

Trajectories of Physical Discipline: Early Childhood Antecedents and Developmental Outcomes

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This study examined childhood antecedents and developmental outcomes associated with trajectories of mild and harsh parental physical discipline. Interview, questionnaire, and observational data were available from 499 children followed from ages 5 to 16 and from 258 children in an independent sample followed from ages 5 to 15. Analyses indicated distinct physical discipline trajectory groups that varied in frequency of physical discipline and rate of change. In both samples, family ecological disadvantage differentiated the trajectory groups; in the first sample, early child externalizing also differentiated the groups. Controlling for early childhood externalizing, the minimal/ceasing trajectory groups were associated with the lowest levels of subsequent adolescent antisocial behavior in both samples and with parent–adolescent positive relationship quality in the second sample.

Contemporary theories on the socialization process have emphasized the role that parental discipline qualities, especially harshness, play in facilitating children's behavioral and social competence (Gershoff, 2002; Grusec & Goodnow, 1994; Kochanska & Thompson, 1997; Ladd & Pettit, 2002; Patterson, Reid, & Dishion, 1992). Although harsh and physical discipline techniques have been found to be linked to negative child outcomes, less is understood regarding how discipline changes during middle childhood and early adolescence and whether there are family and child factors that are associated with such change. The present study examines developmental trajectories of mild and

harsh physical discipline during middle childhood and early adolescence using data collected in two long-term, longitudinal projects. In addition, we examine childhood antecedents of physical discipline trajectories and associations between different patterns of physical discipline and later developmental outcomes.

Methods by which parents ensure child compliance with and eventual internalization of society's rules have been the subject of considerable study (Barber, 1996; Steinberg, 1990). Methods that promote choice and autonomy and are characterized by parental explanations and minimal use of power are generally found to be more effective at facilitating child moral internalization than methods that are reactive, harsh, and physically coercive (Grusec & Goodnow, 1994; Kochanska & Thompson, 1997; Kuczynski & Hildebrandt, 1997). Conversely, physical discipline has been found to be associated with more problematic child outcomes, such as child antisocial behavior (e.g., Farrington & Hawkins, 1991; Gershoff, 2002; Straus, 2001). Nevertheless,

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over 90% of American parents report having used physical discipline (Straus, 2001), and there is considerable variability in parents' and children's beliefs regarding the utility of physical discipline (Deater-Deckard, Lansford, Dodge, Pettit, & Bates, 2003). Overall, the literature suggests that the effects of physical discipline are likely determined by the context in which it is administered (e.g., Lansford et al., 2005; McLoyd & Smith, 2002), its amount (Gershoff, 2002), and its severity (Larzelere, 2000).

Parents, on average, decrease in their use of physical discipline during middle childhood and adolescence (Giles-Sims, Straus, & Sugarman, 1995), perhaps reflecting developmental changes across this period within the child and within the parent-child relationship. For instance, the parent-child relationship is said to be transformed, realigned, and renegotiated, changing from unilateral parental decision making to mutual decision making (e.g., Steinberg, 1990). Moreover, as children enter middle childhood, they are better able to understand reasoning, appreciate nonphysical consequences of misbehaving, and have more volitional control over their own behavior (see Collins, Madsen, & Susman-Stillman, 2002). However, although some parents may adjust their use of physical discipline in response to such child developmental changes, others may be unable or unwilling to adjust their socialization efforts and may maintain or even increase levels of physical discipline. An inability to adapt to normative developmental changes in the child may reflect a parent's limited resources or disruptions in the parent-child relationship that could forecast poor developmental outcomes for the child. It could also be a natural response to the seriousness or increasing rate of the child's misbehavior.

The issue of the severity of physical discipline has received conceptual attention, but few studies have addressed this issue empirically. Conceptually, several scholars (e.g., Larzelere, 2000) have argued that studies that combine spanking with harsher forms of physical discipline may confound physical discipline with physical abuse and therefore conclude that physical discipline has more adverse effects than do studies that do not combine mild and harsh forms of physical discipline. The present study empirically advances understanding of discipline severity by conducting parallel analyses for mild physical discipline and harsh physical discipline. Using this approach has the advantage of making it possible to examine whether mild and harsh physical discipline have similar trajectories over time and whether they are associated with

similar developmental antecedents and outcomes. If trajectories, antecedents, and outcomes are similar for mild and harsh physical discipline, this would suggest that the conceptual distinction may not be as critical as some have argued (e.g., any physical discipline is bad for children regardless of its severity or that even harsh physical discipline is not problematic as long as it does not become abusive). If, however, trajectories, antecedents, and outcomes are distinct for mild and harsh physical discipline, this would suggest that these forms of discipline may not be simply different points along a continuum but rather qualitatively distinct and worthy of examining separately rather than as indicators of a single underlying construct.

In the present study, we examined developmental change in mild and harsh physical discipline during middle childhood and adolescence using Nagin's (1999) semiparametric, group-based approach. We sought to examine developmental trajectories of physical discipline strategies, early childhood predictors of physical discipline trajectories, and developmental outcomes associated with different longitudinal patterns of physical discipline. Few investigations have explored changes in parent-child relationships over time or what may be the early childhood antecedents and outcomes of such changes. This would not necessarily be a problem if parent-child relationships are static in their effects over time. However, studies that have modeled change over time in parenting practices suggest that parent-child relationships often change in ways that may have important implications for children's development. For example, Herrenkohl, Hill, Hawkins, Chung, and Nagin (2006) identified three trajectories of family management practices (defined by combining youths' responses to questions about their parents' knowledge of their whereabouts and behaviors related to discipline, rules, praise, and criticism) of youths aged 11-14 years. At the end of the study period, youths whose parents' scores on the family management practice measures improved over time showed levels of violence that were as low as youths whose parents had consistently demonstrated good family management practices (Herrenkohl et al., 2006). Laird, Criss, Pettit, Bates, and Dodge (2009) examined developmental trajectories of adolescents' perceptions of family rules and parents' knowledge of their activities. Low socioeconomic status (SES) and living in an unsafe neighborhood predicted stable, high levels of family rules, but youth externalizing problems, peers' antisocial behavior, and living in an unsafe neighborhood predicted

decreasing, low levels of parental knowledge about their adolescents' activities. The present study extends this type of inquiry to examine early childhood antecedents and consequences of changes in parents' use of physical discipline during middle childhood and early adolescence. Understanding how and why discipline changes during middle childhood and early adolescence is important both conceptually in advancing knowledge about parents' socialization of children and young adolescents and in practice because such understanding would clarify whether intervening to change parents' discipline practices (and thereby their trajectories of discipline) would be likely to benefit children.

Antecedents and Outcomes of Physical Discipline

Many factors may affect whether and how frequently parents use physical discipline and parents' ability or inability to change their parenting practices over time. In the present study we are interested not only in trajectories of physical discipline over time but also in what causal inferences might be made about developmental antecedents and outcomes of physical discipline. Theories that emphasize the importance of social contexts, family systems, and ongoing relationship contexts (e.g., Laursen & Collins, 1994) all suggest possible developmental precursors and consequences of parents' use of physical discipline. For example, physical discipline techniques have been found to be related to socioeconomic characteristics, child attributes, and parent-child relationships (Gershoff, 2002; Krishnakumar & Buehler, 2000; Lansford, Deater-Deckard, Dodge, Bates, & Pettit, 2004; McLoyd & Smith, 2002). The conceptual model guiding the present study included this diverse array of factors.

Ecological risk, defined by factors such as low family SES and single parent status, has been found to be associated with frequent use of physical discipline. Giles-Sims et al. (1995) found that mothers who worked only a few hours a week, lived in poverty, and received government financial assistance engaged in significantly higher levels of physical discipline compared to other mothers. Similarly, Lansford et al. (2004) found a negative association between family SES and physical discipline during adolescence. Such differences in physical discipline could be a function of frustration and dysregulation due to higher stress levels and lower resources in at-risk families. It could also be that lower SES adults do not have the same freedoms in the workplace as do higher SES adults, which may lead

them to create a home environment where children are strongly discouraged from questioning authority (see Baumrind, 1972; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000). Such an approach could be adaptive for parents whose offspring are more likely to end up in jobs that do not condone non-compliant and questioning behavior of their supervisors. Thus, instead of reflecting stress in parents' lives, use of physical discipline might reflect low-SES parents' experience of the world as a place where children should respect their elders and be seen and not heard, consciously preparing their children for demands of their future workplaces.

Not only do family context factors shape parents' discipline strategies, children's own externalizing behaviors have been found to elicit parents' use of physical discipline. In particular, in the face of non-compliance or adverse temperament traits, parents may resort to harsh and punitive discipline strategies (e.g., Bell & Harper, 1977; Campbell, 1990; Catron & Masters, 1993; Flynn, 1998; Grusec & Lytton, 1988; Scarr & McCartney, 1983). Moreover, scholars have argued for the importance of controlling for initial levels of behavior problems when examining links between physical discipline and subsequent behavior problems, as parents' use of physical discipline may be elicited by prior and current individual differences in child disruptive behavior, and associations between physical discipline and antisocial behavior may only reflect continuity in the latter (e.g., Larzelere, 2000).

Discipline and parent-child relationship quality also are related over time. In a 4-year longitudinal study of 4- and 5-year-olds, McLoyd and Smith (2002) found that increases in spanking were significantly related to decreases in emotional support in the parent-child dyad. Shaw, Lacourse, and Nagin (2005) found that high levels of punitive and rejecting parenting at ages 1½ and 2 years were related to high levels of parent-child conflict at ages 5 and 6 years.

The Present Study

The present study had three goals: First, we examined developmental change in mild and harsh physical discipline during middle childhood and adolescence using Nagin's (1999) semiparametric, group-based method, which is a person-centered approach that allows for an exploration of distinct trajectory groups, using data from the Child Development Project (CDP) and the Pitt Mother-Child Project (PMCP). We hypothesized that there would be variation with respect to patterns of change in

physical discipline exhibited across the different trajectory groups. In particular, we expected that different groups would show initial mean differences on levels of physical discipline, with some parents frequently and other parents never using physical discipline. Over time, we expected that most of these groups would decrease in their use of physical discipline but that some groups would remain stable or even increase in their use of physical discipline. Previous research does not lead to a clear hypothesis regarding whether the trajectories would differ for mild versus harsh physical discipline. Thus, we did not hypothesize specific differences but examined trajectories separately for mild physical discipline and harsh physical discipline.

Second, we explored two early childhood antecedents of the physical discipline trajectory groups: family ecological disadvantage and child externalizing problems. The literature suggests that high levels of family ecological disadvantage and child externalizing behavior may elicit high levels of physical discipline and may affect trajectories of physical discipline over time (Catron & Masters, 1993; Flynn, 1998). Physical discipline becomes less developmentally appropriate as children age. If a parent is using physical discipline with an older child, this may indicate that the parent cannot adjust to the developmental changes within the child. We expected that parents from families characterized by high levels of ecological disadvantage would be less able or less willing to adapt to the developmental changes within the child and the parent-child relationship and, thus, would report higher and more stable levels of physical discipline in comparison with other families, who would be more able to adjust to developmental changes within the child over time. Likewise, child externalizing may affect trajectories of physical discipline to the extent that externalizing problems facilitate the perpetuation and escalation of physical discipline tactics (e.g., Patterson, 2002). We hypothesized that ecological disadvantage and child externalizing behavior would distinguish trajectories of harsh physical discipline more than trajectories of mild physical discipline because mild physical discipline may be used more pervasively whereas harsh physical discipline may be used more in difficult socio-cultural circumstances or with children who are more difficult to manage.

Third, we explored developmental outcomes of physical discipline trajectories. We predicted that parents who over time consistently reported high and stable levels of physical discipline would be

more likely than others to have children with higher levels of externalizing problems and have poorer relationships with their offspring. We hypothesized that trajectory differences in developmental outcomes would be more pervasive for harsh than mild physical discipline.

Study 1: Child Development Project

Method

Participants

The CDP is a multisite longitudinal study of child development (e.g., Dodge, Bates, & Pettit, 1990). Families with children entering kindergarten were recruited from two cohorts in 1987 and 1988 from three sites: Knoxville and Nashville, TN and Bloomington, IN. During the first assessment at age 5, data were collected from 585 families (52% boys; 81% European American, 17% African American, 2% Other; 26% single-parent-headed families; family SES $M = 39.53$, $SD = 14.01$, corresponding to skilled craftsmen, clerical, and sales workers in the Hollingshead, 1979, system). CDP data used in the current study were collected annually from age 5 through age 16 years.

The final CDP subsample used in this study consisted of 499 families (81.8% European American, 16.6% African American, 1.6% Other; 52.1% male) who had physical discipline data from at least 2 of the 4 years in which discipline data were collected. Participating families ($n = 499$) were compared with nonparticipating families ($n = 86$) on age 5 demographic variables (maternal education, family SES) and on the early childhood antecedents of physical discipline (family ecological disadvantage, child externalizing behavior). Significant differences were found only for family SES, $F(1, 570) = 6.68$, $p < .01$. Participating families had higher SES scores ($M = 40.14$, $SD = 13.97$, corresponding to medium-level business people, minor professionals, and technical workers) compared to nonparticipating families ($M = 35.80$, $SD = 13.74$, corresponding to craftsmen, clerical, and sales workers).

Measures: Physical Discipline

Physical discipline was assessed when the children were aged 6–9. During home interviews, mothers reported (0 = *never* to 4 = *about every day*) how frequently they used various discipline techniques to correct child behavior, including two

types of physical discipline (i.e., spank with hand, spank with object). These two indicators were modeled separately as indicators of mild and harsh physical discipline, respectively. Because of funding issues, physical discipline data at age 9 were collected only from Cohort 1. However, no significant differences were found between Cohorts 1 and 2 on physical discipline at ages 6, 7, and 8 years.

Measures: Early Childhood Antecedents of Physical Discipline

During the summer preceding the children's entry into kindergarten (age 5), families participated in a 90-min interview that included both structured and open-ended questions. Two antecedent variables were based on data collected during this assessment.

Ecological disadvantage (Criss, Pettit, Bates, Dodge, & Lapp, 2002) was defined as the additive risk of low SES, high family stress, and single-parent status. SES was derived from the occupation and education levels, of both parents at the age 5 assessment ($M = 39.53$, $SD = 14.01$). Based on parental recollections of specific family stressors (e.g., death, family moves) during two developmental periods (12+ months until 1 year ago, and the past year), interviewers rated the extent of stressful, challenging events faced by the family using a 5-point rating scale ranging from *minimal challenge* to *severe frequent challenges* (interrater $r = .79$). The ratings from the two eras were averaged ($r = .47$, $p < .001$) to yield a score for family life stress ($M = 2.96$, $SD = 0.95$). For each ecological disadvantage component, families were assigned a 1 if they were at risk (i.e., single-parent, above the median on stress, below the median on SES) and a 0 if they were not at risk (i.e., married or cohabitating, below the median on stress, above the median on SES). The scores were summed to compute the final ecological disadvantage variable (range = 0–3).

Child *externalizing behavior* was based on mother reports at age 5 on the Child Behavior Checklist (CBC; Achenbach, 1991). For each item, mothers noted whether the statement was *not true for the child* (0), *somewhat or sometimes true* (1), or *very true or often true* (2). The final externalizing behavior factor was based on the sum of 33 items ($\alpha = .87$).

Measures: Adolescent Outcomes of Physical Discipline

The *parent–adolescent positive relationship quality* factor was created by standardizing and averaging

($r = .37$, $p < .001$) mother and observer ratings when adolescents were 16 years old. Using an instrument developed by the Oregon Social Learning Center, mothers used a 5-point scale (0 = *never or less than once a month* to 5 = *at least once a day*) to rate the level of positivity of the parent–adolescent dyad (e.g., “How often is it enjoyable for you to spend time with your adolescent?”). Mother ratings on the six items were averaged ($\alpha = .77$) to create the mother-reported positive relationships component ($M = 2.59$, $SD = 0.63$). Observed parent–child relationship quality was based on a measure developed by Melby et al. (1998). This scale reflects the quality of the dyad's relationship. Mothers and adolescents were videotaped as they engaged in three tasks (a conversation task, a problem-solving task, and a role-playing task). Each dyad received one score for Tasks 1, 2, and 3 (interrater reliability calculated through intraclass correlations: $\rho_s = .71$, $.72$, and $.69$, respectively, $p < .001$). A 9-point scale was used with low scores indicating an unhappy, emotionally unsatisfying, or brittle relationship. A high score reflects a dyad that displays warm, open, happy, and emotionally satisfying interactions. Scores in the middle reflect families where there is no evidence concerning the quality of the relationship or if there are equal amounts of negative and positive evidence. Data from the three tasks were averaged ($\alpha = .90$) to create the final observed relationship quality variable ($M = 6.03$, $SD = 1.43$).

Adolescent age 16 *antisocial behavior* was based on mother and target child's reports on the CBC and Youth Self-Report (YSR; Achenbach, 1991), respectively. The final antisocial behavior factor was based on the mean ($r = .45$, $p < .001$) of mother ($\alpha = .91$; $M = 8.28$, $SD = 6.28$) and adolescent ($\alpha = .89$; $M = 11.61$, $SD = 7.47$) impressions of adolescent externalizing behavior. Table 1 provides a summary of the CDP measures.

Results and Discussion

Overview of Analyses

Data analyses proceeded in three steps. First, descriptive statistics for all study variables were computed. Second, a semiparametric group-based modeling strategy was used to identify distinct groups of individual trajectories in mild physical discipline and harsh physical discipline. Third, early childhood antecedents and adolescent outcomes of trajectory group membership (TGM) were investigated by computing analyses of covariance

Table 1
Descriptive Statistics (CDP Sample)

Variable	Age at assessment	N	M	SD
Physical discipline ^a				
Mild physical discipline	6	480	1.42	1.10
Mild physical discipline	7	469	1.16	0.96
Mild physical discipline	8	470	0.99	0.98
Mild physical discipline	9	229	0.87	0.97
Harsh physical discipline	6	480	0.63	0.99
Harsh physical discipline	7	469	0.58	0.91
Harsh physical discipline	8	470	0.54	0.90
Harsh physical discipline	9	229	0.41	0.72
Antecedents				
Family ecological disadvantage ^b	5	499	0.70	0.90
Child externalizing behavior ^c	5	489	11.67	7.09
Outcomes				
Parent-adolescent positive Relationship quality ^d	16	438	-0.03	0.87
Adolescent antisocial behavior ^e	16	429	0.01	0.84

Note. CDP = Child Development Project.

^aMother reports; discipline data were collected on only one of the two cohorts at age 9. ^bMother reports of low SES, high family stress, and single-parent status. ^cMother reports on 33 items in the Achenbach externalizing scale. ^dMother ratings on six items and observer ratings from three tasks. ^eMother and adolescent reports on the Achenbach Child Behavior Checklist and Youth Self-Report externalizing scales.

(ANCOVAs). Early childhood externalizing behavior (age 5) was entered as a covariate in each ANCOVA, except when it was analyzed as an antecedent of TGM. The substantive findings essentially were the same when we reran the analyses controlling for SES, but we did not include SES in the analyses reported below because SES was captured already in the ecological disadvantage predictor.

Descriptive Statistics

Descriptive statistics are listed in Table 1. Consistent with previous research (Straus & Stewart, 1999), both mild and harsh physical discipline declined with age, though mothers reported harsh physical discipline less frequently than mild physical discipline at all ages. At age 6, the mean for mild physical discipline was between *about once a month* and *less than once a month* on the response scale; by age 9, the mean was close to *less than once a month*. For harsh physical discipline, the mean was between *never* and *less than once a month* at both age 6 and 9, but closer to *less than once a month* at age 6 and closer to *never* at age 9.

Examination of Developmental Trajectories

To find distinct developmental trajectories in physical discipline, Nagin's (1999) semiparametric, group-based approach was adopted by using SAS PROC TRAJ. This approach uses a polynomial function to model the association between a characteristic (e.g., physical discipline) and age. Although assigning families to trajectory groups could be accomplished through a set of subjective categorization criteria determined a priori, this may lead to creating groups that reflect only random fluctuation and failing to identify unusual but real developmental trajectories (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). In addition, other approaches, such as hierarchical and latent growth curve modeling, assume a continuous distribution of trajectories. That is, these approaches are used to explore developmental processes that vary regularly within a population (Nagin, 1999; Raudenbush, 2001). In contrast, Nagin's TRAJ analysis allows for an easy identification of population heterogeneity both in terms of an attribute at a given age and how this attribute changes over time. For instance, parents within a population are likely to vary with respect to their use of physical discipline at any given point in time with some adopting this discipline strategy at high rates, others at more moderate levels, and still other individuals rarely or never displaying this behavior. Likewise, there may be variation with respect to change: Physical discipline may steadily accelerate, decelerate, or display no change. Thus, TRAJ provides a more flexible approach for the identification of unusual mixtures of trajectories within a population. Moreover, this analysis handles missing data using a maximum likelihood approach that allows the retention of participants who provided discipline data at some, but not all, time points. To model developmental change, time was specified as the number of years between assessments.

The Bayesian information criterion (BIC; Jones, Nagin, & Roeder, 2001; Nagin, 1999) has been recommended for selecting the best model fit based on the number of trajectory groups (i.e., three, four) and type of slope (i.e., quadratic, linear, zero). BIC scores that are closest to zero are considered to have the best fit. To determine the optimal number of trajectories for physical discipline from ages 6 to 9, models with three and four groups were estimated in accordance with previous research (Nagin & Tremblay, 1999; Shaw et al., 2003). Trajectory analyses were computed separately for both mild and harsh physical discipline.

Mild physical discipline. The BIC score was $-2,303.78$ for three groups and $-2,293.26$ for four groups with the four-group model fitting the data best (for recommendations regarding model fit, see D'Unger, Land, McCall, & Nagin, 1998). As shown in Figure 1, in the high decreasing group (14.7% of sample; constant = 2.61, $SE = 0.10$, $p < .001$; linear slope = $-.29$, $SE = 0.07$, $p < .001$), the level of mild physical discipline started high and declined with age but it still remained relatively high. The moderate quadratic group (55%) displayed decreasing levels of mild physical discipline, though the rate of decline decreased over time (constant = 1.05, $SE = 0.07$, $p < .001$; quadratic slope = $.15$, $SE = 0.05$, $p < .01$). Members of the low quadratic cluster (14.3%) reported relatively stable levels of mild physical discipline until around age 7 after which it decreased in frequency (constant = 0.92, $SE = 0.14$, $p < .001$; quadratic slope = $-.61$, $SE = 0.17$, $p < .001$). Approximately 16% of the mothers reported that they rarely if ever used mild physical discipline (constant = 0.00, $SE = 0.17$, *ns*).

Harsh physical discipline. The BIC score was $-1,593.27$ for three groups and $-1,598.08$ for four groups with the three-group model fitting the data best. Approximately 12% of the sample (Figure 2) displayed a high and linear slope (constant = 2.33, $SE = 0.19$, $p < .001$; linear slope = $-.23$, $SE = 0.09$, $p < .01$). Harsh physical discipline significantly decreased in this cluster, though it still remained relatively high. The moderate decreasing group (40.1%) reported moderate and decreasing levels of harsh physical discipline (constant = 0.48, $SE = 0.11$, $p < .001$; linear slope = $-.18$, $SE = 0.05$, $p < .001$). As with mild physical discipline, the final group consisted of mothers who rarely if ever used harsh physical discipline (47.7%; constant = 0.00, $SE = 0.26$, *ns*), but a larger proportion of the mothers were classified in the minimal and ceasing group for harsh than mild physical discipline.

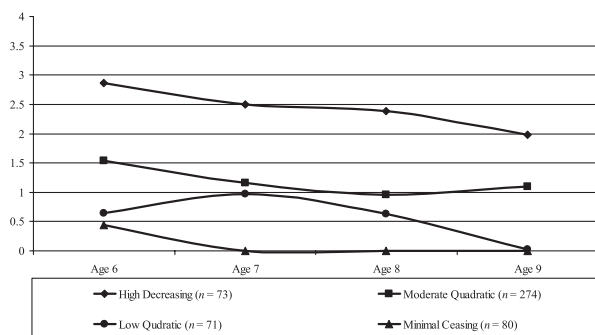


Figure 1. Developmental trajectories of mild physical discipline (Child Development Project sample).

We conducted two sets of supplementary analyses to assess the overlap between mild and harsh forms of physical discipline. First, we computed bivariate correlations between mild and harsh physical discipline at each time point. These correlations ranged from $.27$ to $.50$, suggesting significant, but not complete, overlap. Second, we computed a chi-square analysis between trajectory groups of mild physical discipline and trajectory groups of harsh physical discipline. The chi-square statistic was significant, suggesting overlap in the trajectories of mild and harsh physical discipline. For example, 78% of the minimal ceasing mild group was in the minimal ceasing harsh group, suggesting that most families who were not using mild physical discipline also were not using harsh physical discipline, but 12% of the families using harsh physical discipline were not using mild physical discipline.

Early Childhood Antecedents and Adolescent Outcomes of Physical Discipline

We then examined the characteristics of the trajectory groups, focusing on early childhood antecedents and adolescent developmental outcomes. A series of ANCOVAs (using pairwise deletion to handle missing data) were computed separately for each antecedent and outcome variable to examine mean differences across groups. Child externalizing behavior (age 5) was entered as a covariate in each analysis, except when it was examined as an antecedent. Bonferroni post hoc analyses were used for intergroup comparisons. Separate ANCOVAs were computed for mild and harsh physical discipline.

Mild physical discipline. For the first set of ANCOVAs, we examined antecedents and outcomes of mild physical discipline TGM. Results revealed that child externalizing behavior at age 5 (but not family ecological disadvantage)

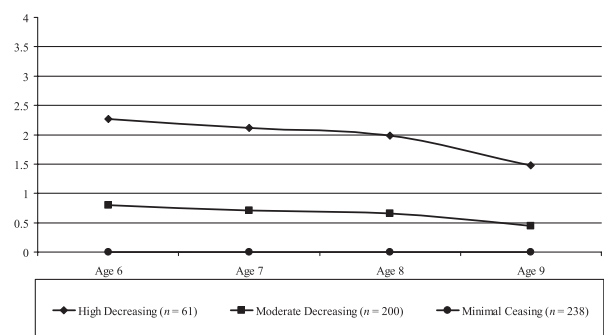


Figure 2. Developmental trajectories of harsh physical discipline (Child Development Project sample).

significantly differentiated the trajectory groups (see Table 2). Bonferroni post hoc analyses indicated that children in the high decreasing group had significantly higher levels of externalizing behavior compared to those in the three other trajectory groups. Turning to the adolescent-era outcomes, adolescent antisocial behavior at age 16

(but not parent-adolescent relationship quality) significantly differentiated the trajectory groups. Post hoc analyses indicated that adolescents from the high decreasing and moderate quadratic groups displayed significantly higher levels of antisocial behavior compared to those in the minimal/ceasing group.

Table 2

ANCOVAs Examining Antecedents and Outcomes of Mild Physical Discipline Trajectory Groups (CDP Sample)

Trajectory groups	Family ecological disadvantage (<i>n</i> = 491)	Child externalizing behavior (<i>n</i> = 490)	P-A positive relationship quality (<i>n</i> = 432)	Adolescent antisocial behavior (<i>n</i> = 422)
High decreasing group				
Adjusted mean (<i>SE</i>)	0.89 (0.11)	16.23 (0.80) _a	-0.16 (0.11)	0.17 (0.10) _a
Confidence interval	0.68 to 1.10	14.67 to 17.80	-0.37 to 0.06	-0.03 to 0.37
Moderate quadratic group				
Adjusted mean (<i>SE</i>)	0.70 (0.05)	11.54 (0.42) _b	-0.08 (0.06)	0.02 (0.05) _a
Confidence interval	0.60 to 0.81	10.72 to 12.35	-0.19 to 0.03	-0.08 to 0.12
Low quadratic group				
Adjusted mean (<i>SE</i>)	0.54 (0.11)	10.06 (0.82) _b	0.10 (0.11)	0.02 (0.10)
Confidence interval	0.33 to 0.75	8.45 to 11.67	-0.12 to 0.32	-0.18 to 0.21
Minimal and ceasing				
Adjusted mean (<i>SE</i>)	0.59 (0.10)	9.29 (0.78) _b	0.18 (0.11)	-0.30 (0.10) _b
Confidence interval	0.39 to 0.79	7.76 to 10.81	-0.03 to 0.38	-0.49 to -0.12
<i>F</i>	2.04	15.42***	2.36	4.24**
η_p^2	0.01	0.09	0.02	0.03

Note. *F* statistic reflects associations with mild physical discipline trajectory group membership. Means and standard errors (in parentheses) for each group were adjusted controlling for child externalizing behavior (age 5). Means with a subscript of "a" differ significantly from means with a subscript of "b" based on Bonferroni post hoc comparisons ($p < .05$). Means with no subscript do not differ significantly from any other means. ANCOVA = analysis of covariance; CDP = Child Development Project; P-A = parent-adolescent.

** $p < .01$. *** $p < .001$.

Table 3

ANCOVAs Examining Antecedents and Outcomes of Harsh Physical Discipline Trajectory Groups (CDP Sample)

Trajectory groups	Family ecological disadvantage (<i>n</i> = 491)	Child externalizing behavior (<i>n</i> = 482)	P-A positive relationship quality (<i>n</i> = 429)	Adolescent antisocial behavior (<i>n</i> = 421)
High decreasing group				
Adjusted mean (<i>SE</i>)	0.85 (0.12)	15.37 (0.89) _a	-0.10 (0.12)	0.31 (0.10) _a
Confidence interval	0.62 to 1.07	13.62 to 17.11	-0.33 to 0.13	0.11 to 0.52
Moderate decreasing group				
Adjusted mean (<i>SE</i>)	0.79 (0.06) _a	12.52 (0.49) _b	-0.07 (0.07)	0.02 (0.06) _b
Confidence interval	0.66 to 0.91	11.56 to 13.49	-0.20 to 0.07	-0.10 to 0.14
Minimal and ceasing group				
Adjusted mean (<i>SE</i>)	0.56 (0.06) _b	9.99 (0.45) _b	0.03 (0.06)	-0.11 (0.05) _b
Confidence interval	0.45 to 0.68	9.11 to 10.88	-0.09 to 0.14	-0.22 to -0.01
<i>F</i>	4.29**	17.13***	0.48	6.57**
η_p^2	0.02	0.07	0.00	0.03

Note. *F* statistic reflects associations with harsh physical discipline trajectory group membership. Means and standard errors (in parentheses) for each group were adjusted controlling for child externalizing behavior (age 5). Means with a subscript of "a" differ significantly from means with a subscript of "b" based on Bonferroni post hoc comparisons ($p < .05$). Means with no subscript do not differ significantly from any other means. ANCOVA = analysis of covariance; CDP = Child Development Project; P-A = parent-adolescent.

** $p < .01$. *** $p < .001$.

Harsh physical discipline. We next examined whether trajectories of harsh physical discipline were significantly differentiated by childhood- and adolescence-era variables. As displayed in Table 3, the ANCOVAs indicated that family ecological disadvantage and child externalizing behavior at age 5 were both significant predictors of TGM. Bonferroni post hoc analyses indicated that members of the moderate decreasing group experienced significantly higher levels of ecological risk compared to individuals in the minimal/ceasing group. In addition, mothers in the high decreasing group reported significantly higher levels of child externalizing behavior compared to those in the other two trajectory clusters. The ANCOVAs also indicated that TGM was significantly related to adolescent antisocial behavior but not relationship quality. Specifically, adolescents in the high decreasing group engaged in significantly higher levels of antisocial behavior compared to adolescents in the other two groups.

We tested for child sex and ethnic differences by examining (a) whether each predicted TGM (chi-square analyses) and (b) whether sex or ethnicity significantly interacted with TGM in the prediction of the antecedent and outcome variables (ANCOVAs). Chi-square analysis revealed that child ethnicity was a significant predictor of mild physical discipline TGM, $\chi^2(3) = 8.01$, $p < .05$. Inspection of the frequencies indicated that the high linear and low quadratic groups had higher percentages of African Americans (25% and 23.5%, respectively) compared to the moderate quadratic and minimal/ceasing clusters (14.7% and 11.5%, respectively). The chi-square analysis indicated that child ethnicity also was significantly related to harsh physical discipline TGM, $\chi^2(2) = 42.91$, $p < .001$. Specifically, the percentage of African Americans in the high decreasing group (38.3%) was higher than in the moderate linear (22.8%) and minimal/ceasing (6.4%) groups. Ethnicity did not interact with TGM in the prediction of the antecedent and outcome variables. Gender was unrelated to TGM and did not interact with TGM in the prediction of the antecedent and outcome variables.

Overall, the results indicated that child externalizing behavior early in life differentiated the mild and harsh physical discipline patterns that developed over time. In addition, high family ecological disadvantage was associated with trajectories of harsh physical discipline but was unrelated to trajectories of mild physical discipline. Developmental patterns of mild and harsh physical discipline also were predictive of differences in subsequent adoles-

cent antisocial behavior. In some ways, these findings are similar to findings from previous research that has examined physical discipline at a single point in time rather than using a trajectory approach. The findings are also in accord with Patterson's (2002) social coercion theory. For example, consistent with findings that children's externalizing problems can elicit parents' physical discipline, children showed initially high levels of externalizing behavior problems in both the mild and the harsh trajectory groups that began with high levels of physical discipline, whereas children showed initially low levels of externalizing behavior problems in the trajectory groups that began with moderate or low levels of physical discipline. Over time, however, if parents continued to use moderate levels of mild physical discipline, their children were at risk for subsequent antisocial behavior during adolescence.

Study 2: Pitt Mother–Child Project

Despite the strengths of our approach using the CDP data, we believed that empirical and conceptual questions warranted replicating and extending our analyses using a separate sample with different demographic characteristics. Empirically, one concern in using a data-driven analytic strategy such as Nagin's semiparametric group-based approach is that the resulting groups may be dependent on a particular sample and may not generalize to other samples (Muthén, 2004). Thus, we sought to test the generalizability of the trajectory groups we found in the CDP by conducting similar analyses on a sample that differed in several demographically important ways from the CDP. The sample from the PMCP was ideal in this respect because it afforded a chance to analyze very similar longitudinal data on discipline, early childhood antecedents, and adolescent outcomes using a sample that is older, lower in SES, and higher risk than the CDP sample. In addition to testing the generalizability of our CDP results, using the higher risk PMCP sample also enabled us to extend our focus conceptually. Some researchers have proposed that more authoritarian forms of parenting (often including physical discipline) are more effective in higher risk social contexts (Baumrind, 1972; Pinderhughes et al., 2000). Therefore, it is possible that different types of physical discipline trajectories may be found in higher risk contexts and that these trajectories may be related differently to developmental antecedents or outcomes.

Method

Participants

The PMCP is an ongoing longitudinal project examining vulnerability and resilience in low-income boys (e.g., Criss & Shaw, 2005). The sample was recruited in 1991 from low-income families who were participants in the Women, Infants, and Children (WIC) Nutritional Supplement Program in the Pittsburgh metropolitan area. The WIC program provides monetary supplements to purchase food for income-eligible families from pregnancy until children are 5 years old. The first assessment consisted of 310 families with 1½-year-old children (51% European American, 39% African American, 10% Other; 33% single-parent-headed families; family SES $M = 23.32$, $SD = 9.29$, corresponding to machine operators and semiskilled workers in the Hollingshead, 1979, system). Because the original intent of the project was to examine precursors of antisocial behavior, the sample was restricted to boys. PMCP data used in the current study were collected over an 11-year period, covering ages 5 through 15 years.

The final PMCP subsample included in the study consisted of 258 families (52% European American, 38% African American, 10% Other) who had physical discipline data from at least 2 of the 4 years in which physical discipline data were collected. Participating families ($n = 258$) were compared with nonparticipating families ($n = 52$) on age 1½ demographic variables (maternal education, family SES) and on the early childhood antecedents of physical discipline (family ecological disadvantage, child externalizing behavior). Of the four tests performed, no significant differences were found.

Measures: Physical Discipline

Physical discipline was assessed when the boys were of ages 10, 11, 12, and 15. During interviews (home visit at ages 10, 12, and 15, laboratory visit at age 11), mothers were asked about the frequency with which they used certain discipline techniques when the child misbehaved, including two physical discipline items ("spank" and "slap or hit with hand, fist, or object"). These items were used as indicators of mild physical discipline and harsh physical discipline, respectively. Mothers rated each item on a 4-point scale (1 = *I never do this* to 4 = *I do this frequently*).

Measures: Early Childhood Antecedents of Physical Discipline

Two antecedent variables were based on home interviews at age 5 years. *Ecological disadvantage* reflected the additive risk of low SES, high neighborhood danger, and single-parent status. SES was based on the occupation and education level of both parents ($M = 26.86$, $SD = 9.65$). Using a 3-point scale (1 = *not a problem*, 2 = *somewhat a problem*, and 3 = *big problem*), mothers rated the extent to which 17 activities such as prostitution, vandalism, illicit drug use, and gambling were problematic in their neighborhoods (Pittsburgh Youth Study, 1991). Neighborhood danger at age 5 ($\alpha = .95$; $M = 25.73$, $SD = 8.73$) was based on the sum of the 17 items. For each ecological disadvantage component, families were assigned a 1 if they were at risk (i.e., single-parent, above the median on neighborhood danger, below median on SES) and a 0 if they were not at risk (i.e., married or cohabitating, below the median on neighborhood danger, above median on SES). The scores were summed to compute the final ecological disadvantage variable (range = 0–3).

Child *externalizing behavior* at age 5 was based on mother reports on the CBC (Achenbach, 1991). The final externalizing factor was based on the sum ($\alpha = .88$) of the 33 items. Externalizing behavior at age 8 was used as a control variable in the major analyses. This also was based on mother reports on the CBC ($\alpha = .90$; $M = 10.44$, $SD = 7.67$).

Measures: Adolescent Outcomes of Physical Discipline

The *mother-adolescent positive relationship quality* factor (age 15) was created by standardizing and averaging ($r = .30$, $p < .001$) mother and interviewer impressions. Using a 5-point scale (1 = *no, not at all* to 5 = *yes, completely*), mothers rated the extent to which they trusted their children with respect to spending money, taking responsibility for life, doing well in school, and being alone at home. The four items were averaged ($\alpha = .82$) to create the mother-reported component ($M = 3.89$, $SD = 0.85$). After the home visits, interviewers completed a series of postassessment ratings measuring aspects of the family environment, including positivity in the parent-child relationship (e.g., "Did the parent initiate positive physical contact with the child?"). The 11 items were rated on a 5-point scale (1 = *never or almost never* to 5 = *always or almost always*) and averaged ($\alpha = .84$) to create the interviewer-rated component ($M = 4.02$, $SD = 0.60$).

Adolescent antisocial behavior at age 15 was based on the reports of the mother and adolescent. Mothers' ratings on the 33-item CBC externalizing behavior subscale were summed ($\alpha = .93$; $M = 7.81$, $SD = 9.08$). Adolescents provided information regarding their level of antisocial behavior using a 55-item measure that was adapted from the Self-Report of Delinquency questionnaire (Elliott, Huizinga, & Ageton, 1985). Using a 3-point rating scale (1 = *never*, 2 = *once/twice*, and 3 = *more often*), adolescents rated the extent to which they engaged in different types of antisocial behaviors (e.g., stealing, hitting person, smoking cigarettes). Adolescent reports were averaged ($\alpha = .92$; $M = 8.98$, $SD = 9.66$) to create the composite. Finally, mother and adolescent scores were standardized and averaged ($r = .41$, $p < .001$) to create the final adolescent antisocial behavior factor. PMCP measures are summarized in Table 4.

Results and Discussion

Analyses proceeded in the same steps as with the CDP data. Child externalizing behavior at age 8 years was entered as a covariate in the ANCOVAs.

Descriptive Statistics

Descriptive statistics are listed in Table 4. As in the CDP, scores for frequency of physical discipline declined with age in the PMCP sample, though the change was somewhat greater for mild physical discipline than for harsh physical discipline. At age 10, the mean for both mild and harsh physical discipline was slightly less than *I rarely do this* on the response scale; by age 15, the mean for both mild and harsh physical discipline declined to closer to *I never do this*.

Examination of Developmental Trajectories

Mild physical discipline. The BIC score was -955.26 for three groups and -959.86 for four groups with the three-group model fitting the data best. As shown in Figure 3, approximately 20.5% of the sample displayed high and stable (slope = 0) levels of mild physical discipline (constant = 2.20, $SE = 0.06$, $p < .001$). The second cluster displayed a moderate quadratic slope (48.6%; constant = 1.51, $SE = 0.72$, $p < .001$; quadratic slope = $-.16$, $SE = 0.05$, $p < .001$). The rate of decrease in mild physical discipline in this group accelerated after age 12. The minimal/ceasing group consisted of mothers who rarely

Table 4
Descriptive Statistics (PMCP Sample)

Variables	Age at assessment	N	M	SD
Physical discipline ^a				
Mild physical discipline	10	234	1.79	0.75
Mild physical discipline	11	240	1.72	0.75
Mild physical discipline	12	234	1.62	0.67
Mild physical discipline	15	237	1.29	0.61
Harsh physical discipline	10	234	1.68	0.68
Harsh physical discipline	11	240	1.61	0.65
Harsh physical discipline	12	234	1.62	0.66
Harsh physical discipline	15	237	1.46	0.66
Antecedents				
Family ecological disadvantage ^b	5	246	1.36	1.01
Child externalizing behavior ^c	5	237	14.01	7.87
Outcomes				
Parent-adolescent positive Relationship quality ^d	15	211	-0.01	0.82
Adolescent antisocial behavior ^e	15	221	0.01	0.86

Note. PMCP = Pitt Mother-Child Project.

^aMother reports. ^bMother reports of low socioeconomic status, high neighborhood danger, and single-parent status. ^cMother reports on 33 items in the Achenbach externalizing scale. ^dMother ratings on four items and interviewer ratings on 11 items. ^eMother reports on the Achenbach externalizing scale and adolescent ratings on 55 items.

if ever used mild physical discipline (30.9% of sample; constant = 1.01, $SE = 0.26$, ns).

Harsh physical discipline. The BIC score was -959.86 for three groups and -972.71 for four groups with the three-group model fitting the data best. Approximately 38.8% of the sample (Figure 4) displayed high and stable levels of harsh physical discipline (constant = 2.02, $SE = 0.04$, $p < .001$). The moderate quadratic group (33.1%) reported moderate and decreasing levels of harsh physical discipline (constant = 1.17, $SE = 0.10$, $p < .001$; quadratic

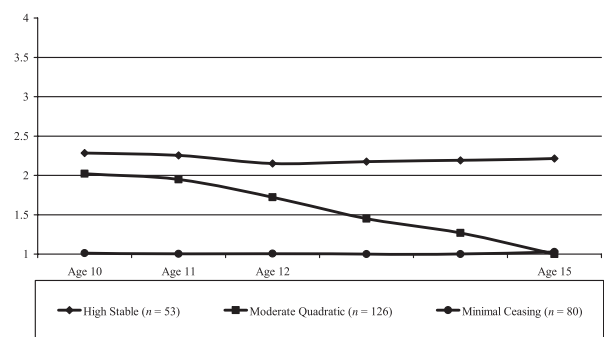


Figure 3. Developmental trajectories of mild physical discipline (Pitt Mother-Child Project sample).

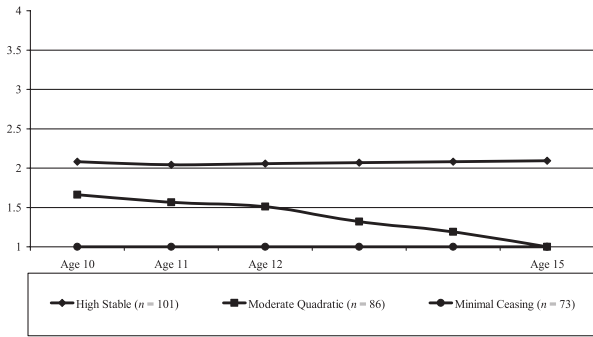


Figure 4. Developmental trajectories of harsh physical discipline (Pitt Mother–Child Project sample).

slope = $-.13$, $SE = 0.04$, $p < .01$), though the rate of decrease accelerated after age 12. As with mild physical discipline, there was also a group of mothers who rarely if ever used harsh physical discipline (28.1%; constant = 1.00, $SE = 0.20$, *ns*).

As in the CDP, we conducted two sets of supplementary analyses to assess the overlap between mild and harsh forms of physical discipline. Bivariate correlations between mild and harsh physical discipline at each time point ranged from .50 to .60, suggesting significant, but not complete, overlap. A chi-square analysis between trajectory groups of mild physical discipline and trajectory groups of harsh physical discipline was significant, suggesting overlap in the trajectories of mild and harsh physical discipline. For example, 65% of the minimal ceasing mild group was in the minimal ceasing

harsh group, suggesting that most families who were not using mild physical discipline also were not using harsh physical discipline.

Early Childhood Antecedents and Adolescent Outcomes of Physical Discipline

Mild physical discipline. For the first set of ANCOVAs, we examined antecedents and outcomes of mild physical discipline TGM. Results revealed that TGM was significantly related to parent–adolescent relationship quality and adolescent antisocial behavior, but not early childhood ecological risk or externalizing behavior (see Table 5). Bonferroni post hoc analyses indicated that adolescents in the high stable and moderate quadratic groups had significantly poorer relationships with their mothers compared to adolescents in the minimal/ceasing group. Likewise, adolescents in the minimal/ceasing group displayed significantly lower levels of antisocial behavior compared to those in the moderate quadratic group.

Harsh physical discipline. We next examined whether trajectories of harsh physical discipline were significantly differentiated by childhood- and adolescence-era variables. As displayed in Table 6, the ANCOVAs indicated that family ecological disadvantage and child externalizing behavior at age 5 were both significant predictors of TGM. Bonferroni post hoc analyses indicated that members of the high stable group had significantly higher levels of ecological disadvantage compared to those in the

Table 5
ANCOVAs Examining Antecedents and Outcomes of Mild Physical Discipline Trajectory Groups (PMCP Sample)

Trajectory groups	Family ecological disadvantage (n = 228)	Child externalizing behavior (n = 238)	P–A positive relationship quality (n = 201)	Adolescent antisocial behavior (n = 210)
High stable group				
Adjusted mean (SE)	1.47 (0.15)	14.61 (1.13)	–0.17 (0.12) _a	0.11 (0.12)
Confidence interval	1.17 to 1.77	12.40 to 16.83	–0.41 to 0.06	–0.13 to 0.36
Moderate quadratic group				
Adjusted mean (SE)	1.35 (0.10)	14.38 (0.74)	–0.18 (0.08) _a	0.15 (0.08) _a
Confidence interval	1.16 to 1.54	12.91 to 15.84	–0.33 to –0.02	–0.01 to 0.31
Minimal and ceasing group				
Adjusted mean (SE)	1.15 (0.12)	13.08 (0.90)	0.35 (0.10) _b	–0.19 (0.10) _b
Confidence interval	0.92 to 1.39	11.30 to 14.86	0.16 to 0.54	–0.40 to 0.01
F	1.52	0.45	9.81***	3.56*
η_p^2	0.01	0.01	0.09	0.03

Note. F statistic reflects associations with mild physical discipline trajectory group membership. Means and standard errors (in parentheses) for each group were adjusted controlling for child externalizing behavior (age 8). Means with a subscript of “a” differ significantly from means with a subscript of “b” based on Bonferroni post hoc comparisons ($p < .05$). Means with no subscript do not differ significantly from any other means. ANCOVA = analysis of covariance; PMCP = Pitt Mother–Child Project; P–A = parent–adolescent.

* $p < .05$. *** $p < .001$.

Table 6
ANCOVAs Examining Antecedents and Outcomes of Harsh Physical Discipline Trajectory Groups (PMCP Sample)

Trajectory groups	Family ecological disadvantage (<i>n</i> = 228)	Child externalizing behavior (<i>n</i> = 238)	P–A positive relationship quality (<i>n</i> = 201)	Adolescent antisocial behavior (<i>n</i> = 210)
High stable group				
Adjusted mean (<i>SE</i>)	1.53 (0.11) _a	14.80 (0.83)	−0.18 (0.09)	0.15 (0.09)
Confidence interval	1.32 to 1.75	13.17 to 16.43	−0.36 to 0.00	−0.03 to 0.32
Moderate quadratic group				
Adjusted mean (<i>SE</i>)	1.15 (0.11) _b	14.79 (0.87)	0.08 (0.10)	−0.01 (0.10)
Confidence interval	0.93 to 1.37	13.07 to 16.51	−0.11 to 0.28	−0.21 to 0.19
Minimal and ceasing group				
Adjusted mean (<i>SE</i>)	1.24 (0.13)	12.06 (0.95)	0.11 (0.11)	−0.07 (0.11)
Confidence interval	0.99 to 1.49	10.20 to 13.92	−0.11 to 0.32	−0.29 to 0.15
<i>F</i>	3.30*	2.98*	2.73	1.27
η_p^2	0.03	0.03	0.03	0.01

Note. *F* statistic reflects associations with harsh physical discipline trajectory group membership. Means and standard errors (in parentheses) for each group were adjusted controlling for child externalizing behavior (age 8). Means with a subscript of “a” differ significantly from means with a subscript of “b” based on Bonferroni post hoc comparisons ($p < .05$). Means with no subscript do not differ significantly from any other means. ANCOVA = analysis of covariance; PMCP = Pitt Mother–Child Project; P–A = parent–adolescent.

* $p < .05$.

moderate quadratic group. None of the post hoc analyses involving child externalizing behavior was significant. Parent–adolescent relationship quality and adolescent antisocial behavior were not significantly related to TGM.

We examined whether there were adolescent ethnic differences regarding (a) TGM and (b) the links between TGM and the antecedent and outcome variables. Chi-square analysis revealed that child ethnicity was a significant predictor of mild physical discipline TGM, $\chi^2(2) = 12.73$, $p < .01$. Inspection of the frequencies indicated that the high stable and moderate quadratic groups had higher percentages of African Americans (56.9% and 46.7%, respectively) compared to the minimal/ceasing cluster (26.7%). The chi-square analysis indicated that child ethnicity also was significantly related to harsh physical discipline TGM, $\chi^2(2) = 6.77$, $p < .001$. Specifically, the percentage of African Americans in the high stable group (51.1%) was higher than in the moderate quadratic (43.6%) and minimal/ceasing (30.6%) groups. Ethnicity did not moderate links between TGM and the antecedent and outcome variables.

To summarize, as in the CDP, parents in the PMCP sample who when the child was 10 years old were high, moderate, or low in their frequency of using physical discipline generally remained relatively high, moderate, or low in their frequency of using physical discipline 5 years later, with one exception—a group of mothers who precipitously decreased their use of physical discipline after the

age of 12. These different developmental patterns of physical discipline were associated with different early childhood antecedents as well as adolescent outcomes. In particular, early ecological disadvantage and child externalizing problems predicted subsequent trajectories of harsh physical discipline, and trajectories of mild physical discipline were associated with subsequent parent–adolescent relationship quality and adolescent antisocial behavior.

General Discussion

The present study investigated three research questions related to trajectories of physical discipline during middle childhood and early adolescence. The investigation was motivated by the goal of understanding how parents may adjust their use of physical discipline over time, factors that may influence parents’ ability or desire to adjust or adapt to their children’s developing competencies, and consequences of whether their discipline strategies change. As expected, we found distinct developmental patterns in mild and harsh physical discipline, early childhood antecedents that predicted developmental patterns of physical discipline, and specific developmental patterns in physical discipline that were associated with more positive outcomes in adolescence.

Despite the different demographic characteristics of the CDP and PMCP samples (age, risk status, gender), we found some similarities in develop-

mental trajectories of parents' use of physical discipline over time. In both samples and for both mild and harsh physical discipline, there were groups of mothers who rarely if ever used physical discipline over time. In both samples and for both mild and harsh physical discipline, there were also groups that began at high levels of use and groups that began at moderate levels of use. In the CDP, these groups decreased over time; in the PMCP, the groups that began at high levels of use remained high, and the groups that began at moderate levels decreased precipitously after the age of 12. Overall, the consistencies in the findings across the two samples are reassuring in terms of the generalizability of the trajectory groups that emerged using a data-driven approach, but the differences make sense conceptually given the different ages and risk characteristics of the samples. For example, given that lower SES has been associated with more frequent use of physical discipline (Giles-Sims et al., 1995), it makes sense that a high stable group was found in the lower SES PMCP sample. Furthermore, given the older age of the PMCP sample, the precipitous drop in the use of physical discipline after the age of 12 in moderate use groups might be indicative of some parents' belief that physical discipline was no longer an appropriate strategy to use as their children aged into adolescence. Despite the possibility that the use of physical discipline might have been more normative and adaptive in the higher risk PMCP sample, the antecedents and outcomes that were associated with the trajectory groups showed a great deal of consistency between the two samples.

One difference between the samples in outcomes associated with different trajectories was in parent-adolescent positive relationship quality, which was related to trajectories of mild physical discipline in the PMCP but not in the CDP. It is possible that the age differences between the two samples may have accounted for this finding. In particular, for the groups in the PMCP that continued to use mild physical discipline with their children between the ages of 10 and 15, by which point the use of physical discipline is much less common than at younger ages, subsequent parent-adolescent relationship quality was poorer than in the group that did not use physical discipline during this developmental period. It is possible that using mild physical discipline between the ages of 6 and 9 in the CDP was more normative and, therefore, not related to poorer subsequent parent-adolescent relationship quality (see Lansford et al., 2005). This finding would be consistent with other research showing

that physical discipline is associated with worse outcomes in older than younger samples (e.g., Gunnoe & Mariner, 1997). Another possibility is that the timing of measurement of parent-adolescent relationship quality in relation to the timing of measurement of the discipline trajectories accounted for this difference between the samples. In the CDP, parent-adolescent relationship quality was assessed 7 years after the last trajectory point, whereas in the PMCP, parent-adolescent relationship quality was assessed contemporaneously with the last trajectory point. Therefore, in the PMCP, there was no time lag between the last trajectory point and the assessment of parent-child relationship quality. In the CDP, much could have changed in the parent-child relationship in the 7 years between the last discipline trajectory point and the subsequent measure of parent-adolescent relationship quality. This methodological limitation in the timing of assessment applies also to the adolescent antisocial behavior outcomes.

In the CDP, early child externalizing problems differentiated the trajectories of discipline, but early child externalizing appeared to be related to initial levels of use of physical discipline rather than to changes in use over time. That is, children with low levels of externalizing problems at age 5 were infrequently physically disciplined at the age of 6, whereas children with high levels of externalizing problems at age 5 were frequently physically disciplined at age 6, but externalizing problems at age 5 did not differentiate the groups that showed quadratic changes in use of physical discipline after the age of 6. Children whose parents remained high in their use of physical discipline across this developmental period showed the highest levels of antisocial behavior in adolescence. These findings suggest the need for future research to examine transactional associations between parental discipline and children's externalizing. Parents may change their discipline strategies if their children's behavior changes; parents may not change their discipline strategies if their children's behavior does not change.

Our findings highlight the incremental knowledge generated by the trajectory analyses as an advance over other approaches to assessing physical discipline. Using the PMCP findings for both mild and harsh physical discipline, cross-sectional approaches or longitudinal approaches that did not follow trajectories over time would not be able to capture the finding that families in the moderate quadratic group initially showed levels of physical discipline that were nearly as high as

the high stable group but that ceased by the age of 15. Without following the trajectory of mild physical discipline over time, it would not be clear why adolescents from the moderate quadratic group had poorer relationships with their parents and displayed more adjustment difficulties compared to those from the minimal/ceasing group. In sum, the trajectory analyses provided evidence regarding how different groups of families changed over time with respect to the use of physical discipline.

In both the CDP and PMCP samples, family ecological disadvantage differentiated the trajectory groups. It is interesting that, as hypothesized, this difference emerged for harsh but not mild physical discipline, suggesting the importance of considering the severity of discipline (e.g., see Larzelere, 2000). Given American parents' widespread use of physical discipline (Straus, 2001), it makes sense that use of milder forms of physical discipline may not be limited to families at ecological risk. Families who experience higher ecological risk, however, may be more likely than other families to escalate their use of physical discipline into harsher forms (for a discussion of how contextual factors are related to the coercion process, see Capaldi, DeGarmo, Patterson, & Forgatch, 2002). Given that mild and harsh physical discipline had somewhat different antecedents and outcomes, examination of both forms of discipline is an important contribution of the present investigation.

We found no evidence that gender or ethnicity moderated the associations between TGM and early childhood antecedents or outcomes associated with these trajectories. In previous research with the CDP sample (Deater-Deckard, Dodge, Bates, & Pettit, 1996; Lansford et al., 2004) and other samples (Gunnoe & Mariner, 1997), physical discipline has been found to be related to subsequent behavior problems for European American but not African American children. In the present study, the TGM \times Ethnicity interaction terms predicting the developmental antecedents and outcomes were not significant, but for these analyses, we were concerned by the small number of African American families represented in the different trajectory groups, which would have made it difficult to detect a significant interaction. In the previous published findings from the CDP that have reported significant ethnic differences in links between physical discipline and externalizing behavior, the measure of physical discipline has been continuous, rather than categorical, so the small cell sizes when divided by ethnic group were not a problem. To

understand the trajectory findings more completely, we ran ANCOVAs predicting the antecedents and outcomes separately for the European American and African American subsamples. In these separate ANCOVAs, we found the same pattern of findings as in previous CDP articles showing that trajectories characterized by high use of physical discipline were related to more externalizing outcomes in the European American but not in the African American sample. Additional attention to the outcomes of different patterns of discipline in diverse samples will be an important direction for future research.

Although outcome data were available from multiple informants, mothers served as the only informants for physical discipline. Future research that includes other informants could enhance understanding of whether the findings generalize to children's or other caregivers' perceptions of the extent to which the child experienced physical discipline. In some cases, we had similar but not identical measurement of constructs across the two data sets. For example, ecological disadvantage was a composite based on family SES and single parent status in both samples but also family stress in the CDP and neighborhood danger in the PMCP. Parent-adolescent positive relationship quality was also assessed differently in the two samples. In the CDP, our measures of mild and harsh physical discipline were spanking with one's hand and spanking with an object, respectively; in the PMCP, the spanking measure did not specify whether the spanking was done with a hand or object, but the harsher physical discipline indicator included slapping or hitting with a hand, fist, or object. Thus, we caution that the measures represent somewhat different constructs in the two studies. The trajectories derived in these analyses are based on the sample data and may not be generalizable to other samples that differ from the present samples in age or other demographic or risk characteristics. Nevertheless, our replication of some of the trajectory groups in two independent samples that differed on demographics (e.g., older and higher risk in the PMCP than in the CDP sample) contributes to our confidence that the results would generalize to other populations as well.

Although Nagin's (1999) semiparametric, group-based approach has a number of advantages over other approaches that were outlined earlier in the article, we acknowledge that this method does have its limitations. First, TRAJ is data dependent in that the number and characteristics of the trajectory groups may be a function of the sample (Muthén,

2004). In other words, conducting this analysis with other samples may yield somewhat different developmental trajectories in physical discipline. Second, this approach typically requires the use of the same measures at multiple time points, which may limit its utility for investigators who do not conduct long-term longitudinal projects. Third, as in the current investigation, TRAJ analysis often yields individual trajectory groups that may contain a relatively small number of families (53 families in the smallest trajectory group in the present study). For instance, in their exploration of trajectories of conduct problems in childhood, Shaw et al. (2003) reported an extreme chronic trajectory group that had 16 families. Although a trajectory group that includes few families may be theoretically meaningful (as it was in the Shaw et al., 2003, study), it may make it more statistically challenging when conducting the follow-up intergroup comparisons. Thus, it may not be feasible to conduct Nagin's TRAJ analysis with small sample sizes.

The findings suggest that in the process of socializing their children during middle childhood, most parents likely respond to the changing developmental capabilities and needs of their children and to the shifting relational dynamics by decreasing their use of physical discipline, particularly in low-risk samples. Although the present study did not focus on corresponding changes in other types of discipline strategies or parenting practices, it is possible that as children's cognitive abilities become more sophisticated, parents rely more on reasoning and other nonphysical forms of discipline. Reasoning, offering explanations, providing guidance about rules and morals, and discussing how a child's behavior affects others are thought to be important strategies to foster children's internalization of morality and development of social and emotional competence (e.g., Grusec & Lytton, 1988; Hoffman, 1970, 1983; Kochanska & Thompson, 1997; Kuczynski & Hildebrandt, 1997). If decreases in physical discipline are accompanied by increases in inductive reasoning, this will likely serve the best interests of the child. If, on the other hand, decreases in physical discipline are accompanied by increases in harsh verbal discipline, then children may be exposed to aggressive discipline practices consistently over time, even if the specific form that aggressive discipline takes changes developmentally. One direction for future research will be to link the study of trajectories of physical discipline with the study of trajectories of other types of parenting behaviors to examine whether parenting

behaviors change in concert across a range of domains and how changes in each type of parenting behavior relate to children's adjustment. Another direction for future research will be to examine repeated measures of both child adjustment and physical discipline over relatively short intervals of time to provide a more detailed perspective on reciprocal and transactional processes between parents and children (see Shaw, Gross, & Moilanen, 2009). Such analyses also could incorporate parents' propensity for aggressive behavior as an antecedent of the discipline trajectories and to account for the possibility that parents and children share genetic risk for behaving aggressively.

Given that the minimal/ceasing discipline trajectory groups were associated with the lowest levels of subsequent adolescent antisocial behavior (even controlling for early childhood externalizing behavior) and, in the PMCP, with the most positive parent-adolescent relationship quality, an implication for interventionists and mental health specialists who work with families is that parents should be encouraged to refrain from using physical discipline and assisted in developing alternate discipline strategies. Mothers in our higher risk PMCP sample were more likely than mothers in the lower risk CDP sample to remain stable at high levels of physical discipline use, suggesting that intervening with high-risk mothers may be especially important because they may be less likely to alter their discipline strategies on their own in response to their child's changing developmental capacities. Future research on what contributes to the precipitous drop in use of physical discipline among some groups could suggest strategies that could be implemented in working with other parents on issues related to discipline.

This article makes a notable contribution to the field in providing a good analysis of how the parent-child relationship changes from middle childhood through adolescence. Although several theoretical accounts describe how the parent-child relationship should change over time, few empirical studies have investigated such change. With this study, we now have preliminary data showing how parent-child relationships change in two developmental periods in a normative and high-risk, low-income sample. Furthermore, although numerous cross-sectional and longitudinal studies have demonstrated that parent-child interactions and relationship quality in general and parental discipline techniques in particular are important predictors of children's adjustment, few studies have investigated what may be the early child-

hood antecedents and outcomes of changes in parent-child relationships over time. Our study contributes to the literature by focusing on the implications for a child's adjustment if parents change their use of mild or harsh physical discipline during middle childhood and early adolescence and the characteristics of children and families that are associated with changes in discipline strategies over this developmental period.

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