

The Interplay of Externalizing Problems and Physical and Inductive Discipline during Childhood

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Author Note

This research was supported by a grant awarded to Sheryl Olson, Ph.D., and Arnold Sameroff, Ph.D., from the National Institute of Mental Health (RO1MH57489). We would like to thank the Collaborative for the Analysis of Pathways from Childhood to Adulthood (CAPCA), the mothers, children, and teachers who participated in our longitudinal study, and the many people who assisted in data collection and coding.

During his dissertation study, Daniel Choe was a pre-doctoral fellow of the International Max Planck Research School on the Life Course (LIFE, www.imprs-life.mpg.de; participating institutions: MPI for Human Development, Humboldt-Universität zu Berlin, Freie Universität Berlin, University of Michigan, University of Virginia, University of Zurich).

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Abstract

Children who are physically disciplined are at elevated risk for externalizing problems. Conversely, maternal reasoning and reminding of rules, or inductive discipline, is associated with fewer child externalizing problems. Few studies have simultaneously examined bidirectional associations between these forms of discipline and child adjustment using cross-informant, multi-method data. We hypothesized that less inductive and more physical discipline would predict more externalizing problems, children would have evocative effects on parenting, and high levels of either form of discipline would predict low levels of the other. In a study of 241 children—spanning ages 3, 5.5, and 10—structural equation modeling indicated that 3-year-olds with higher teacher ratings of externalizing problems received higher mother ratings of physical discipline at age 5.5. Mothers endorsing more inductive discipline at child age 3 reported less physical discipline and had children with fewer externalizing problems at age 5.5. Negative bidirectional associations emerged between physical and inductive discipline from ages 5.5 to 10. Findings suggested children’s externalizing problems elicited physical discipline, and maternal inductive discipline might help prevent externalizing problems and physical discipline.

Keywords: externalizing, physical discipline, inductive discipline, parenting, bidirectional effects

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Approximately half of preschool-age children with overt externalizing problems, such as physical aggression and impulsivity, cease demonstrating them after school entry, supporting evidence of a developmentally normative decline in the frequency of behavioral problems from early to middle childhood (Campbell, Shaw, & Gilliom, 2000; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Children who continue showing externalizing problems after school entry are more likely to develop antisocial behavior that persists into adulthood (Moffitt & Caspi, 2001; van Lier, Wanner, & Vitaro, 2007). Therefore, it is of theoretical and practical importance to identify factors that contribute to the continuity of externalizing problems during childhood.

Negative patterns of parenting are key risk factors for children's externalizing problems (Patterson, DeBaryshe, & Ramsey, 1989; Rothbaum & Weisz, 1994). Parents' use of physical discipline has been shown to predict high levels of child externalizing problems, but we know little of how it combines with inductive discipline to influence children's adjustment (Gershoff, 2002). These discipline techniques represent antithetical methods of eliciting socially appropriate conduct from children and externally constraining their disruptive behavior. Whereas physical discipline coerces child compliance, induction directs children's attention to the consequences of their actions on the wellbeing of others', thereby helping children develop empathic motives to behave in prosocial ways (Hoffman, 2000). Few studies have tested these types of discipline together and whether children's behavior elicits different discipline techniques from parents. Parents' discipline choices are contingent on whether children misbehave, making it essential to test for child evocative effects. In this longitudinal study spanning early to middle childhood, we simultaneously examined the interplay of physical and inductive discipline and children's externalizing problems in a structural equation model (see Figure 1) and tested for indirect

effects to delineate how these variables may operate together as a process through childhood.

Effects of Physical and Inductive Discipline on Children's Externalizing Problems

Most studies of parental discipline have focused on physical punishment (Huang, Caughy, Lee, Miller, & Genevro, 2009). Young children who consistently experience physical discipline techniques, such as spanking, shaking, or hitting with an object, are at elevated risk for externalizing problems (Deater-Deckard, Dodge, Bates, & Pettit, 1998; Dodge & Pettit, 2003; Gershoff, 2002; Rothbaum & Weisz, 1994). Physical discipline provides parents with a power-assertive means of eliciting immediate compliance and allows them to demonstrate their relational and physical dominance over children. Moreover, high levels of physical discipline are often accompanied by mothers' negative emotions such as anger, hostility, and frustration (Critchley & Sanson, 2006). These adverse qualities of physical discipline have contributed to its characterization as a key risk factor for the progression of externalizing problems in childhood.

Inductive discipline techniques include limits-setting, reminding of rules, and reasoning to elicit understanding from children about socially-appropriate conduct and the potential harmful consequences of their behavior on others (Hart, DeWolf, Wozniak, & Burts, 1992; Hoffman, 2000; Pettit, Bates, & Dodge, 1997). Inductive discipline relies heavily on verbal communication and permits caregivers to serve as external regulators of young children's behavioral adjustment, as a means of helping them learn to inhibit disruptive behaviors in lieu of prosocial alternatives. Inductive discipline is associated with fewer externalizing problems and more prosocial behavior in preschoolers (Hart et al., 1992) and middle school children (Krevans & Gibbs, 1996; Pettit et al., 1997). Therefore, data suggest that high levels of inductive discipline in early childhood contribute to child desistance from externalizing problems after school entry.

Traditionally, physical and inductive discipline have been examined separately in relation

to children's externalizing problems, but research examining their simultaneous interplay is needed (Huang et al., 2009). Studies examining all three constructs have indicated that the frequency of children's externalizing problems vary by the type of discipline they receive (Kerr, Lopez, Olson, & Sameroff, 2004). For example, mothers who reported frequently using physical discipline had preschool-age children with more externalizing problems, whereas those who engaged in more informal teaching had children with fewer behavioral problems (Olson, Ceballo, & Park, 2002). Furthermore, children who were more defiant during a cleanup task with their mothers experienced more negative maternal control, which was associated with mothers being less responsive to their children. Children with early externalizing problems who receive less inductive discipline and more physical discipline may be at risk for disruptive behavior that persists into the school-age years. Enduring behavioral problems that spread to school settings may subsequently elicit more discipline from parents during early childhood. This suggests that models examining bidirectional associations are needed to determine whether parents' use of physical and inductive discipline varies in response to children's externalizing problems. A transactional perspective provided a useful framework for delineating their complex interplay.

Transactional Framework

The *transactional model of development* illustrates the continuous, dynamic interplay of the child and social environment (Sameroff, 2009). The model emphasizes the plasticity of both the caregiving environment and the child and acknowledges the mother and child's active role in shaping socialization through ongoing exchanges in the mother-child dyad, a process believed to be at the core of socialization (Sameroff & Mackenzie, 2003). The *transactional perspective of developmental psychopathology* extends the transactional model to child and adolescent psychopathology (Cicchetti & Toth, 1997). Following this perspective, Snyder, Cramer, Afrank,

and Patterson (2005) demonstrated that maternal ratings of children's externalizing problems in kindergarten predicted adverse forms of maternal discipline, which in turn predicted high levels of child conduct problems. Sheehan and Watson (2008) found that youths' aggressive behavior predicted high levels of mothers' physical and inductive discipline, but only physical discipline predicted high levels of aggressive behavior. Thus, evidence has indicated that children who misbehave elicit more discipline from parents. Unfortunately, these investigations did not examine the interplay of physical and inductive discipline and they relied on maternal reports of their parenting and children's behavioral problems. These methodological limitations were largely addressed in the current study.

The Current Study

Few studies have examined positive and negative forms of discipline in parallel and their effects on children's externalizing behavior, and even fewer have tested whether children elicit variation in parental discipline use. Moreover, previous research has relied on mother reported data. This longitudinal study used a transactional framework to examine the dynamic interplay of physical and inductive discipline techniques and children's externalizing problems from the preschool years to middle childhood, thus providing the first prospective investigation to contribute multi-method and cross-informant evidence of bidirectional associations between distinct forms of parental discipline and the development of children's externalizing problems. We used structural equation modeling (SEM) to examine the continuity of these three constructs and how they predict levels of one another over time using data collected by questionnaires and interviews with mothers and teachers when children were ages 3, 5.5, and 10 (see Figure 1).

A dearth of previous research that has simultaneously examined positive and negative parenting and children's externalizing behavior discouraged us from specifying the exact ages

that we expected to find significant relations. Therefore, we only made hypotheses about their general patterns of association. We hypothesized that high levels of physical discipline and low levels of inductive discipline would predict elevated levels of children's externalizing problems (Gershoff, 2002; Hart et al., 1992; Huang et al., 2009; Pettit et al., 1997). Following transactional theory, we hypothesized that child externalizing problems would predict high levels of both physical and inductive discipline (Patterson et al., 1989; Sameroff, 2009; Sheehan & Watson, 2008; Snyder et al., 2005). Previous study of our sample indicated that physical and inductive discipline were negatively associated at age 3 (Kerr et al., 2004), so we expected that high levels of physical and inductive discipline would predict low levels of the other. Lastly, we hypothesized that parental discipline and child externalizing behavior would have indirect effects through childhood, such that high levels of physical discipline and low levels of inductive discipline would predict high levels of child externalizing behavior, which in turn would predict high levels of both types of parental discipline in middle childhood.

Method

Participants

This prospective longitudinal study recruited 241 (49% girls) children for a larger investigation of the etiology of school-age behavior problems (Olson, Sameroff, Kerr, Lopez, & Wellman, 2005). Eighty-six percent of children were European American and the remaining were biracial (8%), African American (4%), or identified as other (2%). Eight percent of children resided in single-parent households. Children were recruited to represent the full range of externalizing symptom severity of the Child Behavior Checklist for Ages 2–3 (CBCL 2/3; Achenbach, 1992) by oversampling children rated by their mothers in the borderline clinical and clinical ranges of the Externalizing Problem scale ($T \geq 60$; 41%). This helped capture a sufficient

amount of variability in early externalizing behavior to examine its development. Families were recruited through newspaper ads, fliers at childcare centers, and by pediatrician referral. Parents who expressed interest filled out a screening questionnaire and were interviewed briefly by telephone. Single parent families experiencing extreme economic hardship did not volunteer for the study. Children with severe health problems, disabilities, or cognitive deficits were excluded.

Mothers and teachers provided information at time 1 (T1) when children were about age 3 ($M = 3.14$ years, $SD = .23$), at time 2 (T2) when children were almost 5.5 ($M = 5.29$ years, $SD = .23$), and at time 3 (T3) when children were about 10 ($M = 10.42$ years, $SD = .63$). Mothers were interviewed in their homes by a female social worker at T1 and T2 about parents' use of physical discipline. Mothers completed questionnaires on inductive discipline at all assessments and on physical discipline at T3. Families were paid for their time. At age 3, 85% of children were enrolled in preschool, and about 92% of teachers filled out surveys. About 78% of all children's teachers provided ratings of externalizing problems at T1, 79% in the early school years at T2, and 80% in middle childhood at T3. Teachers received gift certificates for their time.

Measures

Inductive discipline. Mothers completed the Parenting Dimensions Inventory (Power, Kobayashi-Winata, & Kelley, 1992), a 47-item multidimensional measure of parental support, control, and structure. The current study used two scales from the control dimension. Mothers rated how likely they would remind (e.g., "remind your child of the rule, repeat the direction") and reason (e.g., "talk to the child, discuss alternatives") with their child in five hypothetical situations that frequently occur in early childhood (e.g., "After arguing over toys, your child strikes a playmate."). Responses were made on a 4-point scale: *very unlikely to do* (0); *very likely to do* (3). Mothers' ratings were averaged to create two 5-item scales: Reminding of Rules ($\alpha =$

.73 to .80) and Reasoning (α s = .64 to .72). These highly correlated scales (r s = .67 to .76, $p < .001$) were theoretically related to inductive discipline's techniques for scaffolding awareness of consequences and others' well-being (Hoffman, 2000). Two-indicator latent variables for maternal inductive discipline at each time point were created with standardized scores of scales.

Physical discipline. Dodge, Pettit, and Bates' (1994) Harshness of Discipline scale was administered during home interviews at T1 and T2. Mothers reported the frequency with which each parent had physically disciplined their child (e.g., spank with a hand or object, grab, or shake) during the last three months using a 5-point scale: *never* (0), *once per month* (1), *once per week* (2), *daily* (3), and *several times daily* (4). Half point responses were accepted (e.g., *once every two weeks* (1.5); *every other day* (2.5); no responses of 3.5 or 4.5 were provided). Rank order scores from 0 to 35 were created based on mother reported frequencies of each parent's use of physical discipline. The lowest ranking, 0, was assigned to children who did not receive physical discipline from either parent (i.e., responses of 0, 0). Children assigned the next lowest ranking, 1, did not receive physical discipline from one parent, but were physically disciplined once every two months by the other (0, .5). Children who experienced physical discipline several times daily from both parents received the highest ranking of 35 (4, 4). There were no responses of 3.5, so the next highest ranking, 34, indicated children who were physically disciplined daily by one parent and several times daily by the other (3, 4).

Mothers rated how frequently they used physical discipline at T3 using a questionnaire created from the same group of researchers that developed the previous scale for younger children (Dodge et al., 1994; Lansford, Criss, Dodge, Shaw, Pettit, & Bates, 2009). The 13-item questionnaire contains two items addressing physical discipline techniques (i.e., spank with hand, spank with object) that overlap with items in the Harshness of Discipline scale. Mothers

answered how often they had used the technique over the last year to correct children's behavior using a 5-point response scale ranging from *never* (0) to *about every day* (4). The items were standardized and included in a 2-indicator latent variable for T3 maternal physical discipline.

Externalizing problems. Preschool teachers at T1 completed the Caregiver-Teacher Report Form for Ages 1½–5 (CTRF; Achenbach, 1997), a commonly-used measure of early childhood adjustment. The CTRF's Externalizing Problem score consisted of two highly correlated scales ($r = .78, p < .001$): a 17-item scale for Attention Problems ($\alpha = .92$) and a 23-item scale for Aggressive Behavior ($\alpha = .94$). Teachers at T2 and T3 completed the Teacher Report Form for Ages 6–18 (TRF; Achenbach & Rescorla, 2001), a well-validated measure of child functioning in school (Achenbach, 2001). The TRF's Externalizing Problem score consisted of two highly correlated scales ($r_s = .75$ to $.77, p_s < .001$): a 12-item scale for Rule-Breaking Behavior ($\alpha_s = .61$ to $.70$) and a 20-item scale for Aggressive Behavior ($\alpha_s = .93$ to $.95$). For both the CTRF and TRF, teachers rated the child on items that described the child's behavior during the past six months using a 3-point scale: *not true* (0); *very/often true* (2). Raw aggregate scores were used to indicate children's externalizing problems. Teacher reports were collected by mail at T1 and T2 and mostly online at T3.

The proportion of children rated by teachers as falling in the borderline clinical range of the Externalizing Problem scale (T -score range was 60 to 63) ranged between 4.1% and 5.8% across preschool to middle childhood. Similarly, proportions of children rated by teachers in the clinical range ($T \geq 64$) were between 7.5% and 8.3%. Different teachers' ratings of children's externalizing problems were moderately to highly inter-correlated across childhood and comparable in the proportion of children rated in the borderline clinical and clinical ranges.

Data Analysis Strategy

Analyses of attrition and missing data were conducted to determine whether they occurred at random, which is an assumption of our missing data estimator in SEM. Descriptive statistics and correlations among variables were then calculated using SPSS 19.0. SEM was conducted using Mplus 5.21 with maximum likelihood with robust standard errors (Muthén & Muthén, 2007). Latent variables were created for inductive discipline at all time points and for physical discipline at T3. As shown in Figure 1, an autoregressive cross-lagged model was created by combining study variables across three time points. Within-time covariances were estimated between disturbance errors of each variable within each time point to account for same assessment times. Across-time covariances among residual errors of indicators for inductive discipline accounted for their shared measurement error (not shown in Figure 1). Across-time covariances between the first and last assessments of physical discipline and externalizing problems accounted for their shared unexplained variance and cross-time stability. Model specification was informed by a study that illustrated the advantages of longitudinal SEM using a fully cross-lagged design (Burkholder & Harlow, 2003). Preliminary modeling comparing boys and girls by multiple-group SEM showed no gender differences. We also examined our model with two covariates: child gender and family socioeconomic status (SES), measured via Hollingshead (1979) four-factor score of parental education and occupational status. No major changes in structural estimates were found (two effects became marginally significant, $p < .08$). Covariates were excluded from our main analyses due to their negligible effects and reduction in statistical power when we added 18 parameters that were needed to estimate their effects.

Following Bentler (2007), SEM results include model chi-square (χ^2), comparative fit index (CFI), estimated root mean square error of approximation (RMSEA) and its 90% confidence interval (CI), and standardized root mean square residual (SRMR). SRMR values <

.10 are considered favorable. RMSEA values $\leq .05$ indicate close approximate fit. CFI values greater than .90 reflect reasonably good fit. Following our main SEM analysis, we tested for indirect effects using bootstrapping with 2000 iterations.

Results

Attrition and Missing Data

Data were available for 241 families at T1, 223 families at T2, and 211 families at T3. Attrition was largely due to family relocation, leaving almost 88% of the original sample at T3. Attrition families and those remaining in the study were compared on demographic and study measures using *t*-tests to ensure that dropout from the study occurred at random. Nonrandom attrition jeopardizes the validity of maximum likelihood estimation of missing data in SEM. No significant differences were found suggesting nonselective attrition. Similar analyses were conducted in regard to missing data values. Negligible group differences were found between participants with missing values and without. Thus, attrition families and participants who were missing some data were included in all analyses. Four participants were missing values for major study variables and were removed from analyses, leaving 237 children in the final study sample.

Descriptive Analyses

Descriptive statistics for study variables are reported in Table 1. Mother-reported scores for reasoning and reminding of rules were positively correlated both within and across time. These inductive discipline scales were negatively correlated with almost all physical discipline scores and items. Scores for externalizing problems were correlated with one another and some inductive and physical discipline scores and items. Among all parenting variables, T1 externalizing problems only were correlated with T1 physical discipline. T1 and T2 reminding of rules and T3 spank with object were not significantly associated with any externalizing problems

score, while T3 spank with hand only was associated with externalizing problems at T3.

Measurement Model

Two-indicator latent variables for inductive discipline (T1 to T3) and T3 physical discipline were estimated with correlations between them. The measurement model produced reasonable fit indices: $\chi^2(14, N = 235) = 28.51, p = .012$. CFI = .98. RMSEA = .07, 90% CI [.03, .10]. SRMR = .03. PDI scales for reasoning and reminding of rules loaded on latent variables of inductive discipline with standardized estimates ranging from .71 to .97 ($p < .001$). The latent variable of T3 physical discipline had two mother-reported items that loaded with estimates of .56 ($p < .001$). All latent variables were correlated with one another in the expected direction ($p \leq .002$). Latent variable indicator loadings for inductive discipline were constrained to be equal across the three measurement points to test their factorial invariance. This constrained measurement model did not differ in fit from the previous unconstrained model, $\Delta\chi^2(2) = 2.92, p > .10$: $\chi^2(16) = 31.43, p = .012$. CFI = .98. RMSEA = .06, 90% CI [.03, .10]. SRMR = .04. Thus, factorial invariance was established for latent variables for inductive discipline, indicating that they were constant in relation to their manifest indicators across the three assessment points.

All unstandardized and standardized measurement model estimates for latent variables of inductive discipline and physical discipline from our SEM analysis are shown in the top half of Table 2. Indicator loadings on all latent variables were significant ($p \leq .002$). Latent variables of inductive discipline loaded onto PDI scales for reasoning and reminding of rules with standardized estimates ranging from .78 to .94. The latent variable of T3 physical discipline loaded onto mother-reported items with standardized estimates of .60 and .52.

Structural Equation Modeling

We tested an autoregressive cross-lagged model to examine bidirectional effects between

inductive and physical discipline and child externalizing problems across three assessment points. Figure 2 displays significant standardized estimates for an integrative model of the constructs at ages 3, 5.5, and 10 years. All significance levels were from unstandardized estimates, which more accurately account for standard errors. All unstandardized and standardized structural estimates are provided in the bottom half of Table 2. The model produced, $\chi^2(35, N = 237) = 56.52, p = .012$. CFI = .97. RMSEA = .05, 90% CI [.02, .08]. SRMR = .03. Fit indices indicated a close approximate fit of the model, which accounted for 30% of the variance in T2 inductive discipline, 30% of the variance in T2 physical discipline, and 26% of the variance in T2 externalizing problems, 41% of the variance in T3 inductive discipline, 55% of the variance in T3 physical discipline, and 36% of the variance in T3 externalizing problems.

Parenting effects on child behavior. We hypothesized that high levels of physical discipline and low levels of inductive discipline would predict more child externalizing problems. As shown in Figure 2, T1 inductive discipline predicted low levels of T2 externalizing problems ($\beta = -.17, p = .01$). Physical discipline had no effect on externalizing problems. The effect of inductive discipline on child externalizing problems partially confirmed our hypothesis.

Child evocative effects on parenting. We hypothesized that children's externalizing problems would predict high levels of both physical and inductive discipline. T1 externalizing problems predicted high levels of physical discipline use at T2 ($\beta = .16, p = .053$) but was unrelated to inductive discipline, partially confirming our hypothesis of child evocative effects.

Bidirectional effects between parenting variables. We hypothesized that high levels of physical and inductive discipline would predict low levels of one another during childhood. We found that T1 inductive discipline predicted low levels of T2 physical discipline ($\beta = -.28, p < .001$). T2 inductive discipline predicted low levels of T3 physical discipline ($\beta = -.23, p = .046$).

T2 physical discipline predicted low levels of T3 inductive discipline ($\beta = -.18, p = .038$). Thus, bidirectional effects between physical and inductive discipline supported our hypothesis.

Second-order effects. Despite finding a positive correlation between T1 physical discipline and T2 externalizing problems ($r = .23, p < .01$), we were surprised that their modeled path was not significant ($\beta = .09, p = .30$). To test for longer effects, we added six second-order cross-lagged effects from T1 to T3 variables. Second-order effects are less commonly entered in autoregressive cross-lagged models making their addition difficult to rationalize a priori. We included second-order effects to elucidate less intuitive but meaningful relations across childhood (Burkholder & Harlow, 2003). Adding these effects improved the overall model fit, $\Delta\chi^2(6) = 13.55, p = .035$. Figure 3 displays significant standardized estimates for this close fitting model: $\chi^2(29, N = 237) = 41.32, p = .06$. CFI = .98. RMSEA = .04, 90% CI [.00, .07]. SRMR = .03. This model accounted for 30% of the variance in T2 inductive discipline, 30% of the variance in T2 physical discipline, and 27% of the variance in T2 externalizing problems, 42% of the variance in T3 inductive discipline, 55% of the variance in T3 physical discipline, and 38% of the variance in T3 externalizing problems. As shown in Figure 3, only one second-order cross-lagged effect was significant. T1 physical discipline predicted high levels of T3 child externalizing problems ($\beta = .22, p = .031$). Despite finding an effect post hoc, we supported the initial hypothesis that physical discipline would predict high levels of externalizing behavior, confirming effects of both positive and negative discipline on child externalizing problems.

Indirect effects. Levels of significance for indirect effects were estimated with bootstrapping, which is considered to be more robust than typical tests of indirect effects (Hayes, 2009). As recommended by Cole and Maxwell (2003), we provide standardized estimates of both overall and time-specific indirect effects to represent the entire developmental timeframe.

Our bootstrap model produced a close approximate fit: $\chi^2(35, N = 237) = 43.19, p = .16$. CFI = .99. RMSEA = .03, 90% CI [.00, .06]. SRMR = .03. Supporting the general hypothesis that parental discipline and child externalizing behavior would have indirect effects through childhood, we found two indirect effect of T1 inductive discipline. T1 inductive discipline predicted low levels of T3 physical discipline use (total indirect effect $\beta = -.29, p = .024$) through its effect on T2 physical discipline use ($\beta = -.20, p = .013$). T1 inductive discipline predicted low levels of T3 child externalizing problems (total indirect effect $\beta = -.09, p = .050$) through its effect on T2 externalizing problems ($\beta = -.09, p = .011$). Although its total indirect effect was not significant, T1 physical discipline was stable into T2, and T2 physical discipline ($\beta = -.06, p = .042$) predicted low levels of T3 inductive discipline. A nonsignificant total indirect effect in the presence of a time-specific effect indicates that other nonsignificant paths canceled out the total effect (i.e., effects of T1 physical discipline on T2 induction and T2 externalizing). Finally, despite no time-specific indirect effects, the total indirect effect of externalizing problems at T1 on inductive discipline at T3 was marginal ($\beta = -.09, p = .074$). T1 externalizing problems predicted low levels of T3 inductive discipline through its cumulative effects on all T2 variables. Thus, most indirect effects were transmitted through the stability of variables, and our specific expectation of associations between all three variables in an indirect pathway was not met. Following tests of indirect effects, we examined whether the interaction of physical and inductive discipline predicted externalizing problems in a series of hierarchical regressions. No effects of interaction terms were found across all combinations of variables.

Discussion

Our main goal was to delineate the interplay of inductive and physical discipline and children's externalizing problems from the preschool years to middle childhood. We found

bidirectional associations between parents' positive and negative discipline techniques and evocative effects of children's behavioral problems. Mothers' endorsement of inductive discipline in the preschool years predicted less parental use of physical discipline and fewer child externalizing problems in kindergarten. Over the same period, more of children's externalizing problems predicted more parental use of physical discipline, and conversely, more parental use of physical discipline in the preschool years predicted more of children's externalizing problems in middle childhood. Tests of indirect effects suggested that parental discipline and children's behavioral problems continually affected each other throughout childhood. When we compared the effects of the two discipline styles, physical discipline increased children's externalizing problems and inductive discipline reduced child behavior problems.

Consistent with prior research and our initial hypothesis that more physical discipline and less inductive discipline would predict high levels of child externalizing problems, maternal inductive discipline when children were 3-years-old was associated with fewer externalizing problems at age 5.5 (Huang et al., 2009; Olson et al., 2002; Pettit et al., 1997). Inductive techniques such as reminding of rules and reasoning help children internalize social norms regarding appropriate behavior (Hart et al., 1992; Kerr et al., 2004). These parenting behaviors explicate consequences of children's actions on other people and provide prosocial alternatives to disruptive behaviors (Hoffman, 2000). Mothers often emphasize rules about safety, interpersonal behaviors, and self-care and use other inductive techniques when preschool-age children deliberately violate moral principles (Critchley & Sanson, 2006; Gralinski & Kopp, 1993). Inductive discipline helps children internalize social conventions in age-appropriate ways that coincide with gains in critical abilities associated with behavioral adjustment, such as language (Menting, van Lier, & Koot, 2011), social-cognition (Wellman, 2011), and self-

regulation (Rothbart & Bates, 1998). Mothers' inductive discipline fits accordingly with young children's developmental advances and likely encourages cooperation with parental requests. These findings indicate that inductive discipline is a positive parenting technique that contributes to children's desistance from externalizing behaviors.

Physical punishment does not model appropriate behavior or help children internalize social conventions (Hoffman, 2000; Kerr et al., 2004). Supporting our initial hypothesis, parental use of physical discipline when children were 3-years-old was associated with high levels of externalizing problems at age 10. Only experiences of physical discipline in the preschool period predicted children's behavioral problems in middle childhood. These findings are consistent with evidence that children who experience physical discipline before age 5 demonstrate more serious and stable externalizing problems through middle childhood than children who experience it after age 5 or not at all (Keiley, Howe, Dodge, Bates, & Pettit, 2001). Bivariate analyses showed physical discipline at age 3 was more consistently associated with externalizing problems at all ages than physical discipline at 5.5 and 10, suggesting a sensitive period prior to kindergarten in which physical discipline elevates the severity and stability of children's externalizing problems.

At this point it is important to distinguish between harsh physical punishment and normative levels of physical discipline such as spanking. Baumrind, Larzelere, and Owens (2010) recently reported no harmful effects of spanking during the preschool years on adolescent adjustment. Although we found only a modest effect of physical discipline on child externalizing problems, this study was consistent with the broader literature in finding that even mild levels of physical discipline was a risk factor for children's adjustment problems (Deater-Deckard et al., 1998; Dodge & Pettit, 2003; Gershoff, 2002; Huang et al., 2009; Rothbaum & Weisz, 1994). Baumrind and colleagues' (2010) findings were derived from data of children born in the 1960s,

approximately 30 years before children in our study. Approval of corporal punishment by parents decreased markedly from the 1960s to the 1990s in the U.S. (Straus & Mathur, 1996), reflecting changes in cultural attitudes toward the effective use of physical discipline. Previous research has demonstrated that cultural norms regarding the use of physical discipline can moderate how adverse these experiences are on children's development (Lansford et al., 2005). Children who were spanked but perceived it to be a normative experience were less likely to evince aggressive behavior than physically disciplined children who did not view it as a normal parenting behavior. Changing attitudes toward spanking may reflect why Baumrind and colleagues (2010) found no effect of normative physical discipline, whereas in our study it was associated with more child externalizing problems approximately 7 years later.

Findings partially confirmed the hypothesis that child externalizing problems would predict high levels of physical and inductive discipline. Preschool-age children's externalizing problems were associated with high levels of parents' physical discipline use at age 5.5, which replicated evidence of child evocative effects on parental discipline in early childhood and adolescence (Lansford et al., 2009; Sheehan & Watson, 2008; Snyder et al., 2005). Externalizing problems, however, did not predict maternal inductive discipline, which is contrary to research conducted with older children and adolescents using mother-reported data (Sheehan & Watson, 2008). Our data from mothers and teachers suggested that parents use physical discipline in response to children's behavioral problems, whereas mothers endorse the use of inductive discipline for general socializing purposes. Previous research has shown that mothers use more inductive and physical discipline when children break social rules, but variations in their use are related to contextual influences, such as a mother's mood and whether a child's misbehavior is viewed as intentional (Critchley & Sanson, 2006). Importantly, mothers' endorsement of

induction in the preschool years was associated with low levels of parental physical discipline use after kindergarten entry. Mothers who endorsed inductive discipline had children with fewer behavioral problems and used physical discipline less often with their partners.

Inductive discipline at age 3 was associated with low levels of physical discipline use at age 5.5, and negative bidirectional associations between physical and inductive discipline emerged from ages 5.5 to 10, supporting the hypothesis that physical and inductive discipline would predict low levels of the other during childhood. This also extended previous findings of a negative relation between physical and inductive discipline in the preschool years (Kerr et al., 2004). Researchers have found that mothers who use more of one technique often use more of the other (Huang et al., 2009), but mothers are more likely to respond with induction (Critchley & Sanson, 2006). Consistent with the latter finding, mean levels of inductive discipline did not change over time, but levels of physical discipline declined precipitously after age 3. In contrast to Huang and colleagues' (2009) study, which focused on toddlerhood and relied on mother-reported data, we consistently found negative associations between inductive and physical discipline use across childhood both in our model and bivariate analyses. This difference may be attributable to our use of interviews and questionnaires to attain valid ratings of parental discipline. Parents are often reticent to report their use of physical punishment because of concerns that researchers may regard high levels as abuse. The interviews and rank order scores provided an assessment sensitive to individual differences in parents' use of physical discipline. Relatedly, mothers may have exaggerated ratings of inductive discipline to appease researchers. Multiple methods of data collection may have helped diminish systematic effects of reporting bias when mothers reported levels of positive and negative discipline.

Generally supporting our last hypothesis, we found multiple indirect effects involving

both types of parental discipline and child externalizing problems. Although our expectation that parental discipline would predict later discipline levels through its effect on child behavior was not supported, maternal inductive discipline during the preschool years predicted low levels of physical discipline and child externalizing problems in middle childhood through its associations with these variables in the early school years. Thus, positive effects of mothers' early induction on negative discipline use and children's behavioral problems persisted from early to middle childhood. This is consistent with evidence that inductive discipline predicts fewer externalizing problems in both young and older children (Hart et al., 1992; Krevans & Gibbs, 1996; Pettit et al., 1997). In contrast, parental physical discipline use in the preschool period was stable into the early school years and was associated with low levels of maternal inductive discipline in middle childhood. Parental use of physical discipline when children were age 5.5 also transmitted an indirect effect of preschool-age inductive discipline on physical discipline in middle childhood. This suggests that in addition to negative bidirectional associations, maternal inductive discipline and parental physical discipline use indirectly influence levels of the other through their effects on the frequency of physical discipline use after children enter kindergarten.

Child externalizing problems at age 3 were associated with low levels of inductive discipline at age 10 through its aggregate effect on all variables at age 5.5. Positive bivariate relations between children's externalizing problems at age 3, externalizing problems and physical discipline at age 5.5, and inductive discipline at age 10, suggested that the total indirect effect was driven by child evocative effects on physical discipline use in the early school years. We should clarify that indirect effects were modest in magnitude, but given that we accounted for construct stabilities, robust effect sizes were not expected. Nonetheless, findings indicated that parental physical and inductive discipline and children's externalizing problems affected one

another in transformative processes throughout childhood. Children's early behavioral problems elicited physical discipline, indirectly altering their later experiences of induction. Mothers' early endorsement of induction diminished parental use of physical punishment and child externalizing problems across 7 years. Finally, early use of physical discipline contributed to more child behavioral problems in middle childhood and indirectly reduced maternal inductive discipline.

Limitations and Future Directions

A limitation of the current study was our use of different measures to assess physical discipline across childhood. Interviews with mothers at ages 3 and 5.5 assessed total frequencies of physical discipline used by both parents. At age 10, mothers reported the frequency with which only they used physical discipline, but fathers' use of physical discipline was not accounted for. Although the same group of researchers created these measures to be relatively similar in theoretical formulation (Dodge et al., 1994; Lansford et al., 2009), not assessing fathers was problematic because they may play an important disciplinary role in middle childhood. Fathers may feel more justified in using physical discipline when children are more physically mature than during the early years, especially in relation to their sons. Fathers also may use more inductive discipline with their daughters as they enter adolescence and socialize more with boys. Thus, exclusion of father reports of discipline prevented us from testing their bidirectional effects with child externalizing problems, as well as their interplay with maternal parenting. The dynamics of paternal and maternal parenting across children's development require further study. Future research addressing positive and negative discipline used separately by mothers and fathers can delineate the interplay of parental discipline and children's maladjustment.

Another measurement-related limitation was our assessment of mothers' hypothetical use

of inductive techniques in response to generic examples of child misconduct. Ideally, we would have assessed actual frequencies with which both parents demonstrated inductive discipline, and we would have focused on key themes of induction (e.g., harm to others). It is possible and quite likely that mothers endorsed higher levels of inductive discipline than they actually used with their children. As touched on earlier, social desirability effects may have contributed bias to parenting data. Given that our assessment of inductive discipline was hypothetical in nature, it may have been even more susceptible to these confounds. Future studies can help validate our findings by assessing frequencies of actual discipline use with interviews and reports, as well as including measures of social desirability to account for parents' self-enhancing biases.

Lastly, characteristics of the participants limited the generalizability of our findings. Our sample consisted of children from mostly white two-parent, middle-class families, limiting the generalizability to children from ethnically diverse and single parent family constellations. Families experiencing poverty did not volunteer to participate, which reduced confounds related to severe environmental adversity. Despite our sample's low demographic risk, teachers rated more children in the clinical range for externalizing problems than in the borderline clinical range across the study. The high number of children, particularly girls, with clinically significant problems likely reflects our intentional oversampling of preschoolers with high externalizing problems. Replication of our findings with a more diverse and representative sample is needed.

Implications for Policy and Public Awareness

Abundant evidence has demonstrated long-term negative consequences of parents' punitive behavior on children's adjustment problems (e.g., Deater-Deckard et al., 1998; Keiley et al., 2001) and how closely physical discipline is linked, in a negative direction, with inductive parenting techniques (Huang et al., 2009; Kerr et al., 2004; Sheehan & Watson, 2008). Findings

from these studies, as well as the present investigation, support the importance of prevention programs that help parents of preschoolers learn about the negative consequences of punitive discipline and how inductive discipline supports the development of young children's prosocial behavior. Given that early disruptive behaviors elicit negative parenting, helping parents to effectively use inductive techniques with challenging children should be a widespread targeted prevention practice. For example, parents frequently become frustrated and angry in response to children's disruptive or defiant behaviors, often reacting with the use of coercive behaviors such as yelling and physical punishment (Critchley & Sanson, 2006; Olson et al., 2002). Parents who are able to move beyond their frustration can open themselves to many successful techniques available to help guide their children toward more positive behavior.

Findings from the present study support the early benefits of maternal inductive discipline in reducing children's externalizing problems and parents' use of physical discipline. Moreover, they corroborate prevention studies that have shown that promoting mothers' use of positive parenting and reducing harsh discipline in early childhood help prevent coercive parent-child interactions and behavioral problems in high-risk children (Conduct Problems Prevention Research Group, 2002; Dishion, Shaw, Connell, Gardner, Weaver, & Wilson, 2008). Prevention of coercive parent-child exchanges in the preschool years has the potential to reduce levels of harsh parenting, conduct problems, and their cascading effects on future family conflict. Our cross-informant findings extend the literature by illustrating transactions between parental discipline and child externalizing problems that span the preschool years through middle childhood. Thus, teasing apart effects of discipline techniques on externalizing problems across childhood can clarify the etiology of antisocial behavior and inform prevention efforts targeting at-risk youths.

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Table 1

Descriptive Statistics from Mother Reports of Reasoning, Reminding of Rules, and Physical Discipline and Teacher Reports of Externalizing Problems (N = 241)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. T1 Reasoning	—												
2. T2 Reasoning	.52***	—											
3. T3 Reasoning	.39***	.54***	—										
4. T1 Reminding	.67***	.38***	.27***	—									
5. T2 Reminding	.38***	.76***	.43***	.38***	—								
6. T3 Reminding	.40***	.47***	.72***	.35***	.44***	—							
7. T1 Physical Discipline	-.28***	-.18**	-.18*	-.30***	-.20**	-.15*	—						
8. T2 Physical Discipline	-.35***	-.24**	-.32***	-.30***	-.18*	-.24**	.46***	—					
9. T3 Spank with Hand	-.15*	-.19*	-.28***	-.16*	-.10	-.21**	.20**	.36***	—				
10. T3 Spank with Object	-.24**	-.19*	-.22**	-.22**	-.22**	-.16*	.20**	.44***	.31***	—			
11. T1 Externalizing	.03	-.01	-.15 ⁺	.11	-.02	-.05	.17*	.16 ⁺	.03	.07	—		
12. T2 Externalizing	-.15*	-.19*	-.24**	-.14 ⁺	-.12	-.22**	.23**	.31***	.05	-.01	.43***	—	
13. T3 Externalizing	-.15*	-.11	-.25**	-.12	-.07	-.17*	.30***	.14 ⁺	.17*	.08	.43***	.62***	—
<i>M</i>	2.00	2.00	2.01	1.98	1.97	1.96	6.30	4.13	.17	.04	10.01	4.39	3.39
<i>SD</i>	.47	.48	.47	.41	.44	.46	6.85	5.61	.40	.20	12.42	8.10	6.12

Note. T1 = age 3. T2 = age 5.5. T3 = age 10.

⁺*p* < .10. **p* < .05. ***p* < .01. ****p* < .001.

Table 2

Unstandardized and Standardized Estimates for Model in Figure 2 (Standard Errors in Parentheses; N = 237)

<i>Parameter Estimate</i>	<i>Unstandardized</i>	<i>Standardized</i>	<i>p</i>
Measurement Model Estimates			
T1 Inductive Discipline → T1 Reasoning	1.00	.85	–
T1 Inductive Discipline → T1 Reminding	.81 (.12)	.78	.00
T2 Inductive Discipline → T2 Reasoning	1.00	.94	–
T2 Inductive Discipline → T2 Reminding	.81 (.11)	.81	.00
T3 Inductive Discipline → T3 Reasoning	1.00	.92	–
T3 Inductive Discipline → T3 Reminding	.86 (.09)	.79	.00
T3 Physical Discipline → Spank with Object	1.00	.60	–
T3 Physical Discipline → Spank with Hand	1.72 (.56)	.52	.00
Covariance T1 Reasoning and T2 Reasoning	.02 (.01)	.46	.10
Covariance T2 Reasoning and T3 Reasoning	.01 (.01)	.19	.62
Covariance T1 Reasoning and T3 Reasoning	.01 (.01)	.17	.44
Covariance T1 Reminding and T2 Reminding	.01 (.01)	.13	.48
Covariance T2 Reminding and T3 Reminding	.01 (.01)	.13	.44
Covariance T1 Reminding and T3 Reminding	.01 (.01)	.15	.20
Structural Model Estimates			
T1 Inductive Discipline → T2 Inductive Discipline	.61 (.10)	.54	.00
T2 Inductive Discipline → T3 Inductive Discipline	.52 (.10)	.54	.00
T1 Physical Discipline → T2 Physical Discipline	.29 (.09)	.35	.00
T2 Physical Discipline → T3 Physical Discipline	.02 (.01)	.72	.01
T1 Externalizing Problems → T2 Externalizing Problems	.29 (.07)	.46	.00
T2 Externalizing Problems → T3 Externalizing Problems	.40 (.06)	.52	.00
T1 Inductive Discipline → T2 Physical Discipline	–3.89 (.95)	–.28	.00
T1 Inductive Discipline → T2 Externalizing Problems	–3.33 (1.30)	–.17	.01
T1 Physical Discipline → T2 Inductive Discipline	–.00 (.00)	–.02	.77
T1 Physical Discipline → T2 Externalizing Problems	.11 (.10)	.09	.30
T1 Externalizing Problems → T2 Inductive Discipline	–.00 (.00)	–.04	.55
T1 Externalizing Problems → T2 Physical Discipline	.07 (.04)	.16	.05
T2 Inductive Discipline → T3 Physical Discipline	–.06 (.03)	–.23	.05
T2 Inductive Discipline → T3 Externalizing Problems	.02 (.80)	.00	.98
T2 Physical Discipline → T3 Inductive Discipline	–.01 (.01)	–.18	.04
T2 Physical Discipline → T3 Externalizing Problems	.02 (.06)	.02	.71
T2 Externalizing Problems → T3 Inductive Discipline	–.01 (.00)	–.09	.17
T2 Externalizing Problems → T3 Physical Discipline	–.00 (.00)	–.19	.14
Covariance T1 Inductive Discipline and T1 Physical Discipline	–.95 (.21)	–.35	.00
Covariance T1 Inductive Discipline and T1 Externalizing Problems	.43 (.40)	.09	.29
Covariance T1 Physical Discipline and T1 Externalizing Problems	13.90 (8.38)	.16	.10
Covariance T2 Inductive Discipline and T2 Physical Discipline	.02 (.16)	.01	.90
Covariance T2 Inductive Discipline and T2 Externalizing Problems	–.31 (.19)	–.12	.09
Covariance T2 Physical Discipline and T2 Externalizing Problems	7.43 (3.05)	.23	.02
Covariance T3 Inductive Discipline and T3 Physical Discipline	–.01 (.00)	–.26	.10
Covariance T3 Inductive Discipline and T3 Externalizing Problems	–.20 (.13)	–.13	.11
Covariance T3 Physical Discipline and T3 Externalizing Problems	.08 (.06)	.19	.18
Covariance T1 Physical Discipline and T3 Physical Discipline	–.02 (.10)	–.03	.85
Covariance T1 Externalizing Problems and T3 Externalizing Problems	13.87 (5.61)	.23	.01

Note. $\chi^2(35) = 56.52, p = .01$. CFI = .97. RMSEA = .05 [.02, .08]. SRMR = .03. T1 = age 3. T2 = age 5.5. T3 = age 10.

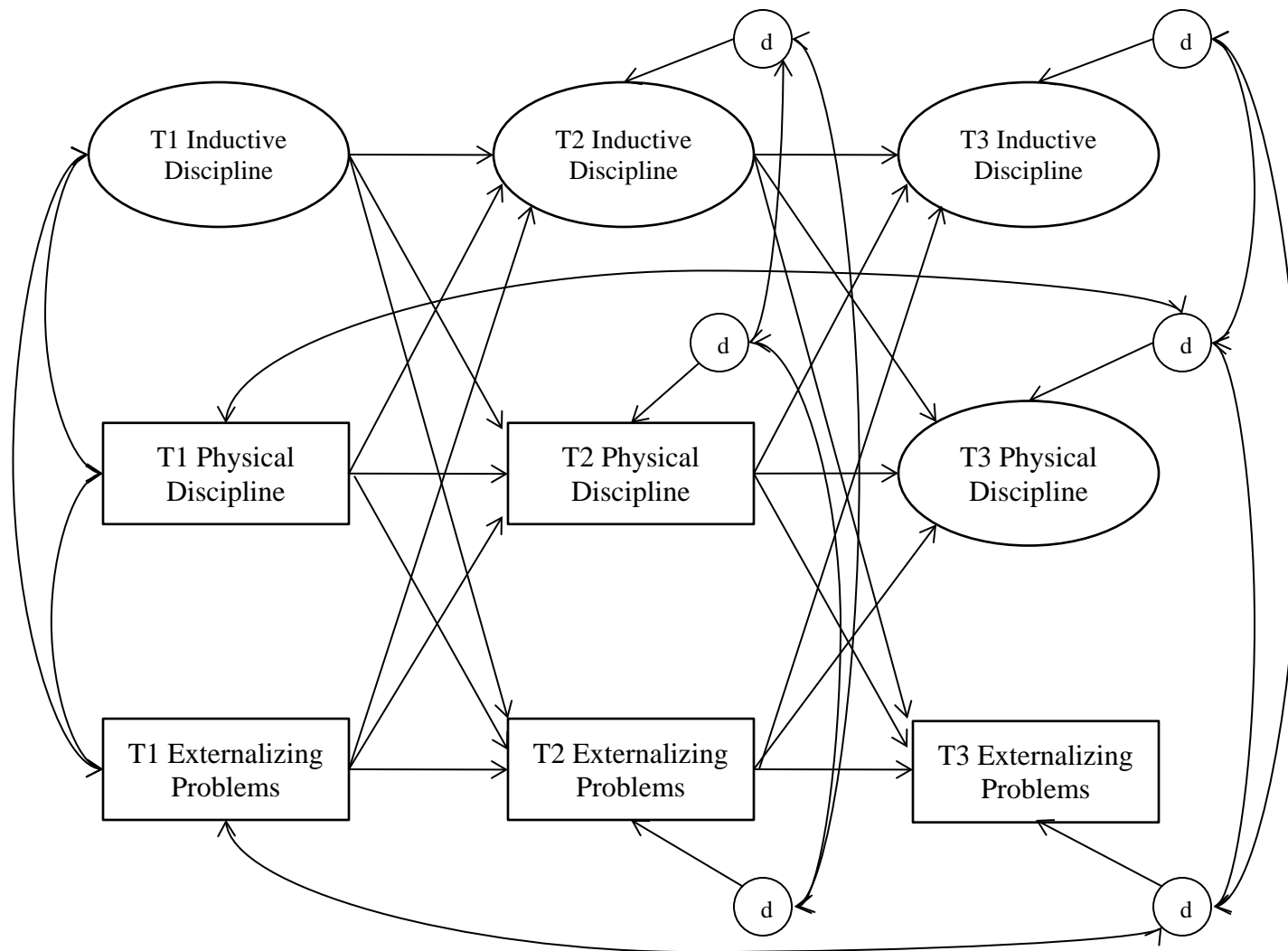


Figure 1. Autoregressive cross-lagged model of inductive discipline, physical discipline, and child externalizing problems at ages 3 (T1), 5.5 (T2), and 10 years (T3). Latent variable indicators and their correlated residuals are removed. d = disturbance term.

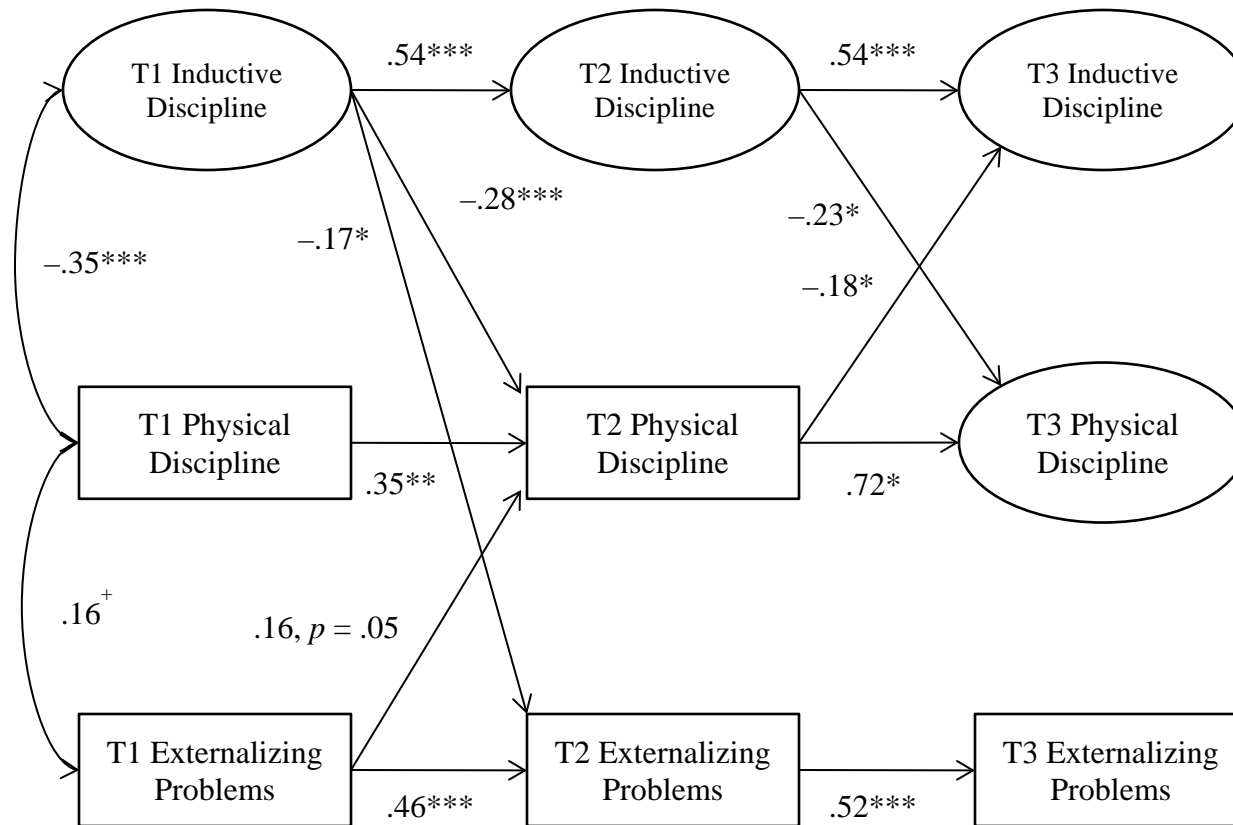


Figure 2. Standardized model of discipline and externalizing problems at ages 3 (T1), 5.5 (T2), and 10-years-old (T3). $\chi^2(35, N = 237) = 56.52, p = .012$. CFI = .97. RMSEA = .05, 90% CI [.02, .08]. SRMR = .03. Correlated error terms and nonsignificant paths are removed. ⁺ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

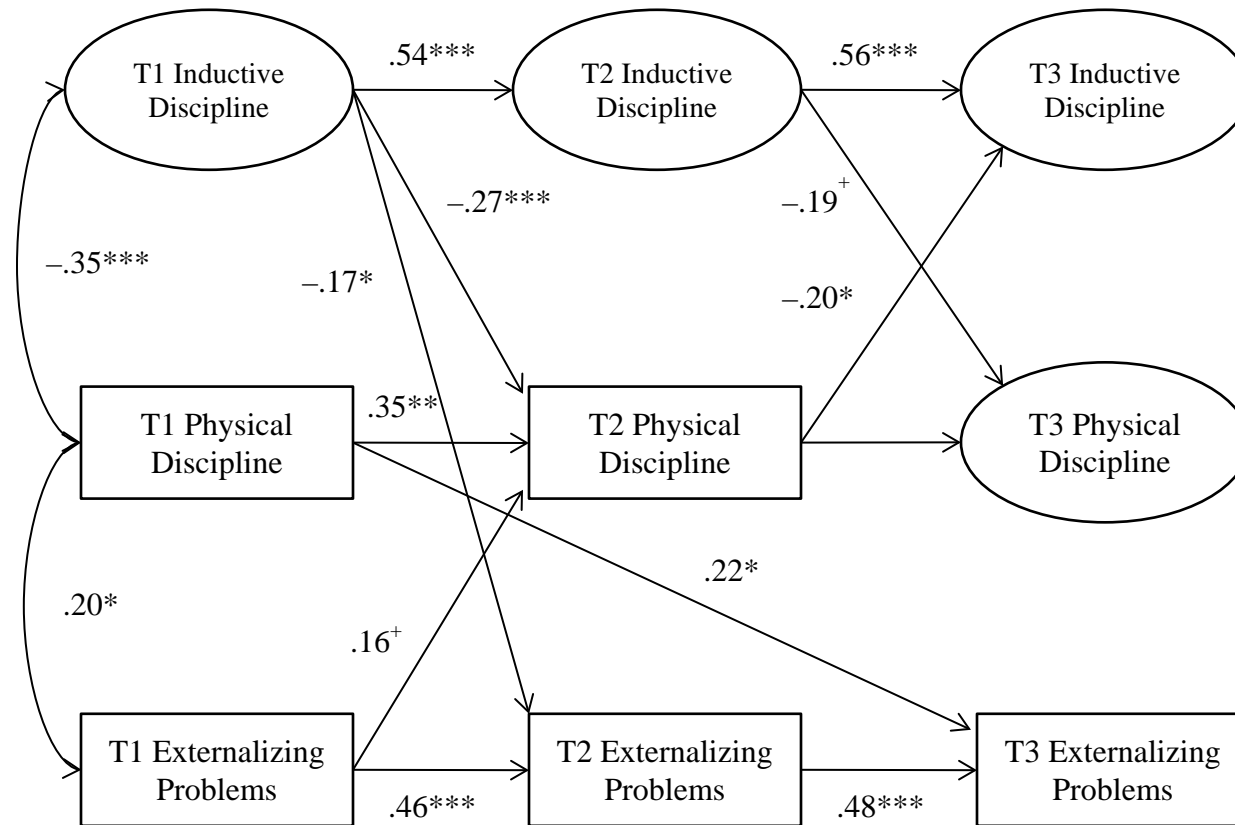


Figure 3. Standardized model with second-order cross-lagged effects of discipline and externalizing problems at ages 3 (T1), 6 (T2), and 10 years (T3). $\chi^2(29, N = 237) = 41.32, p = .06$. CFI = .98. RMSEA = .04, 90% CI [.00, .07]. SRMR = .03. T1 = 3 years. T2 = 5.5 years. T3 = 10 years. Correlated error terms and nonsignificant paths are removed. ⁺ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.