ethnicity and the Bidirectional Parent–Child Relationship

The importance of examining ethnic differences in the bidirectional associations between parenting practices and conduct problems has received growing attention in recent years. For example, research with youth living in the United States suggests that the link between conduct problems and parenting practices (particularly physical punishment) may differ between African-American and Caucasian families (Gershoff 2002). For African American children, several studies have found that non-abusive physical punishment may be unrelated to conduct problems, whereas physical punishment is more consistently associated with increases in conduct problems for Caucasian children (Larzelere 2000). However, these studies have been limited by a reliance on cross-sectional data, a failure to adequately account for prior levels of conduct problems, and/or the use of relatively small samples of African-American families. Moreover, ethnic differences in the associations between other parenting factors (e.g., positive reinforcement, involvement) and later conduct problems in youth have largely been ignored.

Longitudinal studies examining possible ethnic differences in the influence youths' conduct problems may have on parenting behaviors across time are also rare. Turning again to physical punishment, studies have shown that African-American parents are more likely than Caucasian parents to endorse and use physical punishment to discipline their children (Giles-Sims et al. 1995; McLoyd and Smith 2002). However, it is unclear if African-American parents are more likely to increase their use of physical discipline in response to their child's conduct problems in comparison to Caucasian parents. Some preliminary work in this area suggests that youth conduct problems tend to elicit increases in the use of physical punishment in both African-

American and Caucasian families (McLeod et al. 1994), but this issue has not been extensively examined. In addition, studies examining differences between African American and Caucasian parents in terms of the associations between youth conduct problems and changes in parenting behaviors other than corporal punishment are needed.

## The Current Study

To address limitations in the existing literature, the current study will examine the bidirectional relationship between youth conduct problems and parenting practices using a longitudinal sample of boys assessed from 6 to 16 years of age. Participants were assessed every 6 months across this ten year period, making the current study better suited than previous investigations for examining reciprocal parent–child interactions, as well as exploring systematic changes in these relationships across development. In addition, bidirectional models will be examined for several facets of parenting linked to the development of conduct problems (i.e., positive reinforcement, timid parenting, physical punishment, parental monitoring, parental involvement, and poor communication), and will be tested using multiple informants of conduct problems (i.e., parents and teachers). The current study will also examine whether the nature of the bidirectional parent–child relationship varies across African-American and Caucasian families. Lastly, these models will be tested after controlling for multiple socioeconomic and structural family characteristics that may confound the bidirectional associations of interest.

Based on Patterson’s coercion model (Patterson 1995), it was hypothesized that a bidirectional association between youth conduct problems and various parenting practices would be found from childhood to adolescence. These effects were expected to be present for both parent and teacher reports of conduct problems. Based on the findings of Laird et al. (2003), we hypothesized that the strength of the reciprocal relationship between parental monitoring and child conduct problems would increase from childhood to adolescence. In addition, we anticipated that there would be an overall tendency for youth to exert a stronger influence on problematic parenting practices over time as they entered adolescence and began exerting more control in family interactions. Based on prior research (Larzelere 2000), we also anticipated that physical punishment would be more strongly related to changes in conduct problems for Caucasian youth compared to African-American children. However, it was anticipated that there would be no ethnic differences in the association between conduct problems and increases in parents’ use of physical punishment across time (McLeod et al. 1994).

## Methods

### Participants

The Pittsburgh Youth Study consists of three cohorts of boys who were in the first, fourth, and seventh grades when the study began (called the youngest, middle, and oldest cohorts, respectively). The staff of the Board of Public Education provided names and addresses of all eligible first, fourth, and seventh grade boys in participating schools in 1987–1988. From this pool, there were 1,165 (1st grade), 1,146 (4th grade) and 1,125 (7th grade) children randomly selected for potential participation in the screening. Follow-up data were collected on a subset of screening boys. This follow-up sample was selected using a screening risk score that measured each boy’s antisocial behavior using parent, teacher, and self-report instruments. Within each grade-based cohort, boys identified at the top 30% on the screening risk measure ( $n \approx 250$ ), as well as an equal number of boys randomly selected from the remainder ( $n \approx 250$ ), were selected for follow-up. The first follow-up took place 6 months after screening for boys in the youngest ( $N=503$ ), middle ( $N=508$ ) and oldest ( $N=506$ ) cohorts. The mean age of boys in the youngest ( $M=6.9$ ,  $SD=0.55$ ), middle ( $M=10.2$ ,  $SD=0.76$ ), and oldest ( $M=13.4$ ,  $SD=0.78$ ) cohorts of the follow-up sample was similar to the screening sample. The ethnic composition

of the youngest (Caucasian=40.56%, African-American=55.67%, Hispanic=0.20%, Asian=0.99%, Native American=0.20%, mixed ethnicity=2.39%), middle (Caucasian=42.72%, African-American=52.36%, Hispanic=0.19%, Asian= 0.79%, mixed ethnicity=3.94%), and oldest (Caucasian= 41.70%, African-American=55.55%, Hispanic=0.20%, Asian=0.40%, mixed ethnicity=3.16%) cohorts was also similar to the screening sample (for further details see Loeber et al. 1998). Because participants were primarily African-American or Caucasian (95.85%), ethnicity was dichotomized so that participants who reported any African-American or “black” ancestry were compared to Caucasians and all other ethnic groups. However, when the analyses were rerun including only African-American and Caucasian participants the significant ethnic group differences observed remained unchanged, indicating that the results can be extended to direct comparisons between African-American and Caucasian participants. These supplemental analyses are available upon request from the primary author.

## Procedures

Data collection on the PYS cohorts initially took place every six months, and then switched to annual assessments. Because the current study was interested in examining bidirectional parent–child influences that may occur over relatively brief periods of time, only 6 month assessments were used in the current investigation. The number of six month assessments after screening collected on each of the cohorts varied slightly due to lapses in funding (youngest=8, middle=6, oldest=5). At each assessment, an interview was conducted with the boy and his primary adult caretaker (hereafter referred to as “parent”), and self-administered questionnaires were completed by the parent and teacher. Most interviews were conducted within the participants’ homes. Prior to each assessment, informed written consent was obtained from the boys and their parents. The data collection procedures were approved by the Institutional Review Board at the University of Pittsburgh (for details see Loeber et al. 1998).

The PYS represents an accelerated longitudinal design in which different age cohorts were followed over time. In order to use all available data while covering the largest possible developmental span, the data were restructured into aged-based assessments for all 6 month intervals. Participants’ ages were rounded down to the nearest half month prior to this restructuring (e.g., age 7.7 years rounded to 7.5 years). Following this restructuring, data from the three cohorts were concatenated by linking assessments that occurred at overlapping ages (see Table 1). This age-based restructuring resulted in 6 month assessments spanning the ages of 6.5 to 16.5 in which the sample size and relative proportion of participants from each of the three grade-based cohorts varies. As seen in Table 1, most participants made the transition from elementary to middle school at 11–12 years of age and then transitioned from middle to high school at 14–15 years of age.

## Measures

### Child Conduct Problems

Parent- and teacher-reported conduct problems were assessed using the self-administered Child Behavior Checklist (Achenbach 1991) and the Teacher Report Form (Achenbach and Edelbrock 1986). The recently developed scales related to symptoms of oppositional defiant disorder (ODD) and conduct disorder (CD) were used to index conduct problems in the current study (Achenbach and Rescorla 2001). The ODD analog scale consists of 5 items for both the parent and teacher report (e.g., “argues a lot,” “stubborn, sullen or irritable”). The CD analog scale is indexed by 16 items for the parent report and 12 items for the teacher report (e.g., “gets in many fights,” “lying or cheating”). Parents and teachers were asked to rate each item on a 3-point scale (0=“not true”, 1=“sometimes true”, 2=“very true”), and items were summed so that higher scores indicated increased levels of problem behavior. Research has supported the

reliability and concurrent validity of these scales in clinic and community samples (Achenbach et al. 2003; Krol et al. 2006). The internal consistency for the ODD and CD analog scales was moderate to high across all time points for parent (mean  $\alpha$ s=0.77 and 0.86, respectively) and teacher (mean  $\alpha$ s= 0.91 and 0.91, respectively) report.

Items from ODD and CD analog scales were summed to create a total conduct problems (CP) score for both parent and teacher report. The correlation between the ODD and CD scales was high across all time points for parents ( $r$ s from 0.66–0.73) and teachers ( $r$ s from 0.80–0.86). Consistent with prior research (Achenbach et al. 2003), the correlation between the parent- and teacher-reported CP scales ranged from 0.26 to 0.40. The scales were square root transformed prior to the analyses to help normalize the positively skewed distributions. However, when analyses were rerun using the untransformed constructs, the results were similar to those reported here.

## Parenting Practices

Information on parenting behaviors was collected using questionnaires administered to parents every 6 months. In most cases, the parent was the boys' biological mother (89.5%), biological father (3.7%), or grandmother (3.1%). The remaining 3.7% of parents were related to the child in some other manner (e.g., stepmother, stepfather, aunt, uncle, grandfather, foster mother). For each questionnaire, parents were asked to answer using the past 6 months as the reference period. Because parenting measures often include items that are more indicative of the child's behavior than parenting practices per se, three doctorate level clinical psychologists reviewed all items included in the scales below. Items that were determined to be clearly indicative of the child's behavior were eliminated (e.g., "Does your son leave you a note or call you to let you know where he is going?"). Previous investigations have shown that these parenting measures are associated with antisocial behavior in youth (Loeber et al. 1998, 2005). Further details regarding the psychometric properties, temporal stability and mean change in these measures across development are reported elsewhere (Loeber et al. 2000).

**Poor Parent–Child Communication**—The Revised Parent–Adolescent Communication Form (RPACF; Loeber et al. 1998) asks parents how often they discuss issues with their child in an open and supportive manner while gradually fostering the child's psychological autonomy (e.g., "Do you encourage your son to think about things himself and talk about them so that he can establish his own opinion?") Parents responded using a 3-point scale (0="almost never," 1="sometimes," 2="always"). Some items were reverse-scored before being summed so that higher total scores represented poorer parent–child communication. This scale displayed moderate levels of internal consistency across the assessments used (mean  $\alpha$ =0.80).

**Physical Punishment**—One item from the Discipline Scale (Loeber et al. 1998) was used to examine the use of physical punishment (i.e., "If your son does something that he is not allowed to do or that you don't like, do you slap or spank him, or hit him with something?") Parents responded using a 3-point Likert rating scale (1="almost never," 2="some-times," 3="often"). Because the number of parents who endorsed "often" using physical punishment was extremely low at nearly all phases (<5%), this item was dichotomized by combining the categories of "sometimes" or "often." This index of physical punishment has been shown to exhibit moderate temporal stability and has been associated with antisocial behavior in youth (Loeber et al. 2000, 2005).

**Low Positive Reinforcement**—Seven questions from the Positive Parenting scale (Loeber et al. 1998) were used to assess how often parents provided their child with positive reinforcement when he has complied with requests or has done something well (e.g., "When your son did something that you liked or approved of, how often did you give him a wink or

a smile?”). Parents answered using a 3-point scale (1=“almost never,” 2=“sometimes,” 3=“often”). Most items are reverse-scored before being summed so that higher scores represented lower positive reinforcement behaviors. The internal consistency of this scale was moderate across all assessments in the current study (mean  $\alpha=0.78$ ).

**Poor Parental Monitoring**—Four items from the Supervision/Involvement scale (Loeber et al. 1998) were used to assess parental monitoring (e.g., “Do you know who your son’s companions are when he is not at home?”). Responses were scored on a 3-point rating scale (1=“almost never,” 2= “sometimes,” 3=“almost always”). All items were reverse-scored prior to summing the ratings, so that higher ratings indicated poorer parental supervision. Although the internal consistency of the monitoring scale was modest across the assessments (mean  $\alpha=0.56$ ), evidence indicates that this measure is related to the development of antisocial behavior in youth (Loeber et al. 2005). The scale was positively skewed so a natural log transformation (after adding one to eliminate scores of zero) was used to help normalize the distribution. However, the results remained largely unchanged when analyses were run using the untransformed construct.

**Timid Parenting**—Four items from the Discipline Scale (Loeber et al. 1998) were used to measure parents’ reluctance to enforce rules because they are intimidated by their son’s behavior (e.g., “Do you hesitate to enforce the rules with your son because you fear he might then harm someone in your household?”). Responses to these items were measured using a 3-point rating scale (1=“almost never,” 2=“some-times,” 3=“often”). All items were summed so that higher ratings indicated increased levels of timid parenting. The scale exhibited moderate levels of internal consistency across the waves assessed (mean  $\alpha=0.72$ ).

**Low Parental Involvement**—Six items from the Supervision/Involvement measure (Loeber et al. 1998) were used to assess how often parents engaged in joint activities with their son (e.g., “Do you and your son do things together at home?”). Responses to items were measured using a 3-point rating scale (1=“hardly ever,” 2=“sometimes,” 3=“often”). Items were reverse scored and then summed so higher scores were indicative of lower involvement. The average internal consistency was moderate across all assessments (mean  $\alpha=0.72$ ).

## Potential Confounds

**Family/Parent Demographics**—A parent-report Demographic Questionnaire (Loeber et al. 1998) was used to collect time-varying information regarding family composition and parent characteristics. Information on parents’ educational attainment and current occupation were used to calculate the Hollingshead Index of socioeconomic status (Hollingshead 1975). Information was also collected on parents’ age, working status (employed part or full time/unemployed), the presence of a romantic partner in the home (e.g., husband/wife, boyfriend/girlfriend), and the number of children in the home.

**Parental Help-Seeking for Mental Health Problems**—Information on parental mental health problems was assessed using the Family Health Questionnaire (Loeber et al. 1998). As part of this annually administered questionnaire, parents were asked to indicate whether they or their spouse/partner (when applicable) had “sought help for problems with emotions, nerves, drugs, alcohol, mental health, or marital relations” over the past year. Because this question was asked on an annual basis, a single time-invariant construct was created to indicate whether the boys’ parent(s) had sought help for the aforementioned problems at any time during the age span assessed.

## Data Analysis Plan

The data were analyzed using population-averaged generalized estimating equation (GEE) models with STATA version 8.2 (StataCorp 2004). GEE models account for non-independent observations on dependent variables, such as repeated assessments on a single outcome over time. For population-averaged GEE models, the parameters are interpreted similarly to regression coefficients except they represent the omnibus association between an independent and dependent variable across all assessment periods (Horton and Lipsitz 1999).

GEE transitional models were used in the present study, in which the outcome variable measured at time  $T+1$  is regressed onto the same outcome variable (as well as any other predictors and covariates) measured at time  $T$ . Because the analyses involved testing interaction effects, all continuous variables were centered using the overall mean of each variable across the ages assessed (Cohen et al. 2003). For analyses predicting parenting practices at time  $T+1$  from parent-reported conduct problems at time  $T$ , the first step of the model included the time invariant covariates of the caregivers' mental health problems, as well as the time varying covariates (all measured at time  $T$ ) of parental age, working status, partner living in the home, number of children in the home, and family SES. Two weighted effects coded variables representing cohort were included to control for possible differences between the youngest, middle, and oldest cohorts. Also entered in the first step of the model were the time varying variables of interest (all measured at time  $T$ ) representing prior parenting, the boys' age and age squared, and parent-reported CP, as well as the time invariant variable of African-American ethnicity. Age squared was included to account for nonlinear developmental changes over time. In the second step, interactions between parent-reported CP and age (as well as age squared) were entered to determine whether the relation between CP and changes in parenting practices systematically varied in a linear and/or curvilinear fashion over time. The interaction between African-American ethnicity and parent-reported CP was also entered to test for potential ethnic differences in the association between CP and parenting practices. Analyses were conducted separately for each parenting construct.

GEE transitional models were also used to predict group changes in parent- and teacher-reported CP at time  $T+1$  from parenting practices measured at time  $T$ . All models were run separately using parent- and teacher-reported CP to examine the consistency of results across different informants. A linear GEE model with an independent correlation structure and a robust estimator was used. These models included the same family demographic/mental health and cohort covariates described above, and all continuous variables were centered prior to running the models. Models were run separately for each facet of parenting. Interactions between parenting practices and age (as well as age squared) were entered in the second step to determine whether the association between prior parenting and later CP systematically varied in a linear or curvilinear fashion over time. The interaction between parenting and African-American ethnicity was also entered to test for potential ethnic differences in the association between parenting and CP.

## Missing Data

Missing data arose from two distinct mechanisms in the current investigation. The largest portion of missing data was due to the accelerated longitudinal cohort design in which participants were different ages at the beginning of the study. Because this missing data arose due to the design of the study, rather than the study variables themselves, it is reasonable to assume that this data is Missing Completely at Random (MCAR). Specifically, the probability of missingness is independent of the values of the variables in the analysis, missing or observed (Little and Rubin 2002). The second source of missing data arose from participant dropout and a failure to locate participants at follow-up. Missingness related to these processes was relatively low. Data was available for at least 86.1% of the possible observations for each



variable (range 86.1–94.8%) and the modal number of missing observations was zero for each construct.

When observations are partially observed, GEE models base inferences on all observed responses rather than resorting to complete case analysis (Horton and Lipsitz 1999). This produces unbiased parameters when missingness is only related to covariates in the model and not the outcome data. While methods for handling missing data that deviate from this assumption have been proposed, they often require the correct specification of the missingness model or are unable to handle categorical and continuous missing values in the same model (Li et al. 2006; Wang and Fitzmaurice 2006). As a result, these methods were not used.

## Results

A preliminary analysis examined whether the potential confounds used in the current investigation were related to African-American ethnicity, after controlling for the overlap among the confounding variables. This was done using a logistic regression model with adjusted standard errors to account for clustering on the independent variables across time. Specifically, African-American ethnicity was regressed onto the potential confounds of parental age, single parenthood, parents' working status, family SES, number of children in the home, and parental help-seeking for mental health problems. In comparison to Caucasian boys, the findings indicated that parents of African-American boys tended to be younger ( $B=-0.025$ ,  $SE=0.008$ ,  $p=0.001$ ) and their families tended to be of lower SES ( $B=-0.012$ ,  $SE=0.005$ ,  $p=0.009$ ) with more children in the home ( $B=0.203$ ,  $SE=0.046$ ,  $p<0.001$ ). The parents of African-American boys were also less likely to be employed ( $B=-0.118$ ,  $SE=0.050$ ,  $p=0.018$ ) and living with a partner ( $B=-0.703$ ,  $SE=0.052$ ,  $p<0.001$ ) and were less likely to have sought help for mental health problems ( $B=-0.525$ ,  $SE=0.114$ ,  $p<0.001$ ) in comparison to parents of Caucasian boys.

### Parenting Predicting Later Conduct Problems

Results from GEE analyses predicting changes in parent- and teacher-reported CP are presented in Table 2. While the detailed results for the potential confounds are not depicted in this table due to space considerations, the significant findings are summarized here. For all models predicting both parent- and teacher-reported conduct problems, parental employment and having a partner in the home were significantly associated with decreases in conduct problems over time. Parental help-seeking for mental health problems was significantly associated with increases in parent-reported conduct problems, but was not significantly associated with changes in teacher-reported conduct problems. No other confounds consistently predicted either parent-reported conduct problems or teacher-reported conduct problems in these models. Further details regarding these results are available upon request from the primary author.

In models involving parent-reported CP, there was a robust positive association between CP measured at time  $T$  and CP measured at time  $T+1$  (see Table 2). However, after controlling for parent-reported CP at time  $T$  (as well as other covariates), there was a significant positive association between each parenting practice measured and parent-reported CP at time  $T+1$ . In nearly all models involving parent-reported CP, African-American ethnicity was significantly related to lower levels of parent-reported conduct problems at time  $T+1$  after controlling for potential confounds. However, in the model that included timid parenting as a predictor, the association between African-American ethnicity and parent-reported CP was reduced to nonsignificance. The variables of age and age squared did not reach statistical significance in any of the models predicting parent-reported CP.

Results from GEE models predicting teacher-reported CP from parenting practices revealed consistent results (see Table 2). After controlling for covariates and time  $T$  teacher-reported

conduct problems, all of the parenting factors, except low positive reinforcement, were significantly related to increased levels of teacher-reported conduct problems. In contrast to models involving parent-reported CP, African-American ethnicity was significantly related to increases in teacher-reported CP in all models. In addition, there was a significant positive effect for age indicating that teacher-reported conduct problems tended to increase over time.

### Parenting Predicting Later Conduct Problems—Age and Ethnicity as Moderators

In models predicting parent-reported CP, there were no statistically significant interactions between parenting practices and age, age squared, or African-American ethnicity. However, three significant interactions emerged in models predicting teacher-reported CP: physical punishment by age, physical punishment by ethnicity, and poor parental monitoring by age. To probe interactions involving physical punishment, the effect of physical punishment on later teacher-reported CP was examined at ages 7, 9, 11, 13, and 15 separately for African-Americans and Caucasians (for methods see Cohen et al. 2003). All plots were graphed at mean levels of the other covariates in the model. The results revealed that the positive association between physical punishment and teacher-reported conduct problems dissipated with age, with the overall association being stronger for African-Americans in comparison to Caucasians (see Fig. 1). For Caucasians, physical punishment was significantly associated with increases in teacher-reported CP at age 7 (age 7,  $B=0.193$ ,  $SE=0.086$ ,  $p=0.025$ ), but this association was nonsignificant at later ages (age 9,  $B=0.068$ ,  $SE=0.055$ ,  $p=0.218$ , age 11,  $B=-0.025$ ,  $SE=0.060$ ,  $p=0.679$ ; age 13,  $B=-0.086$ ,  $SE=0.062$ ,  $p=0.165$ ; age 15,  $B=-0.116$ ,  $SE=0.106$ ,  $p=0.272$ ). For African-Americans, physical punishment was significantly related to increases in teacher-reported CP from age 7 to 11 (age 7,  $B=0.362$ ,  $SE=0.092$ ,  $p<0.001$ ; age 9,  $B=0.238$ ,  $SE=0.057$ ,  $p<0.001$ ; age 11,  $B=0.145$ ,  $SE=0.057$ ,  $p=0.012$ ), but this association was not significant at later ages (age 13,  $B=0.083$ ,  $SE=0.059$ ,  $p=0.158$ ; age 15,  $B=0.054$ ,  $SE=0.106$ ,  $p=0.612$ ).

The interaction involving poor parental monitoring and age was probed by plotting the association between poor parental monitoring and later teacher-reported CP at ages 7, 9, 11, 13, and 15 (see Fig. 2). Poor parental monitoring was not significantly related to teacher-reported conduct problems at age 7 ( $B=-0.152$ ,  $SE=0.223$ ,  $p=0.494$ ) or age 15 ( $B=0.130$ ,  $SE=0.272$ ,  $p=0.634$ ). However, poor parental monitoring was significantly related to increases in teacher-reported CP from ages 9 thru 13 (age 9,  $B=0.338$ ,  $SE=0.137$ ,  $p=0.014$ ; age 11,  $B=0.548$ ,  $SE=0.153$ ,  $p<0.001$ ; age 13,  $B=0.479$ ,  $SE=0.148$ ,  $p=0.001$ ).

### Conduct Problems Predicting Later Parenting

The findings predicting changes in parenting practices from parent- and teacher-reported CP are presented in Table 3. While detailed results for the potential confounds are not depicted in Table 3 due to space considerations, the significant findings that emerged for models involving both parent- and teacher-reported conduct problems are summarized here (all  $ps<0.05$ ). Results indicated that younger parents exhibited increases in poor parent-child communication, timid parenting, and physical punishment over time. Having a partner in the home was associated with lower levels of poor parent-child communication, poor monitoring, and timid parenting over time. Higher SES was associated with lower levels of poor parent-child communication, poor parental involvement, and poor parental monitoring, but was associated with increases in timid parenting over time. Having a greater number of children in the home was associated with increased levels of low positive parenting and poorer parental involvement. Parental help-seeking for mental health problems was associated with increased levels of timid parenting, while parental employment predicted lower levels of timid parent over time. Further details regarding these results are available upon request from the primary author.

In all models, there was a significant positive association between the parenting practices measured at time  $T$  and later parenting measured at time  $T+1$ . African-Americans were

significantly more likely to exhibit higher levels of poor parent–child communication, physical punishment, and poor parental monitoring, and lower levels of timid parenting across time. In all models, parent-reported CP was associated with higher levels of problematic parenting, even after controlling for covariates and measures of parenting at time *T*. The same findings emerged in analyses using teacher-reported CP to predict parenting practices.

### Conduct Problems Predicting Later Parenting – Age and Ethnicity as Moderators

One significant interaction was found for models predicting changes in parenting practices from parent-reported CP: age squared by parent-reported CP. To elucidate this interaction, the association between parent-reported CP and low positive reinforcement was probed at ages 7, 9, 11, 13, and 15 (see Fig. 3). Parents exhibited high positive reinforcement regardless of the boys' CP at age 7 ( $B=0.018$ ,  $SE=0.068$ ,  $p=0.787$ ), and exhibited low levels of positive reinforcement regardless of the boys' CP at age 15 ( $B=0.060$ ,  $SE=0.064$ ,  $p=0.342$ ). However, parent-reported CP was significantly associated with increases in low positive reinforcement from 9 to 13 years of age (age 9,  $B=0.131$ ,  $SE=0.036$ ,  $p<0.001$ ; age 11,  $B=0.176$ ,  $SE=0.036$ ,  $p<0.001$ ; age 13,  $B=0.152$ ,  $SE=0.035$ ,  $p<0.001$ )

Significant interactions were also found between teacher-reported CP and measures of age in predicting poor monitoring and timid parenting. The association between teacher-reported CP and later levels of poor monitoring was probed at ages 7, 9, 11, 13, and 15 (see Fig. 4). Results indicated that parents tended to exhibit minimal levels of poor parental monitoring at ages 7 and 9 irrespective of teacher-reported CP (age 7,  $B=0.001$ ,  $SE=0.003$ ,  $p=0.657$ ; age 9,  $B=0.002$ ,  $SE=0.001$ ,  $p=0.197$ ), but teacher-reported CP significantly predicted increases in poor parental monitoring for youth age 11 and older (age 11,  $B=0.004$ ,  $SE=0.002$ ,  $p=0.015$ ; age 13,  $B=0.007$ ,  $SE=0.002$ ,  $p<0.001$ ; age 15,  $B=0.012$ ,  $SE=0.003$ ,  $p<0.001$ ). The interaction involving timid parenting was probed across the same ages (see Fig. 5). Results indicated that teacher-reported CP was not significantly related to timid parenting at age 7 ( $B=0.004$ ,  $SE=0.028$ ,  $p=0.881$ ) or age 15 ( $B=-0.007$ ,  $SE=0.028$ ,  $p=0.814$ ). However, teacher-reported CP was significantly related to increases in timid parenting from age 9 to 13 (age 9,  $B=0.043$ ,  $SE=0.014$ ,  $p=0.003$ ; age 11,  $B=0.054$ ,  $SE=0.015$ ,  $p<0.001$ ; age 13,  $B=0.037$ ,  $SE=0.015$ ,  $p=0.015$ ).

## Discussion

The results provide strong evidence for a bidirectional relationship between conduct problems and parenting practices from childhood to adolescence. These bidirectional associations emerged for both parent- and teacher-reported conduct problems and remained significant even after controlling for the potential confounds of parental age, single parenthood, parents' working status, family SES, and parental mental health problems. Taken together, this suggests that the bidirectional parent–child relationship observed cannot be accounted for by shared informant effects (i.e., parents reporting on both parenting practices and conduct problems) or socioeconomic and structural characteristics of the family. These results also provide empirical support for Patterson's coercion model (Patterson et al. 1992) and Bell's control system model (Bell 1980). While the current findings are consistent with prior research (e.g., Laird et al. 2003), they expand on this research by examining a broader range of parenting practices over a large developmental span using multiple informants of conduct problems.

Some subtle, yet potentially important, differences emerged when bidirectional associations were examined using teacher- rather than parent-reported conduct problems. For models involving parent-report, there was a tendency for the child's behavior to be more strongly related to changes in parenting ( $z$ s from 4.49–8.61) in comparison to the influence of parenting on changes in child conduct problems ( $z$ s from 2.49–5.35). For teacher-reported conduct problems, the magnitude of the influence was roughly equivalent for child effects on parenting ( $z$ s from 2.40–5.00) in comparison to parenting effects on child conduct problems ( $z$ s from

1.67–4.83). As a result, the overall influence of child conduct problems on changes in parenting behaviors seems strongest when conduct problems are measured by parents rather than teachers. While this makes intuitive sense given that conduct problems exhibited at home should influence parents' behaviors more than those exhibited at school, this pattern of findings could also be due to shared informant variance (i.e., parents reporting on both conduct problems and parenting). However, results from analyses using parent-and teacher-report measures of conduct problems suggest that the influence of conduct problems on changes in parenting behaviors is as strong as (if not stronger than) the influence of parenting on changes in conduct problems.

### **Moderating Effect of Age on Bidirectional Parent–Child Associations**

Consistent with our hypotheses, an age effect was found for the reciprocal relationship between poor parental monitoring and teacher-reported conduct problems. Specifically, the bidirectional association between poor monitoring and teacher-reported conduct problems tended to strengthen from childhood to early adolescence. This is consistent with the notion that as children age and become more independent, it becomes increasingly important for parents to track the child's whereabouts so they can discourage delinquent peer affiliations and problem behavior (Shaw and Bell 1993). In turn, the findings indicate that, as children with conduct problems get older, it may become increasingly difficult to obtain information regarding their whereabouts, and parents may tend to disengage from monitoring activities out of frustration (Fite et al. 2006; Laird et al. 2003). However, it is important to note that the influence of parental monitoring on later teacher-reported conduct problems was nonsignificant by age 15, while teacher-reported conduct problems continued to influence changes in monitoring at this age. While unexpected, prior studies have found evidence indicating that the effects of youth delinquency on decreases in parental monitoring may be stronger than the effects of monitoring on changes in delinquency in later adolescence (Laird et al. 2003). This is consistent with research indicating that boys begin exerting a greater influence on their social environment as they transition from early to middle adolescence (Pardini et al. 2005).

There was also evidence indicating that parent-reported conduct problems may influence reductions in parental reinforcement primarily during the transition from late childhood to the early teenage years. Prior to age 9, parents in the current study exhibited relatively high levels of positive reinforcement regardless of their boy's conduct problems. During this period, parents may identify and praise their son's positive behaviors, even if he is exhibiting conduct problems, in the hopes that it will encourage prosocial behavior change. By late childhood and early adolescence, however, increased levels of parent-reported conduct problems began predicting decreases in parental reinforcement. During this period, frustrated parents may begin giving up on parental reinforcement as a mechanism for positive behavioral change if their son is exhibiting significant conduct problems. However, by middle adolescence, changes in parental reinforcement are no longer influenced by parent-reported conduct problems. Developmentally, this is a time when parents begin exhibiting lower levels of positive reinforcement overall (see Fig. 3), possibly because adolescent boys are increasingly embarrassed by expressions of parental affection. Because positive reinforcement is less prevalent overall during later adolescence, conduct problems may exert less of an influence on this parenting behavior. It is also interesting to note that positive reinforcement did not emerge as a significant predictor of changes in parent-reported conduct problems in the current study. As a result, parents may tend to reduce the amount of positive reinforcement they provide over time because they feel it is not a significant deterrent of problem behaviors.

There was some evidence that teacher-reported conduct problems had the largest influence on changes in timid parenting during the transition from late childhood to the early teenage years.

Prior to age 9, teacher-reported conduct problems did not influence changes in parents' timidity, possibly because parents are less physically intimidated by the conduct problems of their sons at this age. However, what is unclear is why teacher-reported conduct problems were unrelated to increases in timid behaviors by parents during middle adolescence. While this finding was unexpected, the results did indicate that parent-reported conduct problems tended to be significantly associated with increases in timid parenting across the entire developmental span assessed. Collectively, findings suggest an overall tendency for parents of youth with conduct problems to be hesitant in enforcing rules and confronting their child across time, which is consistent with Patterson's coercive model (Patterson et al. 1992).

In the current study, the effect of physical punishment on changes in teacher-reported conduct problems was strongest in childhood, but physical punishment was unrelated to changes in conduct problems by the early teenage years. This is consistent with a recent meta-analysis indicating that many of the detrimental effects of harsh physical punishment are less pronounced as children get older (Larzelere and Kuhn 2005). It may be that adolescents' cognitive and physical maturity helps to buffer them from experiencing emotional distress during physical punishment, reducing the negative impact it has on their behavioral functioning outside the home. However, this finding does contradict some notions that physical punishment may be less detrimental when it is commonly implemented as a discipline technique within the community (Simons et al. 2002). In the current study, the association between physical punishment and changes in teacher-reported conduct problems was strongest during the youngest ages, when the largest proportion of parents reported using physical punishment as a discipline technique. However, it is important to remember that physical punishment predicted changes in parent-reported conduct problems across all ages, suggesting that it may still have detrimental effects on youth conduct problems into adolescence.

### **Ethnicity and the Reciprocal Parent–Child Relationship**

There were almost no significant differences between African-American and Caucasian families in terms of the bidirectional association between parenting practices and conduct problems across development. The sole exception indicated that physical punishment was more strongly related to increases in teacher-reported conduct problems for African-American children in comparison to Caucasian youth. Specifically, physical punishment led to significant increases in conduct problems for Caucasian youth only up to approximately 7 years of age, but it was related to increased conduct problems for African-American youth from 7 to 11 years of age. This finding contradicts previous research indicating that physical punishment is unrelated to the development of conduct problems in African-American youth, and may even have beneficial effects (Lansford et al. 2004). However, studies in this area have been limited by a failure to control for prior conduct problems, the use of measures that capture a range of parenting behaviors besides physical discipline, and the use of relatively small samples of African-American youth. In addition, research does suggest that once physical discipline becomes abusive, it may be more strongly associated with externalizing problems in African-American youth compared to Caucasians (Lansford et al. 2002). Because the current study was unable to differentiate between abusive and non-abusive forms of physical punishment, it is possible that the differences observed were caused by a greater prevalence of physically abusive discipline in African American parents. While investigators have emphasized the need to differentiate between abusive and non-abusive forms of physical discipline, within prospective community-based studies making this distinction is often difficult because parents and children are informed during the consent procedures that cases of physical abuse will be reported to child protective services. As a result, while this is an area of research in need of future study, accurately distinguishing abusive from non-abusive physical punishment is clearly difficult.

## Limitations and Conclusions

The current findings need to be viewed in the context of several limitations. First, the use of a male sample made it impossible to determine whether sex differences exist in the bidirectional relations observed. Along similar lines, because the current study consisted primarily of mother–son dyads, it is unclear whether the current results will generalize to father–son or father–daughter dyads. In addition, the current study used an accelerated longitudinal design with cohorts that only partially overlapped in age. While cohort effects were controlled for in all analyses, interactions between cohort and measures of conduct problems and parenting practices were not included because they were too collinear with interactions involving age. As a result, age effects should be interpreted cautiously as they may be confounded by cohort effects. There were also limitations with regards to the measures of parenting. First, parenting behaviors were assessed using rating scales instead of direct observation. In addition, corporal punishment was assessed using a single item that included a diverse array of tactics (i.e., spanking, slapping, hitting with an object). Despite this limitation, physical punishment did emerge as a significant predictor of changes in parent- and teacher-reported conduct problems in the current study, supporting the construct's predictive validity. Another limiting factor is that the measure of parental monitoring used exhibited low levels of internal consistency, which may have attenuated relations, particularly for interaction effects. As a result, future longitudinal studies using observational measures of parenting and more internally consistent, and well-defined, measures of parenting are needed. Lastly, the current study used a population average GEE model, which examines change relative to the group rather than the individual. As a result, future studies will use a random-effects approach with the current dataset to better understand aspects of the reciprocal parent–child relationship within families, as well as attempt to explain heterogeneity across families.

It is also important to note that some of the interactions with age were confined to teacher-reported conduct problems. Some researchers have suggested that teachers' expertise in rating children's behavior may dissipate after elementary school, as teachers spend less time with individual children and in fewer contexts during middle school and high school (Evans et al. 2005). As a result, one would anticipate that the effect of teacher-reported conduct problems on parenting behaviors (and vice versa) should dissipate over time as teachers become less knowledgeable about student behavior. However, there is evidence suggesting that middle school teachers are able to provide reliable and accurate information on externalizing problems in youth (Evans et al. 2005; Zahner and Daskalakis 1998). In addition, if the information from teachers systematically diminished in validity over time one would anticipate that teacher-reported conduct problems would become less strongly associated with all parenting practices as children age. However, this pattern of findings was not observed in the current study. In fact, there was evidence that teacher-reported conduct problems became a stronger predictor of changes in poor monitoring during later adolescence. Consequently, it does not seem that the age-related findings for teacher-reported conduct problems can be completely accounted for by a decreased knowledge of student behavior during the middle school and high schools years.

In conclusion, the present study provides evidence for the bidirectional influence of parenting behavior and youth conduct problems from childhood to adolescence in a community sample of boys. While the examination of potential ethnic differences is important, the results suggest that there may be more similarities than differences between African-American and Caucasian families in terms of the bidirectional relation between parenting practices and conduct problems. Current findings suggest that the influence that conduct problems have on changes in parenting behaviors is just as strong as (if not stronger than) the influence that parenting behaviors have on changes in conduct problems. These findings have implications for parent-training interventions that target conduct problems in boys. Specifically, treatment providers

should normalize the tendency for youth exhibiting conduct problems to elicit less than optimal parenting practices from their caregivers, while being careful not to vilify the children as the sole reason for the family's problems. Acknowledging and validating the negative effects that children can have on parenting behaviors is likely to increase parents' feelings of being understood and supported and increase parents' receptiveness to suggestions for improvements. These discussions could also be used to help parents brainstorm ways of preventing further escalations of problematic parenting in response to their sons' conduct problems by developing more adaptive responses to these behaviors. Because results suggest that parents tend to respond to their children's conduct problems by becoming increasingly timid in their enforcement of rules and reducing their positive reinforcement of prosocial behaviors during the transition from late childhood to early adolescence, programs designed to prevent the escalation of negative parent-child interchanges should probably begin during the early elementary school years, if not sooner.

There is also some suggestion that during different developmental periods specific aspects of parenting may be more important to target than others. The parenting practices which seemed to be equally important across the entire developmental span assessed for both parent- and teacher-reported conduct problems were low parental involvement, poor parent-child communication and timid parenting. As a result, prevention and intervention programs targeting youth conduct problems should focus on enhancing developmentally appropriate prosocial activities between parents and youth, while promoting the parents' use of calm and responsive communication strategies when discussing family issues with their children. Moreover, timid parents should be encouraged to consistently enforce family rules despite the fact that their child may react in an aversive manner. The current study also suggests that the use of physical punishment should be discouraged as a discipline technique particularly during the early elementary school years. Moreover, parental monitoring seems particularly important for preventing the development of conduct problems from late childhood to the early adolescence. During this period most boys are making the transition to middle school, and are likely starting to establish more diverse peer groups that may promote antisocial attitudes and behaviors.

Although theoretical models suggesting that conduct problem youth tend to elicit increases in dysfunctional parenting practices have been around for decades (e.g., Bell 1980), researchers continue to interpret cross-sectional associations between parenting practices and conduct problems as evidence that parents influence children's problem behavior. The current results indicate that this interpretation is incomplete at best, as the influence of boys' conduct problems on changes in problematic parenting practices appears as strong as (if not stronger than) the influence of parenting behavior on conduct problems. Future studies advancing this area of research should more closely examine individual differences in the bidirectional effects, as it is likely that some parents are able to maintain adaptive parenting strategies despite their child's conduct problems. Understanding the characteristics of these resilient parents could be useful in designing interventions aimed at preventing the emergence and escalation of coercive parent-child interactions across development.

## Acknowledgments

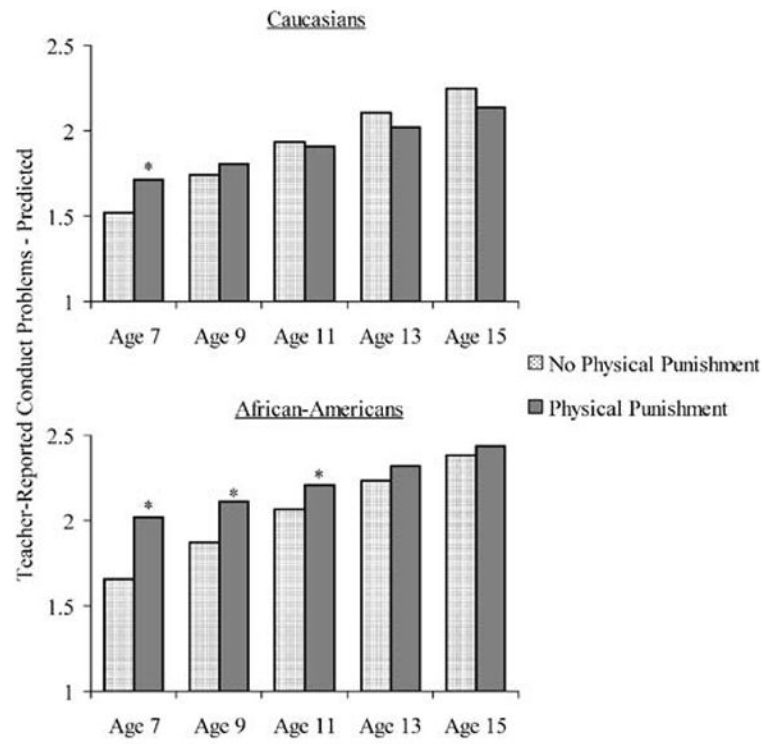
This study is supported by grants from the National Institute on Drug Abuse (DA411018), National Institute on Mental Health (MH 48890, MH 50778), and the Office of Juvenile Justice and Delinquency Prevention (96-MU-FX-0012). Special thanks to Rolf Loeber, Ernesta Pardini, Jamie Pardini, Marcella Schreiber, and Magda Stouthamer-Loeber for their valuable guidance and feedback.

## References

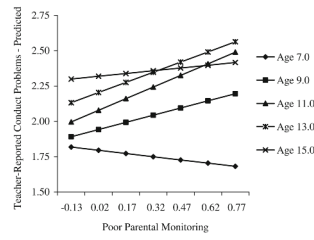
- Achenbach, TM. Integrative guide for the 1991 CBCL/4-18, YSR, TRF profiles. Burlington, VT: University of Vermont; 1991.
- Achenbach TM, Dumenci L, Rescorla LA. Are American children's problems still getting worse? A 23-year comparison. *Journal of Abnormal Psychology* 2003;31:1573–2835.
- Achenbach, TM.; Edelbrock, C. Manual for the teacher's report form and teacher version of the child behavior profile. Burlington: University of Vermont, Department of Psychiatry; 1986.
- Achenbach, TM.; Rescorla, LA. Manual for the ASEBA school-age forms and profiles. Burlington, VT: University of Vermont; 2001.
- Bell, RQ. Socialization findings reexamined. In: Bell, RQ.; Harper, LB., editors. *Child effects on adults*. Lincoln, NE: University of Nebraska Press; 1980. p. 53-84.
- Cohen, J.; Cohen, P.; West, SG.; Aiken, LS. *Applied multiple regression/correlation analysis for the behavioral science*. 3. Mahwah, NJ: Lawrence Erlbaum Association; 2003.
- Crouter, AC.; Booth, A. *Children's influence on family dynamics: The neglected side of family relationships*. Mahwah, NJ: Erlbaum; 2003.
- Evans SW, Allen J, Moore S, Strauss V. Measuring symptoms and functioning of youth with ADHD in middle schools. *Journal of Abnormal Child Psychology* 2005;33:695–706. [PubMed: 16328745]
- Fite PJ, Colder CR, Lochman JE, Wells KC. The mutual influence of parenting and boys' externalizing behavior problems. *Journal of Applied Developmental Psychology* 2006;27:151–164.
- Frick PJ, Christian RE, Wootton JM. Age trends in the association between parenting practices and conduct problems. *Behavior Modification* 1999;23:106–128.
- Gershoff ET. Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin* 2002;128:539–579. [PubMed: 12081081]
- Giles-Sims J, Straus MA, Sugarman DB. Child, maternal, and family characteristics associated with spanking. *Family Relations* 1995;44:170–176.
- Hollingshead, AB. Four factor index of social status. New haven, CT: 1975. Unpublished manuscript
- Horton NJ, Lipsitz S. Review of software to fit generalized estimating equation regression models. *The American Statistician* 1999;53:160–169.
- Krol NP, De Bruyn EE, Coolen JC, van Aarle EJ. From CBCL to DSM: A comparison of two methods to screen for DSM-IV diagnoses using CBCL data. *Journal of Clinical Child and Adolescent Psychology* 2006;35:127–135. [PubMed: 16390308]
- Laird RD, Pettit GS, Bates JE, Dodge KA. Parents' monitoring-relevant knowledge and adolescents' delinquent behavior: Evidence of correlated developmental changes and reciprocal influences. *Child Development* 2003;74:752–768. [PubMed: 12795388]
- Lansford JE, Deater-Deckard K, Dodge KA, Bates JE, Pettit GS. Ethnic differences in the link between physical discipline and later adolescent externalizing behaviors. *Journal of Child Psychology and Psychiatry* 2004;45:801–812. [PubMed: 15056311]
- Lansford JE, Dodge KA, Pettit GS, Bates JE, Crozier J, Kaplow J. A 12-year prospective study of the long-term effects of early child physical maltreatment on psychological, behavioral, and academic problems in adolescence. *Archives of Pediatrics & Adolescent Medicine* 2002;156:824–830. [PubMed: 12144375]
- Larzelere RE. Child outcomes of nonabusive and customary physical punishment by parents: An updated literature review. *Clinical Child and Family Psychology Review* 2000;3:199–221. [PubMed: 11225737]
- Larzelere RE, Kuhn BR. Comparing child outcomes of physical punishment and alternative disciplinary tactics: A meta-analysis. *Clinical Child and Family Psychology Review* 2005;8:1–37. [PubMed: 15898303]
- Li X, Mehrotra DV, Barnard J. Analysis of incomplete longitudinal binary data using multiple imputation. *Statistics in Medicine* 2006;25:2107–2124. [PubMed: 16220495]
- Little, RJA.; Rubin, DB. *Statistical analysis with missing data*. 2. Hoboken, NJ: Wiley and Sons; 2002.
- Loeber R, Drinkwater M, Yin Y, Anderson SJ, Schmidt LC, Crawford A. Stability of family interaction form ages 6 to 18. *Journal of Abnormal Child Psychology* 2000;28:353–369. [PubMed: 10949960]



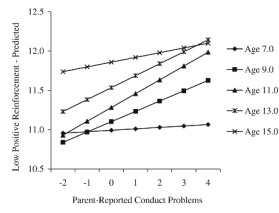
- Loeber, R.; Farrington, DP.; Stouthamer-Loeber, M.; Van Kammen, WB. Antisocial behavior and mental health problems: Explanatory factors in childhood and adolescence. Mahwah, New Jersey: Lawrence Erlbaum Associates; 1998.
- Loeber R, Pardini D, Homish DL, Wei EH, Crawford AM, Farrington DP, et al. The prediction of violence and homicide in young men. *Journal of Consulting and Clinical Psychology* 2005;73:1074–1088. [PubMed: 16392981]
- McLeod JD, Kruttschnitt C, Dornfeld M. Does parenting explain the effects of structural conditions on children's antisocial behavior? A comparison of blacks and whites. *Social Forces* 1994;73:575–604.
- McLoyd VC, Smith J. Physical discipline and behavior problems in African American, European American, and Hispanic children: Emotional support as a moderator. *Journal of Marriage and the Family* 2002;64:40–53.
- Pardini, DA. Empirically supported treatments for conduct disorders in children and adolescents. In: Trafton, JA.; Gordon, W., editors. *Best practices in the behavioral management of disorders of infancy, childhood and adolescence*. Los Altos, CA: Institute for Brain Potential; in press
- Pardini DA, Loeber R, Stouthamer-Loeber M. Developmental shifts in parent and peer influences on boys' beliefs about delinquent behavior. *Journal of Research on Adolescence* 2005;15:299–323.
- Patterson, GR. Coercion as a basis for early age of onset for arrest. In: McCord, J., editor. *Coercion and punishment in long-term perspectives*. New York: Cambridge Press; 1995. p. 81-105.
- Patterson, GR. The early development of coercive family process. In: Reid, JB.; Patterson, GR.; Snyder, JJ., editors. *Antisocial behavior in children and adolescents: A developmental analysis and the Oregon model for intervention*. Washington, DC: American Psychological Association; 2002. p. 25-44.
- Patterson, GR.; Reid, JB.; Dishion, TJ. *Antisocial boys*. Eugene, OR: Castalia; 1992.
- Shaw DS, Bell RQ. Developmental theories of parental contributors to antisocial behavior. *Journal of Abnormal Child Psychology* 1993;21:493–518. [PubMed: 8294650]
- Simons RL, Lin K, Gordon LC, Brody GH, Conger RD. Community differences in the association between parenting practices and child conduct problems. *Journal of Marriage and the Family* 2002;64:331–345.
- Snyder J, Cramer A, A Frank J, Patterson GR. The contributions of ineffective discipline and parental hostile attributions of child misbehavior to the development of conduct problems at home and school. *Developmental Psychology* 2005;41:30–41. [PubMed: 15656735]
- Snyder, J.; Stoolmiller, M. Reinforcement and coercion mechanisms in the development of antisocial behaviour: The family. In: Reid, JB.; Patterson, GR.; Snyder, JJ., editors. *Antisocial behavior in children and adolescents: A developmental analysis and the Oregon model for intervention*. Washington, DC: American Psychological Association; 2002. p. 65-100.
- StataCorp. *Intercooled stata 8.2 for windows*. College Station, TX: Stata Corporation; 2004.
- Vuchinich S, Bank L, Patterson GR. Parenting, peers, and the stability of antisocial behavior in preadolescent boys. *Developmental Psychology* 1992;28:510–521.
- Wang M, Fitzmaurice GM. A simple imputation method for longitudinal studies with non-ignorable non-responses. *Biometric Journal* 2006;48:302–318.
- Zahner GE, Daskalakis C. Modeling sources of informant variance in parent and teacher ratings of child psychopathology. *International Journal of Methods in Psychiatric Research* 1998;7:3–16.



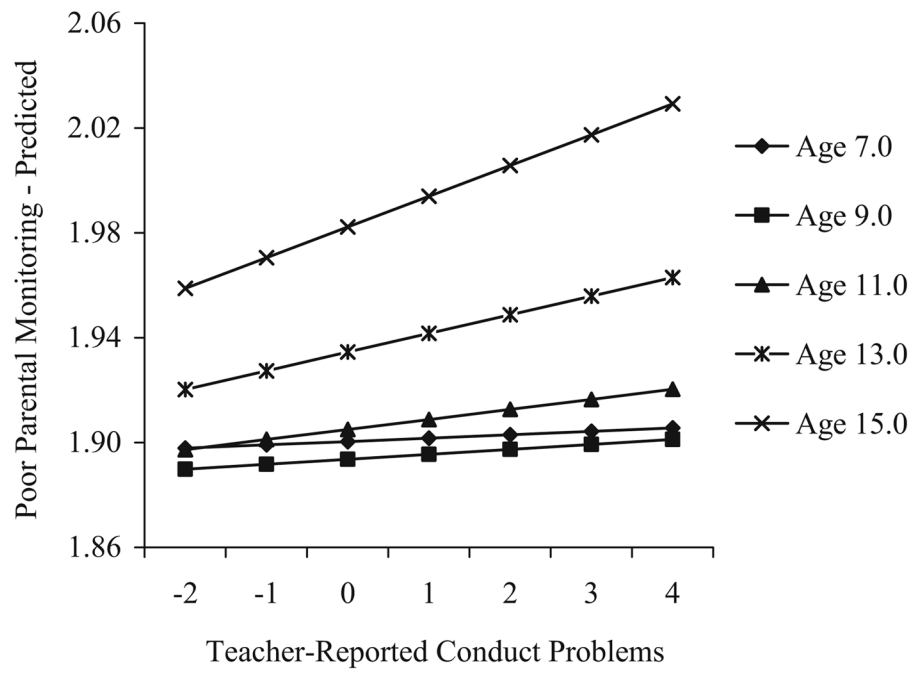
**Fig. 1.** Age and ethnicity moderating the association between physical punishment and changes in teacher-reported conduct problems. \* $p < 0.05$



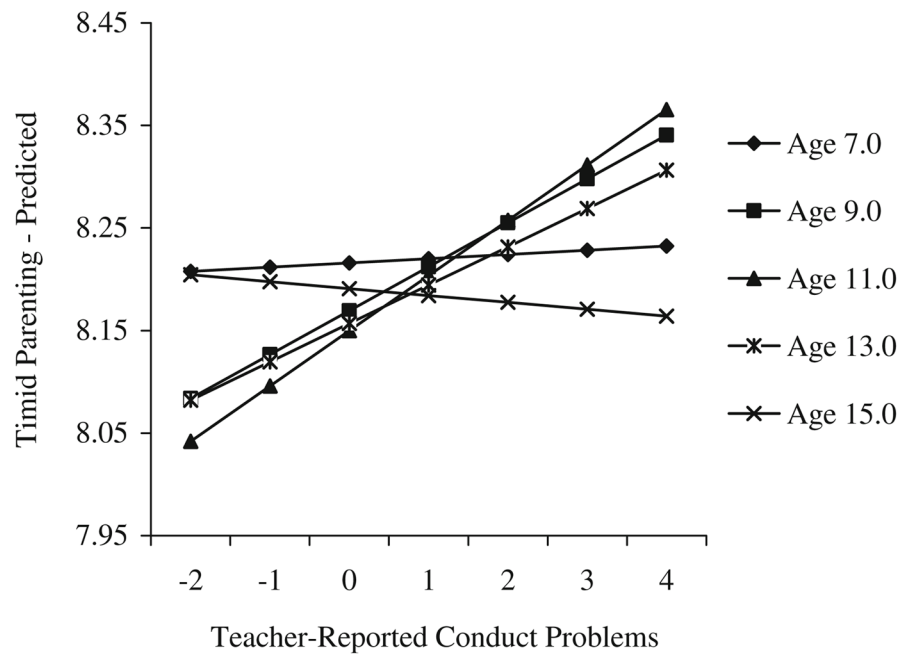
**Fig. 2.** Age moderating the association between poor parental monitoring and changes in teacher-reported conduct problems



**Fig. 3.** Age moderating the association between parent-reported conduct problems and changes in low positive reinforcement



**Fig. 4.** Age moderating the association between teacher-reported conduct problems and changes in poor parental monitoring



**Fig. 5.** Age moderating the association between teacher-reported conduct problems and changes in timid parenting

**Table 1**

Total possible sample sizes and descriptive information for the 6 month assessments in the Pittsburgh Youth Study (PYS)

	Age-based assessments																					
	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16	16.5	
Total N	122	294	428	478	503	509	577	715	729	629	541	511	499	479	458	478	488	437	321	208	116	
PYS cohort																						
Youngest cohort (%)	100	100	100	100	100	99	87	70	52	33	14	5	0	0	0	0	0	0	0	0	0	0
Middle cohort (%)	0	0	0	0	0	1	13	30	48	67	86	95	85	60	35	18	8	4	2	0	0	0
Oldest cohort (%)	0	0	0	0	0	0	0	0	0	0	0	0	14	39	65	82	92	96	98	100	100	100
School level																						
Elementary school (%)	100	100	100	100	100	100	100	99	91	70	44	30	14	7	3	0	0	0	0	0	0	0
Middle school (%)	0	0	0	0	0	0	0	1	9	30	56	70	86	91	81	60	39	29	20	6	1	1
High school (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	2	16	40	61	71	80	95	99	99

Values for the youngest, middle, and oldest cohorts indicate the percentage of participants at each age originating from that cohort.

Table 2

Prior parenting practices predicting changes in conduct problems from age 6.5 to 16.5

Predictors	Conduct Problems (T + 1)					
	Teacher report			Parent report		
	B	SE	z	B	SE	z
<b>Physical punishment</b>						
Step 1						
Prior conduct problems	0.64	0.01	48.89***	0.74	0.01	70.32***
Age	0.04	0.01	4.15***	0.01	0.00	1.17
Age <sup>2</sup>	0.00	0.00	0.11	0.00	0.00	0.77
African-American	0.20	0.04	5.09***	-0.05	0.02	-2.72**
Physical punishment (PP)	0.10	0.04	2.88**	0.09	0.02	4.07***
Step 2						
Age×PP	-0.02	0.01	-2.09*	0.00	0.00	0.91
Age <sup>2</sup> ×PP	0.00	0.00	0.69	0.00	0.00	0.88
African-American×PP	0.17	0.07	2.50*	-0.03	0.04	-0.65
<b>Poor parental monitoring</b>						
Step 1						
Prior conduct problems	0.64	0.01	49.74***	0.74	0.01	69.53***
Age	0.03	0.01	3.69***	0.00	0.00	0.17
Age <sup>2</sup>	0.00	0.00	-0.11	0.00	0.00	0.53
African-American	0.21	0.04	5.26***	-0.04	0.02	-2.16*
Poor monitoring (PM)	0.30	0.11	2.65**	0.16	0.07	2.45*
Step 2						
Age×PM	0.00	0.02	0.00	-0.02	0.01	-1.75
Age <sup>2</sup> ×PM	-0.01	0.00	-2.14*	0.00	0.00	-0.04
African-American×PM	-0.25	0.22	-1.16	-0.14	0.12	-1.15
<b>Timid parenting</b>						
Step 1						
Prior conduct problems	0.64	0.01	49.85***	0.73	0.01	66.79***



Predictors	Conduct Problems (T + 1)					
	Teacher report			Parent report		
	B	SE	z	B	SE	z
Age	0.03	0.01	3.77***	0.00	0.00	0.16
Age <sup>2</sup>	0.00	0.00	-0.01	0.00	0.00	0.74
African-American	0.23	0.04	5.96***	-0.03	0.02	-1.43
Timid parenting (TP)	0.04	0.01	3.43***	0.04	0.01	4.92***
<b>Step 2</b>						
Age×TP	0.00	0.00	-0.85	0.00	0.00	-1.90
Age <sup>2</sup> ×TP	0.00	0.00	-1.20	0.00	0.00	0.41
African-American×TP	0.01	0.02	0.70	-0.01	0.01	-1.09
<b>Low positive reinforcement</b>						
<b>Step 1</b>						
Prior conduct problems	0.64	0.01	50.17***	0.74	0.01	70.88***
Age	0.03	0.01	3.70***	0.00	0.00	0.06
Age <sup>2</sup>	0.00	0.00	-0.01	0.00	0.00	0.57
African-American	0.22	0.04	5.68***	-0.03	0.02	-1.79
Low positive reinforcement (PR)	0.01	0.01	1.67	0.01	0.00	3.87***
<b>Step 2</b>						
Age×PR	0.00	0.00	1.34	0.00	0.00	-0.23
Age <sup>2</sup> ×PR	0.00	0.00	-0.56	0.00	0.00	-1.27
African-American×PR	0.01	0.01	1.01	0.01	0.01	1.17
<b>Low parental involvement</b>						
<b>Step 1</b>						
Prior conduct problems	0.64	0.01	49.72***	0.73	0.01	68.00***
Age	0.03	0.01	3.60***	0.00	0.00	-0.27
Age <sup>2</sup>	0.00	0.00	-0.04	0.00	0.00	0.56
African-American	0.22	0.04	5.60***	-0.04	0.02	-2.07*
Low parental involvement (PI)	0.02	0.01	2.28*	0.03	0.01	5.30***
<b>Step 2</b>						

Predictors	Conduct Problems (T + 1)					
	Teacher report			Parent report		
	B	SE	z	B	SE	z
Age×PI	0.00	0.00	-0.06	0.00	0.00	-0.77
Age <sup>2</sup> ×PI	0.00	0.00	-0.18	0.00	0.00	-0.10
African-American×PI	-0.01	0.02	-0.70	0.00	0.01	-0.15
<b>Poor parent-child communication</b>						
Step 1						
Prior conduct problems	0.64	0.01	49.22***	0.74	0.01	67.83***
Age	0.03	0.01	3.80***	0.00	0.00	0.27
Age <sup>2</sup>	0.00	0.00	-0.13	0.00	0.00	0.67
African-American	0.20	0.04	5.13***	-0.05	0.02	-2.46*
Poor parent-child communication (PC)	0.02	0.00	4.79***	0.01	0.00	4.28***
Step 2						
Age×PC	0.00	0.00	-1.56	0.00	0.00	-0.64
Age <sup>2</sup> ×PC	0.00	0.00	-1.15	0.00	0.00	0.45
African-American×PC	0.00	0.01	0.38	0.00	0.00	-0.98

Time-varying predictors are measured at time *T* and conduct problem outcomes are measured at time *T*+1. All time intervals are 6 months apart. Prior conduct problems were measured using the same informant that reported on the outcome (i.e., either parent or teacher). The effects are after controlling for cohort, parental age, single parenthood, parental employment, number of kids in the home, family SES, and parental help-seeking for mental health problems.

\*  $p < 0.05$   
 \*\*  $p < 0.01$   
 \*\*\*  $p < 0.001$

**Table 3**

Prior conduct problems predicting changes in parenting practices from age 6.5 to 16.5

Parenting practices (T+1)																		
Predictors	Physical punishment			Poor parental monitoring			Timid parenting			Low positive reinforcement			Low parental involvement			Poor parent-child communication		
	B	SE	z	B	SE	z	B	SE	z	B	SE	z	B	SE	z	B	SE	z
Teacher-reported conduct problems (TCP)																		
Step 1																		
Prior parenting	1.03	0.04	23.54***	0.05	0.00	23.55***	0.52	0.02	22.81***	0.53	0.02	31.98***	0.58	0.02	37.98***	0.66	0.01	46.49***
Age	-0.06	0.02	-3.52***	0.01	0.00	6.27***	0.00	0.01	-0.05	0.06	0.02	3.63***	0.04	0.01	4.04***	0.06	0.02	2.40*
Age <sup>2</sup>	0.00	0.00	0.80	0.00	0.00	5.98***	0.00	0.00	1.12	0.00	0.00	2.04*	0.00	0.00	3.05**	0.00	0.00	2.03*
African-American	0.59	0.08	7.21***	0.03	0.00	6.06***	-0.12	0.04	-2.79**	-0.04	0.08	-0.58	-0.01	0.05	-0.29	0.36	0.11	3.36***
TCP	0.07	0.02	3.63***	0.00	0.00	3.77***	0.04	0.01	3.09**	0.05	0.02	2.45*	0.05	0.01	4.10***	0.15	0.03	4.97***
Step 2																		
Age×TCP	0.00	0.00	0.40	0.00	0.00	2.72**	0.00	0.00	-1.00	0.00	0.00	0.49	0.00	0.00	-0.35	-0.01	0.01	-0.87
Age <sup>2</sup> ×TCP	0.00	0.00	-0.14	0.00	0.00	0.86	0.00	0.00	-2.02*	0.00	0.00	0.02	0.00	0.00	-0.45	0.00	0.00	-0.95
African-American×TCP	0.04	0.04	1.01	0.00	0.00	1.47	0.01	0.02	0.44	0.04	0.04	0.96	-0.01	0.02	-0.41	0.09	0.06	1.67
Parent-reported conduct problems (PCP)																		
Step 1																		
Prior parenting	0.97	0.04	23.28***	0.05	0.00	24.22***	0.48	0.02	21.27***	0.52	0.02	32.27***	0.56	0.02	36.46***	0.64	0.01	46.30***
Age	-0.06	0.02	-3.96***	0.01	0.00	7.56***	0.01	0.01	1.32	0.06	0.01	4.05***	0.05	0.01	4.97***	0.07	0.02	3.27**
Age <sup>2</sup>	0.00	0.00	-0.21	0.00	0.00	6.46***	0.00	0.00	0.87	0.00	0.00	1.66	0.00	0.00	2.68**	0.00	0.00	1.88
African-American	0.70	0.08	9.03***	0.03	0.00	7.33***	-0.08	0.04	-1.99*	0.01	0.07	0.12	0.04	0.05	0.96	0.50	0.10	4.83***
PCP	0.25	0.03	8.43***	0.01	0.00	8.04***	0.19	0.02	9.86***	0.12	0.03	4.48***	0.16	0.02	8.57***	0.32	0.04	7.62***
Step 2																		
Age×PCP	0.00	0.01	-0.16	0.00	0.00	0.39	0.00	0.00	0.96	0.00	0.01	-0.29	0.00	0.00	-0.90	0.00	0.01	-0.44
Age <sup>2</sup> ×PCP	0.00	0.00	-0.58	0.00	0.00	0.37	0.00	0.00	1.34	0.00	0.00	-2.11*	0.00	0.00	-1.95	0.00	0.00	-0.35
African-American×PCP	-0.02	0.06	-0.29	0.00	0.00	1.11	0.00	0.04	-0.12	-0.04	0.05	-0.81	0.02	0.03	0.54	0.08	0.08	0.99

Time-varying predictors measured at time T and parenting outcomes measured at time T+1. Time intervals are six months apart. The effects are after controlling for cohort, parental age, single parenthood, parents' working status, family SES, number of children in the home, and parental help-seeking for mental health problems.

\*  $p < 0.05$   
\*\*  $p < 0.01$   
\*\*\*  $p < 0.001$