Distribution Agreement

In presenting this thesis as a partial fulfillment of the requirements for a degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis in whole or in part in all forms of media, now or hereafter now, including display on the World Wide Web. I understand that I may select some access restrictions as part of the online submission of this thesis. I retain all ownership rights to the copyright of the thesis. I also retain the right to use in future works (such as articles or books) all or part of this thesis.

Kerri Woodward April 2, 2013

Delivery Complications and Parenting Behaviors as Predictors of Externalizing Problems in the Preschool Period

by

Kerri E. Woodward

Dr. Patricia Brennan

Adviser

Department of Psychology

Dr. Patricia Brennan

Adviser

Dr. Sherryl Goodman

Committee Member

Dr. Leah Roesch

Committee Member

2013

Delivery Complications and Parenting Behaviors as Predictors of Externalizing Problems in the Preschool Period

By

Kerri E. Woodward

Dr. Patricia Brennan

Adviser

An abstract of

a thesis submitted to the Faculty of Emory College of Arts and Sciences

of Emory University in partial fulfillment

of the requirements of the degree of

Bachelor of Sciences with Honors

Department of Psychology

2013

Abstract

Delivery Complications and Parenting Behaviors as Predictors of Externalizing Problems in the Preschool Period

By Kerri Woodward

Previous studies have shown a relationship between delivery complications and risk for antisocial behavior in childhood. These risks are exacerbated when the child also has negative social experiences, particularly within the family environment. Multiple studies have shown antisocial behavior in childhood to be highly predictive of antisocial behavior into adulthood: It is important to identify possible modifiable factors that may alter this negative trajectory. The present study investigated a relationship between delivery complications and parental behaviors as predictive of externalizing behaviors in the preschool period. Duration of maternal psychiatric illness was investigated as a possible confound to this relationship. Similarly, gender was investigated as a moderator to the relationship between delivery complications, parenting behaviors, and child externalizing behaviors. Participants (N=219) included mothers and their preschool-aged children that performed a parent-child interaction during their lab visit. Observational measures of parenting and multiple measures of child externalizing behaviors were used to test our hypotheses. Linear regressions showed parental warmth to be negatively related and parental control to be positively related to observed and maternal reported measures of child externalizing behaviors. Further, linear regression identified a significant interaction between delivery complications, parental control, and gender as predicting secondary caregiver reports of child externalizing behaviors. For girls with low parental control, delivery complications and externalizing behaviors were positively related. Parental behaviors were related to child behavioral outcome, suggesting an importance for positive parenting in at-risk populations. Further interpretations and implications of these findings are discussed.

Delivery Complications and Parenting Behaviors as Predictors of Externalizing Problems in the Preschool Period

By

Kerri E. Woodward

Dr. Patricia Brennan

Adviser

A thesis submitted to the Faculty of Emory College of Arts and Sciences

of Emory University in partial fulfillment

of the requirements of the degree of

Bachelor of Sciences with Honors

Department of Psychology

2013

Table of Contents

Delivery Complications and Parenting Behaviors as Predictors of Externalizing Problems in the Preschool Period

According to the dominant biosocial theory in the field (Moffitt, 1993), there exist two developmental pathways of antisocial behavior: that characterized by a great increase in delinquent behaviors in adolescence with an equally great decline shortly thereafter, and that characterized by problem behaviors persisting from early childhood into and throughout adulthood. Although the adolescence-limited pathway of antisocial behavior is the most prevalent, the individuals following a more stable life-course-persistent pathway are responsible for a majority of crimes committed (Moffitt, 1993). The earlier children start displaying aggressive behaviors, the more likely the antisocial trend will persist throughout life. In fact, antisocial behaviors at age three are predictive of conduct disorder in childhood and arrest in teenage years (Moffitt, 1993). Research focused on the etiology of child externalizing behaviors early in development may help in determining potential approaches to stop this life-course-persistent antisocial pathway.

While the expression of antisocial behavior changes throughout development as a result of changing social opportunities, the same underlying disposition and trait continues across the life-course (Moffitt, 1993). Ryder (1967) found childhood aggression, physical adventurousness, and nonconformity to be predictive of adult risky sexual behaviors. Further, sexual promiscuity is associated with stealing, alcohol abuse, reckless driving, and violence throughout life (Farrington, 1977, as cited by Moffitt, 1993). Antisocial heterotypic continuity allows for the persistence of a delinquent trait through varied behavioral expressions (Moffitt, 1993).

Moffitt (1993) found a combination of neuropsychological vulnerabilities and criminogenic environments to be the most potent combination in the prediction of persistent

antisocial behaviors. Infants that experienced brain injury as a result of delivery complications are more prone to violence and antisocial behaviors; similarly children with disrupted neural development due to lack of stimulation and affection are more at risk for childhood antisocial behaviors. Unfortunately, the most vulnerable infants are often raised in the most criminogenic environments, with parents that are genetically similar, and thus frequently impatient and irritable. The difficult child with high impulsivity is most likely to experience a chain of poor parent-child interactions (Moffitt, 1993). Moffitt (1990) found children with low neuropsychological functioning and an adverse home environment (e.g. poor parent mental health, parent low intelligence, low socioeconomic status) to be four times more aggressive than children with only one such risk factor. Early difficulties exacerbated by continued poor social interactions can lead a child to life-course-persistent antisocial behavior. Thus, research is needed to understand the influence of parenting on early onset child externalizing behaviors to reduce delinquency continuity.

Prenatal Complications. Risk factors for later behavior problems may be evidenced even before birth, and these perinatal risks are significantly more frequent with advanced maternal age and maternal illness (Jacobsson et al., 2004). Birth complications such as labor induction, preeclampsia, fetal hypoxia and umbilical cord prolapse are all related to later deficits in cognitive and psychological functioning (Buka, Tsuang, & Lipsitt, 1993; O'Dwyer, 1997; Seidman et al., 2000; as cited by Arseneault, et al., 2002). As noted by Moffitt (1993), these delivery complications may lead to neuropsychological impairments that are in turn related to early onset antisocial child outcomes. Not only is the quality of the prenatal environment related to antisocial and anxious behavior early in life, but a longitudinal study by O'Connor and

colleagues (2003) also suggested that these prenatal effects might continue throughout adolescence and into adulthood.

A recent study evidenced the transference of certain traits via environmental factors in utero. Rice and colleagues (2010) investigated a population of mothers impregnated through in vitro fertilization; mothers who were genetically related to their child were compared to unrelated dyads. Maternal prenatal stress was associated with negative child outcomes, even in genetically unrelated mother child dyads. This naturally occurring manipulation allowed the researchers to establish a significant environmental relationship between maternal prenatal stress and child antisocial and anxious behaviors between four and ten years of age (Rice, et al., 2010).

Further, Arseneault and colleagues (2002) found a correlation specifically between preeclampsia and later child aggressive behaviors. The researchers elaborated upon two potential pathways by which this correlation may occur. Preeclampsia occurs towards the end of a pregnancy as a result of maternal hypertension (Arseneault et al., 2002). Consequent profusion problems between the uterus and the placenta lead to abnormal fetal blood flow and, ultimately, to decreased fetal growth and preterm birth (Arseneault et al., 2002). The consequences of preeclampsia also include increased risk of fetal mortality; although induced labor carries increased developmental risks, labor is frequently induced to prevent perinatal mortality (Ladewig, London, & Brookens Olds, 1990; as cited by Arseneault et al., 2002). The combination of a high-risk delivery and compromised fetal blood flow and nutrition leads to neuropsychological deficits, which, as previously mentioned, are directly related to later antisocial behaviors (Arseneault et al., 2002; Moffitt, 1993). Arseneault and colleagues (2002) suggested another pathway through which hypertension is passed from mother to fetus, leading to reduced pain sensitivity in adolescence and a consequent increase in aggressive behaviors.

Both pathways have support of multiple research studies and further emphasize the important relationship between delivery complications and later antisocial outcomes.

Parenting Behaviors. Relationships between birth complications and antisocial behaviors appear to be stronger when children are also exposed to social risk factors such as lack of stimulation and affection or a disruptive family environment (Moffitt, 1993; Brennan, et al., 2003). Many such social risk factors have been investigated in association with externalizing behavior outcomes. Gartstein and Fagot (2003) investigated child outcome relative to family adjustment, parental depression and parental instruction and coercion. Researchers noted ineffectual instruction and excessive coercion by parents experiencing depression, which is associated with child externalizing behaviors (Gartstein & Fagot, 2003). Notably maternal depression had a greater negative influence on child outcome than did paternal depression (Gartstein & Fagot, 2003). Further, negative maternal behaviors such as intrusiveness and negative affect explained nearly all of the variability in boys' externalizing behaviors (Belsky, Hseih, & Crnic, 1998). The 2003 study by Gartstein and Fagot reflects the current study particularly well, as it investigates parenting behaviors and parental psychiatric illness. Overall, parental controlling and restrictive behaviors were correlated with child externalizing behaviors, however there is need for further studies involving multiple measures of child externalizing behaviors (Gartstein & Fagot, 2003).

Rothbaum and Weisz (1994) performed a meta-analytic review of studies investigating parenting behaviors as predictors of child externalizing behaviors. Parenting behaviors such as approval, guidance, motivation, synchrony, and absence of coercion, which add into a singular construct of acceptance-responsiveness, are negatively correlated with child externalizing behaviors: warm caregiving behaviors are associated with the most optimal child outcomes

(Rothbaum & Weisz, 1994). In contrast, more controlling and less responsive parenting behaviors actually encourage the child's use of antisocial and externalizing behaviors (Rothbaum & Weisz, 1994). Rothbaum and Weisz (1994) call for further studies investigating parenting behaviors and child outcome; particularly studies involving observational measures, as they found these to be most accurate and representative. Similarly, Arseneault and colleagues (2002) noted the significance of the preschool period as a time in which typically developing children learn to inhibit aggression; they suggested the necessity of observational studies to investigate social conditions that may hinder this important developmental task, leading to the persistence of aggressive behaviors later in life.

Gender Differences. The 1994 meta-analytic review by Rothbaum and Weisz addresses a gender differential in the relationship between parenting and child externalizing behaviors. It appears that there may be a stronger relationship between maternal behaviors and child behavioral reaction for boys than for girls. Similarly, boys score higher on measures of externalizing behaviors than do girls (Rothbaum & Weisz, 1994). It is important to note, however, that more studies have investigated relationships between parenting and child externalizing behaviors in boys than in girls; this can lead to the assumption of gender differences in these interactions, when in actuality the difference is in the frequency of studies investigating female externalizing behaviors (Rothbaum & Weisz, 1994). Further, because more studies investigating Moffitt's life-course-persistent model of externalizing behaviors evaluate boys rather than girls, less is known about the lifetime expression of externalizing behaviors in girls. Rothbaum and Weisz (1994) investigated 13 studies that reported separate effects for boys and girls: They found a stronger relationship between parenting and child externalizing behaviors for boys than for girls, although neither relationship was statistically significant. In their

discussion, they suggested a more complicated relationship than previously thought between gender and the caregiver-child relationship; they stressed the importance of future studies to establish a better understanding of gender effects on parenting and child externalizing behaviors.

The Present Study. The current study will investigate predictors of preschool age (early-onset) child externalizing problems, using three distinct measures of child externalizing behaviors. Most notably, an observational measure will be used to quantify both child and parental behaviors. Previous studies have called for research into parenting qualities using observational measures; such measures are thought to be more accurate and representative of parenting interactions (Rothbaum & Weisz, 1994). Studies show that both pre- and postnatal environmental factors have an influence on later aggressive behavior in children. These behaviors can persist throughout development and into adulthood. It is important to understand this mechanism for the development of conduct problems in order to inform early intervention approaches. If specific prenatal and parenting factors influence the development of these antisocial behaviors, interventions could be designed to shape parents' relevant behaviors, particularly for at-risk children who have experienced perinatal complications.

Aims. The present study investigates the relationship between delivery complications and later externalizing behaviors, as moderated by parenting behaviors. Specifically it is hypothesized that children who experience both high levels of delivery complications, and more negative parent-child interactions will evidence greater numbers of externalizing behavior problems than the other children in the sample. It is also predicted that the interactive effect of parenting and delivery complications will remain significant even when controlling for maternal psychiatric illness. Finally, the current study aims to perform exploratory analyses of gender differences in the association between delivery complications and externalizing behaviors.

Method

Participants

Participants (N=219) included mother-child dyads recruited through the Emory Child Study Center and Emory Women's Mental Health Program (WMHP). Child age ranged between 2.5 and 5.5 years (mean 3.74 years), with 110 males and 109 females. Child ethnicity was 66.7 percent Caucasian, 7.8 percent African-American, 7.8 percent Biracial, 1.4 percent Hispanic, and 16.4 percent other or unspecified. Maternal age ranged from 21 to 49 years (mean 36.94 years) and 82.5 percent were married. Mothers had an average 13.25-month duration of psychiatric illness during their child's lifetime: no medication was used during pregnancy for 34.2 percent of the sample, antipsychotic medication was used by 9.6 percent, antidepressants were used by 30.6 percent, antiepileptic drugs were used by 18.3 percent, and both antiepileptic and antipsychotic medications were used by 7.3 percent. Exclusion criteria included active maternal substance abuse in pregnancy, maternal age less than 18 years in pregnancy, and severe child developmental disabilities that would prevent completion of cognitive or behavioral testing.

Procedure

Prior to their visit, mothers and alternate-caregivers (e.g. fathers, grandparents, teachers) received the Child Behavior Checklist (CBCL; Achenbach, 2000) with instructions to fill out the form and return it either via mail or at the lab visit. Participants visited the BUILD lab as part of a larger study investigating the impact of maternal psychiatric medications taken during pregnancy on preschoolers' development. Toward the end of their lab visit, mother-child dyads played in a separate room with lab-provided toys. For the first 10 minutes of this session, researchers asked participants to play as they would at home. For the second 10-minute segment, researchers asked participants to clean up the toys and then work together on two puzzles,

providing participants with a more structured environment. All 20 minutes of the parent-child interactions were recorded with a discrete recording device in the testing room. Trained research assistants later coded specific behaviors from the interactions using the Dyadic Parent-Child Interaction Coding Scheme (DPICS).

As the final component of data collection, researchers contacted the Emory Women's Mental Health Program, and other obstetricians when applicable, to obtain a copy of each participant's birth records. These records provide information about all aspects of maternal and fetal health throughout pregnancy and birth, specifically about obstetrical complications (e.g. insufficient oxygen, prematurity, low birth weight, etc.) for the purpose of the present study.

Measures

Parental Warmth. Parental behaviors were coded using the DPICS, a valid and reliable measure for behavioral operationalization (Eyberg & Robinson, 1981). The DPICS allows coders to score frequency of specific parent behaviors (direct commands, information questions, negative talk, positive touch, etc.) and of more general child behaviors (command, question, prosocial talk, yell, etc.). Parenting behaviors were combined into categories of control versus warmth. Parental warmth was defined as a sum of neutral talk, behavioral descriptions, labeled praise, reflections, and unlabeled praise, divided by the total number of mother behaviors to control for varied interaction styles (see Table 1 for descriptives). For the measure of parental warmth, a mean ratio of .337 means that on average 33.7% of parent behaviors within the interaction were classified as warm. Inter-rater reliability for the parental warmth measure was high (α=.99), the internal consistency of this measure was acceptable (α=.57), and the subscales making up this measure were all significantly correlated with one another (see Table 2).

Parental Control. Using the DPICS to code parental behaviors and observing correlations between behaviors, researchers defined a measure of parental control to include any behaviors that were intended to shape the child's subsequent actions. The parental control measure included direct commands, indirect commands, information questions, descriptive questions, and negative talk. Inter-rater reliability for this measure was high (α=.99), and internal consistency was acceptable (α=.65; see Table 3 for intercorrelations between subscales). Again, the observed behaviors categorized as parental control were summed and divided by total parent behaviors to control for interaction differences (see Table 1 for descriptives).

Child Delivery Complications. From the collected birth records, researchers recorded delivery complications experienced by each participant. Delivery complications in our sample are listed with their observed frequencies in Table 4. A sum of all experienced delivery complications was calculated for each participant, ranging from 0 to 5 in our population. Further descriptive statistics of delivery complications can be seen in Table 1.

Child Externalizing Problems, Observed. An observational measure of child externalizing problems was calculated by coding child behaviors during the 20-minute parent-child interaction using the DPICS. Child behaviors coded as whine, yell, negative talk, and negative touch were categorized as child externalizing. Inter-rater reliability was high (α=.95). Internal consistency for child externalizing behavior was acceptable (α=.66). Correlations between child-observed externalizing problems are presented in Table 5. The observed externalizing behaviors were summed and divided by total observed child behaviors to control for differing interaction frequencies (see Table 1 for descriptives).

Child Externalizing Problems, CBCL. The CBCL is a valid, reliable, and age-normalized measure that quantifies problem behaviors in children aged 1.5 to 5 years (Achenbach, 2000).

Raters are asked to assign a value to each of 99 behavioral statements over the past 60-day period: Possible ratings include 0 (not true), 1 (sometimes true), and 2 (very true). A scoring program provides outputs of total overall behavior problems, total externalizing problems, and total internalizing problems. Higher scores in each category indicate a greater prevalence of problem behaviors. Raw scores were standardized and converted to t-scores. Both mothers and alternate caregivers were asked to complete the CBCL for each participant, thus providing two distinct scores of caregiver rated child externalizing behavior problems. Descriptive statistics for both respondents can be seen in Table 1.

Potential Confounds. Child age and gender were examined as potential confounds in data analyses. In addition, maternal psychotropic medication use (as determined prospectively by participants from the WMHP and retrospectively by participants from the community) was coded as present versus absent and examined as a potential confound.

The Beck Depression Inventory (BDI; Beck, et al., 1997) was also used to measure maternal depression on the date of the participants' lab visit. The BDI is a valid and reliable self-report measure of depression. The checklist contains 21 items, with a higher score indicating more depressive symptoms within the past 2 weeks. Maternal BDI score was investigated as a potential confound to mothers' rating of child behavior.

The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID; First, et al., 2002) was used by a psychologist or highly trained graduate students to determine any DSM-IV diagnoses presented by the mother. Throughout the interview, which details a number of possible psychological conditions, demographic information (maternal age, education, marital status) was collected and duration of maternal psychiatric illness throughout the child's lifetime was assessed. Other background information, specifically about the child's biological father's

diagnoses, was also collected. These demographic and psychiatric history variables were subsequently investigated as possible confounds in predicting externalizing behavior and were controlled as detailed below.

Results

This study investigated the relationship between delivery complications and child externalizing behaviors, as moderated by observed parental warmth and control. It was predicted that any correlations would remain significant when controlling for duration of maternal psychiatric illness over the child's lifetime. Finally, gender was investigated as a moderator of the relationship between delivery complications, parenting qualities, and child externalizing behaviors. All hypotheses were tested using linear regression analysis.

Correlations between the independent and dependent measures in this study are presented in Table 6. As can be seen, the three child externalizing measures had a trend towards significance or were significantly correlated in the expected direction. Parental control and warmth were negatively correlated with one another (as expected), and were associated with child externalizing behaviors in the predicted directions as well. Delivery complications were not significantly correlated with the parenting or externalizing behavior measures.

Delivery Complications, Parenting, and Observed Child Externalizing. In preliminary data analysis, child age was significantly correlated with observed child externalizing behaviors ($r(202) = -.273$, $p < .001$) and was thus controlled for in the regression analysis. When controlling for child age, parental warmth was related to observed child externalizing behaviors ($b = -.304$, $t(200) = -4.411$, $p < .001$). Parental warmth remained significantly related to child externalizing behaviors when controlling for duration of maternal psychiatric illness ($b = -.307$, $t(197) = -4.450$, $p < .001$). Similarly, parental control was related to observed child externalizing

behaviors when controlling for child age (b = .164, t(200) = 2.333, p = .021). Parental control also remained significantly related to child externalizing behaviors when controlling for duration of maternal psychiatric illness (b = .163, t(197) = 2.337, p = .020). Birth complications were not significantly related to observed child externalizing behaviors (b = -.071, t(200) = -1.045, p = .297), and were not moderated by either parental warmth (b = -.010, t(199) = -.157, p = .875) or control (b = -.036, t(199) = -.511, p = .610) in the prediction of observed child externalizing behaviors.

Delivery Complications, Parenting, and Child Externalizing - Alternate Caregiver. Multiple significant confounds were observed for the dependent measure of alternate caregiver rating of child externalizing behaviors. Alternate caregiver report of child externalizing was correlated with child age (r(171) = -.210, p = .003), mother age (r(171) = -.198, p = .005), mother marital status, (r(171) = .180, p = .009), and paternal substance use (r(171) = .161, p = .017). When controlling for child age, mother age, mother marital status, and paternal substance use, there were no significant relationships between delivery complications and alternate caregiver report of child externalizing behaviors and no independent or moderating effects of either parental warmth or control. The results remained non significant when also controlling for duration of maternal psychiatric illness (see Table 7).

Delivery Complications, Parenting, and Child Externalizing - Mother. Maternal report of child externalizing behavior was correlated with maternal medication use during pregnancy (r(202) = .224, p = .001) and with maternal BDI score on the day of testing (r(202) = .156, p = .013). Parental warmth was significantly related to maternal report of child externalizing behaviors when controlling for maternal prenatal medication use and BDI total score (b = -.138, t(199) = -2.038, p = .043). Parental warmth remained significantly related to maternal report of

child externalizing behaviors when also controlling for duration of maternal psychiatric illness (b = -.153, t(196) = -2.245, p = .026). Similarly, parental control was significantly related to maternal report of child externalizing behaviors (b = .206, t(199) = 3.063, p = .002). Parental control also significantly predicted maternal report of child externalizing behaviors when additionally controlling for duration of maternal psychiatric illness (b = .216, t(196) = 3.195, p = .002). Delivery complications were not significant in predicting mother-reported child externalizing (b = -.081, t(199) = -1.178, p = .240), nor were there significant interactions between delivery complications and parental warmth (b = -.057, t(198) = -.831, p = .407) or between delivery complications and parental control (b = .058, t(198) = .830, p = .407) as predictive of mother-rated child externalizing behaviors.

Gender as a moderator. Linear regression was used to test the hypothesis that gender would moderate the relationship between birth complications and externalizing behaviors. Controlling for appropriate confounds (as detailed above), no significant gender moderating effects were noted in the association between birth complications and externalizing behaviors (see Table 8).

Further linear regression analyses investigated possible three-way interactions (i.e., parenting X birth complications X gender) predicting child externalizing behaviors. An interaction between delivery complications, gender, and parental control was predictive of alternate caregiver-rated child externalizing behaviors when controlling for child age, mother age, mother marital status, and paternal substance use (b = .203, t(153) = 2.276, p = .024). Girls in particular showed a trend for a significant interaction between delivery complications and parental control as predictive of alternate caregiver-rated child externalizing behaviors (b = -.206, t(73) = -1.843, p = .069). Specifically for girls with low parental control, delivery

complications were positively associated with alternate caregiver-rated child externalizing behaviors (b = .810, $t(14)$ = 3.887, p = .002), whereas for girls with high parental control there was no association between delivery complications and child externalizing behavior (b = -.117, $t(17)$ = -.527, p = .605). For boys parental control did not interact with delivery complications to predict alternate caregiver-rated externalizing, nor did delivery complications significantly predict externalizing behaviors at either high or low levels of parental control. All other three-way interactions were non significant (see Table 9).

Discussion

The results partially support the hypotheses of the present study. Parenting behaviors were significantly related to two measures of child externalizing behaviors, as was predicted. Delivery complications, however, were not significantly related to child behavioral outcome. Any significant results remained when controlling for duration of maternal psychiatric illness, as predicted. Finally, gender did not significantly interact with delivery complications to predict child externalizing behaviors, although a three-way interaction between delivery complications, gender, and parenting behaviors was significantly predictive of one measure of child externalizing behaviors.

Parenting behaviors are related to observed child externalizing. When controlling for child age, parenting behaviors were significantly related to observed child externalizing behaviors. Observational measures of parental warmth, parental control, and child externalizing were collected by coding a 20-minute parent-child interaction. When the mother displayed more parental warmth during this interaction, the child displayed fewer externalizing behaviors. Contrastingly, when the mother displayed more parental control during the interaction, the child

displayed more externalizing behaviors. These are the directions that would have been predicted by previous literature.

Notably one cannot know whether the parenting behaviors led to more or less child externalizing or whether child externalizing led to a different parental reaction. What can be seen, however, is that the mother and child are influencing one another with their behaviors throughout the interaction. This relationship corresponds to previous literature in which Rothbaum and Weisz (1994) note the bidirectional nature of the parent-child relationship. This is particularly valuable in relationships between children of parents with psychiatric illnesses. Regardless of duration of maternal psychiatric illness, a positive and warm interaction with one's child can positively influence child behavioral outcome.

Parenting behaviors are related to mother-rated child externalizing. As mentioned previously and predicted by prior studies, maternal warmth and control were significantly related to mother's rating of child externalizing behaviors. This finding remained significant when also controlling for duration of maternal psychiatric illness. This finding suggests that the child's general pattern of behavior (rather than just a laboratory sample) is associated with maternal warmth and control. The transactional association between these two variables is less apparent as they were measured independently and not within one interaction. Nevertheless, it might be that the child's aggression has had an impact on the parenting behavior over time.

Garstein and Fagot (2003) found that greater parental coercion was related to more child externalizing behaviors. In the present study, this would parallel the relationship between greater parental control and more child externalizing behaviors. Again, this relationship is particularly important to note in our sample of mothers with psychiatric illnesses. Although the child is

genetically at risk for psychiatric illness, a warm maternal interaction with low control is predictive of reduced child externalizing outcomes.

Interaction between delivery complications, gender, and parenting. Our results show a significant three-way interaction between delivery complications, parenting, and gender as predictive of alternate caregiver-rated externalizing. Specifically, for girls whose mothers displayed low parental control, a greater frequency of delivery complications was predictive of greater externalizing behaviors. The positive relationship between delivery complications and externalizing behaviors was expected and supported by previous studies. Arsenault and colleagues (2002) noted a significant and positive relationship between preeclampsia and later aggressive behaviors in children. Other studies indicate the importance of prenatal complications in predicting externalizing behaviors throughout the lifetime (Moffitt, 1993).

It was unexpected, however, that this relationship would only appear in girls, as previous studies have indicated a generally stronger relationship between boys and externalizing behaviors (Rothbaum & Weisz, 1994). Similarly, it was unexpected that this significant relationship would only be observed in conditions of low parental control. Parental control and coercion was noted to relate positively to child externalizing behaviors (Garstein & Fagot, 2003), and thus conditions of high parental control should have led to greater externalizing expression.

As our measures of parenting were calculated as ratios over total parental behaviors, parental warmth and control were mutually exclusive; thus low parental control would indicate greater parental warmth and vice versa. The results can therefore not be explained by low parental control potentially indicating a nonresponsive parent, as low control automatically indicates high parental warmth. It is predicted that for females with a higher frequency of birth complications that parental control may not be viewed negatively: when children are

neurologically compromised it may be possible for parental control and structure to positively impact child behavioral outcome.

As observed by Deater-Deckard and Dodge (1997), parental control is more effective and positive when utilized within a same-sex dyad. This would explain that for interactions between mothers and their daughters, low control was not a positive influence on child outcome. In follow-up analyses, however, gender was not found to significantly moderate the relationship between parenting and child externalizing behaviors, suggesting that this argument does not explain our findings. With the vast number of analyses performed within the present study, it is also possible that this three-way interaction is simply a Type I error.

Implications. The present study supports the idea that parenting behaviors can shape child outcome. Parental warmth was related to fewer child externalizing behaviors, whereas parental control was related to more child externalizing. Positive parenting that encourages child-directed play might help to improve child behavioral outcome. For children at high-risk for behavioral problems due to delivery complications or parental psychiatric illness, specific parenting strategies might positively alter the trajectory of their development.

The lack of significant relationships between delivery complications and child externalizing problems is potentially indicative of our ever-improving medical system. With improved monitoring throughout pregnancy, and especially during labor and delivery, high-risk deliveries are more frequently recognized and prevented through the use of caesarian section (Leitch & Walker, 1998). This lowered threshold for delivery risk leads to quicker identification and amelioration of delivery complications, potentially reducing the risk of neural damage and negative outcomes throughout the lifetime.

Limitations. This present study has a limited generalizability due to our sampling techniques. The study was designed to investigate possible differences in child outcome as a result of maternal psychiatric illness, and thus mother-child dyads were recruited primarily through a tertiary care center. The present study is also focused on a population of highly educated and high SES families, as these families are the ones with the resources to seek psychiatric guidance throughout pregnancy. Similarly, mothers under the age of 18 years, mothers actively abusing substances, and significantly premature infants were excluded from the sample so as to avoid additional confounds. Our sample thus contained women with fairly healthy pregnancies and high quality medical care. The present study's findings are also limited to a single assessment of behavior during the preschool-age. Future follow-ups would be necessary to assess whether these "early onset" cases of externalizing problems are indeed "life course persistent."

Future Directions. Future studies could benefit from investigating different age ranges of children. In our sample of 2.5 to 5.5 year olds, there is a large amount of naturally occurring variability in externalizing behaviors, strictly from a developmental standpoint. As stated by Arsenault and colleagues (2002), the development of aggression inhibition occurs primarily before the age of 4 years. In our sample, only half of our participants had reached this developmental milestone. Future studies could thus learn more about age effects within the relationship between birth complications, parenting, and externalizing behaviors by evaluating a slightly older population of children, especially through the use of longitudinal study designs.

Another possible approach that may be beneficial to future studies would be to investigate specific groupings of delivery complications to determine if any particular delivery complication has a significant influence on later child externalizing behaviors. The present study

used a count of delivery complications to provide adequate power to a sample with a low frequency of delivery complications. Future investigations may include more at-risk deliveries to provide a greater range of delivery complications, thus permitting an evaluation of externalizing behaviors as predicted by specific types of obstetric complications. Arsenault and colleagues (2002) noted the relationship between preeclampsia and later antisocial behaviors in particular: Other delivery complications that lead to preterm labor and reduced fetal blood flow, such as placental abruption, may similarly result in neuropsychological deficits.

Finally, future studies would benefit from investigating the genetic component within the parent-child behavioral relationship. Mothers with more control and less warmth may have a childhood history of externalizing behaviors, thus genetically increasing their child's behavioral risk. It is also possible that women with psychiatric illnesses may be more likely to marry antisocial men and thus have children with a genetic predisposition towards antisocial behaviors. Influenced by genetics, their children show more externalizing behaviors, which in turn lead to increased maternal control and reduced maternal warmth. Studies with genetically sensitive designs (e.g. twin studies) are necessary to investigate these possibilities.

Conclusion. In a multi-informant, multi-measure evaluation of preschool-aged children, delivery complications were not significantly related to child externalizing problems. Parenting behaviors were related to child externalizing behaviors: Greater parental warmth was related to less child externalizing, whereas greater parental control was related to more externalizing behaviors. These significant findings suggest that positive parenting interventions may be useful in improving child outcomes. Even in an at-risk population, warm parental interactions can improve child behavioral outcome, which is predictive of an improved developmental trajectory.

Citations

Achenbach, T. (2000). Manual for ASEBA Preschool Forms & Profiles. Burlington, VT: University of Vermont.

Arseneault, L., Tremblay, R. E., Boulerice, B., & Saucier, J. F. (2002). Obstetrical complications and violent delinquency: testing two developmental pathways. *Child Development, 73(2)*: 496-508.

Beck, A. T., Steer, R. A., & Brown, G. K. (1997). *Beck Depression Inventory: Second Edition*. San Antonio: The Psychological Corporation.

Belsky, J., Hsieh, K. H., & Crnic, K. (1998). Mothering, fathering, and infant negativity as antecedants of boys' externalizing problems and inhibition at age 3 years: differential susceptibility to rearing experience? *Development and Psychopathology, 10*: 301-319.

Brennan, P. A., Grekin, E. R., & Mednick, S. A. (2003). Prenatal and perinatal influences on conduct disorder and serious delinquency. In Lahey, B. B., Moffitt, T. E., & Caspi, A. (Eds.), *Causes of conduct disorder and juvenile delinquency* (319-341). New York: The Guilford Press.

Deater-Deckard, K. & Dodge, K. A. (1997). Externalizing behavior problems and discipline revisited: nonlinear effects and variation by culture, context, and gender. *Psychological Inquiry, 8(3)*: 161-175.

Eyberg, S.M., & Robinson E.A. (1981). *Dyadic parent-child interaction coding system*. Seattle, WA: Parenting Clinic, University of Washington.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. (2002). *Structured clinical interview for DSM-IV axis I disorders - patient edition*. New York: New York State Psychiatric Institute.

Gartstein, M.A., & Fagot, B.I. (2003). Parental depression, parenting and family adjustment, and child effortful control: explaining externalizing behaviors for preschool children. *Journal of Applied Developmental Psychology, 24(2)*: 143-177.

Jacobsson, B., Ladfors, L., & Milsom, I. (2004). Advanced maternal age and adverse perinatal outcome. *Obstetrics and Gynecology, 104(4)*: 727-733.

Leitch, C. R., & Walker, J. J. (1998). The rise in caesarian section rate: the same indications but a lower threshold. *BJOG: An International Journal of Obstetrics and Gynecology, 105(6)*: 621-626.

Moffitt, T. (1993). Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychological Review, 100(4):* 674-701.

Moffitt, T. (1990). The neuropsychology of delinquency: a critical review of theory and research. In N. Morris & M. Tonry (Eds.), *Crime and Justice, (12)*. Chicago: University of Chicago Press.

O'Connor, T. G., Heron, J., Golding, J., & Glover, V. (2003). Maternal antenatal anxiety and behavioural/emotional problems in children: a test of a programming hypothesis. *The Journal of Child Psychology and Psychiatry, 44(7)*: 1025-1036.

Rice, F., Harold, G. T., Boivin, J., van den Bree, M., Hay, D. F., & Thapar, A. (2010). The links between prenatal stress and offspring development and psychopathology: disentangling environmental and inherited influences. *Psychological Medicine, 40*: 335-345.

Rothbaum, F., & Weisz, J. (1994). Parental caregiving and externalizing behavior in non-clinical samples: a meta-analysis. *Psychological Bulletin, 116(1)*: 55-74.

Ryder, R. G. (1967). Birth to maturity revisited: a canonical reanalysis. *Journal of Personality and Social Psychology, 7(2)*: 168-172.

Table 1

Descriptive Statistics of Independent, Dependent, and Moderating Variables

	Mean	**Standard Deviation**
Mom-rated Externalizing	46.51	10.362
Alternate Caregiver-rated Externalizing	46.09	10.958
Observed Child Externalizing	.134	.092
Parent Warmth	.337	.052
Parent Control	.634	.049
Delivery Complications	1.549	1.368

Table 2.

Internal Consistency of Parental Warmth Subscales

		Neutral Talk	Behavioral Description	Reflection	Labeled Praise	Unlabeled Praise
Neutral Talk	*r* *p*	-	**.152*** **.028**	**.251*** **.000**	**.142*** **.040**	**.373*** **.000**
Behavioral Description	*r* *p*	-	-	**.290*** **.000**	**.215*** **.002**	**.164*** **.018**
Reflection	*r* *p*	-	-	-	.107 .124	**.263*** **.000**
Labeled Praise	*r* *p*	-	-	-	-	**.329*** **.000**
Unlabeled Praise	*r* *p*	-	-	-	-	-

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3.

Internal Consistency of Parental Control Subscales

		Negative Talk	Direct Command	Indirect Command	Information Question	Descriptive Question
Negative Talk	*r* *p*	-	**.560*** **.000**	**.148*** **.032**	**.173*** **.012**	-.004 .349
Direct Command	*r* *p*	-	-	**.390*** **.000**	**.172*** **.013**	**.181*** **.009**
Indirect Command	*r* *p*	-	-	-	**.287*** **.000**	**.447*** **.000**
Information Question	*r* *p*	-	-	-	-	**.562*** **.000**
Descriptive Question	*r* *p*	-	-	-	-	-

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4.

Delivery Complication Frequencies

	Frequency	Percent
Cord nuchal	54	26.2
Abnormal fetal heart rate	27	13.5
Fetal distress	21	10.4
Maternal fever or chorioamnio infection	14	6.7
Failure to progress	2	5.9
Cord prolapse	12	5.5
Precipitous labor	8	3.8
Prolonged labor	7	3.3
Maternal hemorrhage	6	2.9
Cephalopelvic disproportion	6	2.9
Heavy meconium	5	2.4
Inadequate anesthesia	4	1.9
Cord knot	3	1.5
Delivery via forceps	3	1.4
Placental abruption	3	1.4
Maternal seizure	2	1.0
Placental previa	2	1.0

Table 5.

Internal Consistency of Child Externalizing Subscales

		Negative Touch	Negative Talk	Yell	Whine
Negative Touch	*r* *p*	-	**.330*** **.000**	**.283*** **.000**	**.296*** **.000**
Negative Talk	*r* *p*	**-**	-	**.291*** **.000**	**.459*** **.000**
Yell	*r* *p*	**-**	**-**	-	**.354*** **.000**
Whine	*r* *p*	**-**	**-**	**-**	-

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.

Correlations between Independent, Dependent, and Moderating Variables

		Mother-rated Externalizing	Alternate Caregiver-rated Externalizing	Observed Child Externalizing	Parent Warmth	Parent Control	Delivery Complications
Mother-rated Externalizing	*r*	-	**.485***	**.144***	-.126	**.198***	-.088
	p		**.000**	**.038**	.069	**.004**	.201
Alternate Caregiver-rated Externalizing	*r*	-	-	.144	**-.198***	**.154***	-.030
	p			.059	**.009**	**.043**	.694
Observed Child Externalizing	*r*	-	-	-	**-.362***	**.227***	.004
	p				**.000**	**.001**	.952
Parent Warmth	*r*	-	-	-	-	**-.862***	-.072
	p					**.000**	.306
Parent Control	*r*	-	-	-	-	-	.098
	p						.162
Delivery Complications	*r*	-	-	-	-	-	-
	p						

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7.

Regression Analysis for Predictors of Alternate Caregiver-rated Child Externalizing Behaviors

Predictors	***b***	**df**	***t***	***p***
Delivery Complications	-.038	158	-.495	.621
Parental Warmth	-.127	158	-1.560	.121
Parental Control	.084	158	1.057	.292
Delivery Complications BY Parental Warmth	.016	157	.197	.844
Delivery Complications BY Parental Control	-.024	157	-.280	.780
Delivery Complications BY Parental Warmth Controlling for Duration Illness	.112	156	1.429	.155
Delivery Complications BY Parental Control Controlling for Duration Illness	.080	156	.987	.325

Table 8.

Regression Analysis of Delivery Complications and Gender Predicting Externalizing Behavior

Outcome	**Predictors**	***b***	**df**	***t***	***p***
Observed Child Externalizing	Delivery Complications BY Gender	.082	199	1.151	.251
Alternate Caregiver-rated Externalizing	Delivery Complications BY Gender	-.023	165	-.283	.777
Mother-rated Externalizing	Delivery Complications BY Gender	.123	209	1.778	.077

Table 9.

Regression Analysis of Three-Way Interactions between Delivery Complications, Gender, and Parenting as Predictive of Child Externalizing

Outcome	**Predictors**	***b***	**df**	***t***	***p***
Observed Child Externalizing	Delivery Complications BY Gender BY Parental Warmth	-.051	195	-.762	.447
	Delivery Complications BY Gender BY Parental Control	-.044	195	-.598	.551
Mother-rated Externalizing	Delivery Complications BY Gender BY Parental Warmth	.020	194	.285	.776
	Delivery Complications BY Gender BY Parental Control	-.029	194	-.387	.699
Alternate Caregiver-rated Externalizing	Delivery Complications BY Gender BY Parental Warmth	-.085	153	-1.059	.291