PREDICTORS OF PATTERNS OF CHANGE IN CHILD DISRUPTIVE BEHAVIOR AND PARENTING STRESS DURING PARENT CHILD INTERACTION THERAPY AND ITS RELATION TO TREATMENT OUTCOME

By

JAIMEE CHRISTINA PEREZ

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To my daughter, Sophia, who inspires me to be authentic and true in all my pursuits. I love you beyond all measure and hope you one day take pride in the legacy I now leave you with the completion of this dissertation.

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PREDICTORS OF PATTERNS OF CHANGE IN CHILD DISRUPTIVE BEHAVIOR AND PARENTING STRESS DURING PCIT AND ITS RELATION TO TREATMENT OUTCOME

By

Jaimee Christina Perez

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Our main aims were to examine predictors of patterns of change in child disruptive behavior and parenting stress during PCIT and to examine patterns of change as predictors of specific parent and child treatment outcomes. Participants were 100 boys and girls who met diagnostic criteria for Oppositional Defiant Disorder and their parents. Families received Parent Child Interaction Therapy, an intervention specifically designed to target disruptive behavior problems in preschoolers, ages 3 to 6 years. Session-by-session data were collected on child disruptive behavior and parenting stress. These data were examined using a multilevel modeling approach to examine treatment, child, parent, and family predictors of patterns of change during PCIT. Patterns of change found in the multilevel model analyses were then examined by two different statistical approaches, as predictors of specific parent and child outcomes.

Results from the first set multilevel modeling analyses found that treatment phase (CDI versus PDI), maternal depression, and perceived barriers to participation in treatment predicted different patterns of change in child disruptive behavior and parenting stress. Families exhibited faster change in child disruptive behavior and parenting stress in CDI than PDI. Patterns of change in child disruptive behavior and parenting stress were associated with changes in maternal depression from pre- to mid- to post-treatment, with mothers with moderate to severe

levels of depression during PCIT exhibiting slower change in levels of parenting stress during PCIT and children of mothers with moderate to severe levels of depression demonstrating less change in disruptive behavior during PCIT. For treatment completers, retrospective ratings of perceived barriers to participation in treatment predicted a slower pattern of change in child disruptive behavior and parenting stress.

Patterns of change were not found to predict to specific parent and child outcomes. Multilevel analyses examining change in outcomes as predictors of patterns change found a trend between patterns of change in child disruptive behavior and change in attachment from pre- to post-treatment. Traditional regression analyses found a significant relationship between change in child disruptive behavior during CDI and change in attachment from pre- to post-treatment, with declines in child disruptive behavior predicting greater change in attachment from pre- to post-treatment. Changes in parent child dysfunctional interaction during CDI and PDI predicted change in child disruptive behavior from pre- to post-treatment. Inspection of mean change in CDI revealed minimal improvement in parent child dysfunctional interaction, which predicted minimal change in child disruptive behavior during CDI. Change in parent child dysfunctional interaction in PDI, however, predicted improvement in child disruptive behavior from pre- to post-treatment. Patterns of change in child disruptive behavior during CDI and PDI did not predict to early versus late dropout. Traditional logistic regression analyses examining change in child disruptive behavior in CDI and PDI also failed to predict early versus late dropout from PCIT.

CHAPTER 1
INTRODUCTION

Brief Overview

In recent years, researchers have provided evidence for the stability of conduct problems in young children (Hinshaw, Lahey, & Hart, 1993; Loeber, 1988, 1991; Moffitt, 1993). For example, in a review of longitudinal studies of hard-to-manage preschoolers, Campbell (1991) found that at least 50% of preschool-age children with moderate-to-severe externalizing problems continued to show some degree of disturbance at school age, even though they had been in treatment as preschoolers. Sixty-seven percent of those children met diagnostic criteria for Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD) by age 9. Developmental studies of the emergence of aggression in young children (Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Nagin & Tremblay, 1999; Shaw, Owens, Vondra, Keenan, & Winslow, 1996) have also provided evidence for the stability of disruptive behaviors from early childhood into adolescence and adulthood. For example, Moffitt et al. (1996) reported that 7% of their community sample of boys from New Zealand, assessed from age 3 years until age 18 years, followed a chronic and persistent pathway, in which they exhibited high levels aggressive and oppositional behaviors from preschool age up through late adolescence. This figure is similar to results from other longitudinal studies of the onset and development of disruptive behavior in children. For example, Nagin and Tremblay (1999) found that 5% of their French Canadian school sample of boys, ages 6 to 15 years, followed a similar course of high levels of aggressive and oppositional behaviors. As noted by Campbell, Shaw, and Gilliom (2000), these figures suggest that, despite differences in the nature (clinical, high risk, or population based) and characteristics of these samples (country of origin,

informant), a certain proportion of preschoolers and early school-age children is at risk for progressing along a persistent pathway that leads to significant conduct problems later in life.

Developmental psychopathology researchers have worked to uncover the developmental pathways that lead to long-term antisocial, conduct disordered behavior (Broidy, Nagin, Tremblay, Bates, Brame, Dodge, Fergusson, Horwood, Loeber, Laird, Lynman, Moffitt, & Pettit, 2003; Hinshaw, Lahey, & Hart, 1993; Loeber, 1988, 1991; Moffitt, 1993). Across various studies, similar developmental pathways have been reported. A certain percentage of children from these studies follow an early starter (Patterson, Capaldi, & Bank, 1991) or life-course persistent pathway (Moffitt et al., 1996), which is characterized by the early onset of aggression and other disruptive behaviors in the preschool or early school age years that persists into adolescence and adulthood. Another percentage of children in these samples follow a high level desister pathway, which is also characterized by early onset of aggression and other disruptive behaviors that decrease to normative levels as the child ages into school age and adolescence. The remaining children in these samples follow a low level desister pathway or a no problem pathway, characterized by low levels of aggression and other problem behaviors that decrease as the child ages.

Recent developmental trajectory studies (Côté, Tremblay, Nagin, Zoccolillo, & Vitaro, 2002; Shaw, Gilliom, Ingoldsby, & Nagin, 2003; Spieker, Larson, Lewis, Keller & Gilchirst, 1999) have attempted to address the question of which children will follow an early starter, persistent course and which children will eventually desist and follow a more normative pathway. The evidence from longitudinal studies of children's disruptive behavior indicates that, for certain preschool and early school age children, disruptive behaviors are stable phenomena that can be detected at an early age (Campbell et al., 2000; Spieker et al., 1999; Owens and

Shaw, 2003). Researchers have attempted to elucidate which child, parent, and family factors put children at risk for the early starter pathway and which factors may protect children from the early starter persistent pathway. Considering that these children persist and progress toward worse outcomes, such as poor academic functioning, further conduct problems, increased likelihood for school dropout, and substance abuse (Coie & Dodge, 1998), early intervention that specifically targets disruptive behavior in preschool-age children is clearly warranted.

In response to findings from the child development literature on disruptive behavior, clinical researchers have developed various interventions to treat these problems and have extensively examined the effectiveness and efficacy of these interventions. They have also examined predictors that negatively affect treatment outcome in interventions specifically designed to target oppositional and aggressive behaviors in young children (Eyberg, 1992; Kazdin, 1996; Patterson, 1982; Webster-Stratton & Hammond, 1997). Similar categories of risk factors, which will be outlined shortly, have been shown to predict both less response to treatment (Dumas & Wahler, 1983; Kazdin & Wassell, 2000; Webster-Stratton & Hammond, 1990) and attrition (Armbruster & Kazdin, 1994; Gould, Shaffer, & Kaplan, 1985).

Though treatments in the child disruptive behavior intervention literature have varied with respect to format and structure, their main goal is to alter the behavior such that the child engages in more prosocial, acceptable behaviors. Early research investigating the correlates and predictors of oppositional and aggressive behaviors in children revealed strong relations between parenting style and negative child outcomes (Azar & Wolfe, 1989; Baumrind, 1967, 1991; Franz, McClelland, & Weinberger, 1991; Olson, Bates, & Bayles, 1990). For example, Baumrind's (1967, 1991) research on parenting styles has shown that parents who do not adequately meet young children's dual needs for nurturance and limits are less likely to have successful and

healthy adolescents. Additionally, researchers found that quality of the interactions between parent and child play an influential role in child behavior outcomes. Coercive interactions, in which the parent and child engage in increasingly manipulative behaviors to gain power in the relationship, have been specifically identified as problematic and contributory to the later development of aggressive, oppositional and conduct-disordered behavior in children (Bates, Bayles, Bennett, Ridge, & Brown, 1991; Campbell, 1991; Patterson, 1982; Patterson, Reid, & Dishion, 1992).

These findings highlight the need to target the interactions between parent and child to effect change in a child's maladaptive behaviors. The treatment format and structure of interest for this study is a parent-child interaction approach that targets the interaction patterns between parent and child (Foote, Eyberg, & Schuhmann, 1998) and focuses on teaching the parent effective strategies to enhance the parent-child relationship and improve parent limit setting and consistency with discipline. A more detailed description of the intervention (Parent Child Interaction Therapy) is provided below.

An extensive literature now exists on the multiple factors associated with worse outcomes in children with disruptive behavior in both the developmental and clinical literature. Three domains of risk have been implicated as predictors that increase the likelihood that a child will progress along an early starter pathway: (a) child risk factors (, difficult temperament, high rates of impulsive, inattentive, hyperactive or aggressive behaviors, child sex); (b) parent risk factors (maternal depression, maternal stress, ineffective parenting strategies and negative attitudes); and (c) family risk factors (marital factors, socioeconomic factors, and other stressors; Webster-Stratton, 1996). Though no definitive model has emerged that is able to account adequately for how each of these factors works toward predicting long-term developmental and clinical

outcomes, results of studies from both literatures have consistently linked risk factors in these three domains to risk for the development of disruptive behaviors in children and to less therapeutic change in children's disruptive behaviors during treatment (Campbell, Shaw & Gilliom, 2000; Kazdin & Wassell, 1998; Owens & Shaw, 2003).

Recently, researchers in the developmental and clinical literature have turned their attention toward more advanced statistical methods to measuring change in child disruptive behavior over time (Broidy et al., 2003; Hartman, Stage, & Webster-Stratton, 2003; Owens & Shaw, 2003). Studies examining change in individuals or groups across time employ longitudinal designs with repeated, time-ordered observations (Wu, Clopper, & Wooldridge, 1999). Pre/post designs are an example, in which the dependent variable or outcome of interest is measured at some initial time point and then measured again either after the completion of treatment or at some other specified time point. Traditional approaches to analyzing these types of data include univariate and multivariate analysis of variance as well as traditional regression approaches. Difference scores have also been employed as a measure of change over time.

In an article comparing traditional approaches to analyzing longitudinal data to multilevel modeling, Wu and colleagues (1999) outlined the following ideal goals for analysis of longitudinal data: (a) direct study of (intra-) individual change, (b) direct identification of interindividual differences in intraindividual change, (c) analysis of the relationship between intra- and interindividual changes, and (d) study of the variables that influence intra- and interindividual change. Methodological researchers such as Rogosa (1995) and Willet (1988, 1994) have argued that traditional statistical approaches do not adequately address these goals, particularly in understanding intraindividual change over time. Wu and colleagues also noted that ANOVA with repeated measures almost exclusively focuses on between-participants or

interindividual effects. Instead, Rogosa and others (Raudenbush & Bryk, 2002; Willet, 1988, 1994) encourage researchers to use multilevel modeling to analyze change over time.

Multilevel model analysis is also referred to as hierarchical linear modeling (HLM). These terms refer to a set of statistical models that analyze change at multiple levels (, individual level and group or organizational level) and are able to handle repeated measures. The basic level in any multilevel model is the *level 1 model*, which specifies change over time within the individual. The *level 2 model* specifies change over time at the group level and can include independent variables hypothesized to predict differences at both the between- and within-participants levels. In the context of analyzing individual change over time, observations are nested within individuals. Therefore, individuals are considered to be the level-2 grouping variable.

The level 1 and level 2 models can be combined to specify change at both the individual and group levels simultaneously. Unlike traditional ANOVA approaches, HLM does not assume that individuals are changing at the same level or the same rate over time. Therefore, it is possible to examine individual differences in the level and rate of change at both the within-participant and between-participant levels. Additionally, HLM procedures do not require that the time between assessment points be equally spaced apart or that each participant have an equal number of assessment points. Hence, all data points can be included in the analyses. Simulated data models have demonstrated that inclusion of all cases regardless of missing data points actually results in estimates closer to the expected values had all participants had complete data (Zeitman-Zait and Zumbo, 2005).

The main aim of this study is to examine predictors of individual change in child disruptive behaviors and parenting stress during treatment in families referred for Parent Child Interaction

Therapy (PCIT; Brinkmeyer & Eyberg, 2003). Children in this study were diagnosed with Oppositional Defiant Disorder (ODD; American Psychiatric Association (APA), 2000), a common childhood disruptive behavior disorder. This study proposes to apply *multilevel (or hierarchical linear) modeling*, to measure patterns of change in children's disruptive behaviors and parenting stress during the course of treatment. In addition to modeling patterns of change in child disruptive behavior and parenting stress, three domains of predictors (child, parent, and family) that have previously been shown to negatively affect change in treatment will be examined to determine whether they predict different patterns of change in child disruptive behavior and parenting stress during PCIT. The patterns of change in child disruptive behavior and parenting stress will then be examined as predictors of change in specific treatment outcomes, including dropout from PCIT.

In the following sections, a more in-depth review is provided on the effects of child, parent, and family predictors on the development of disruptive behavior disorders in children, and on the patterns of change in child disruptive behavior and parenting stress during treatment. Criteria for diagnosing a disruptive behavior disorder will also be reviewed, as well as the theoretical underpinnings and outcome research on the effectiveness of PCIT in treating disruptive behavior in children. We examine methodological considerations in multilevel modeling before discussing specific hypotheses for this study.

Disruptive Behavior Disorders

The category of disruptive behavior disorders includes Oppositional Defiant Disorder (ODD), Conduct Disorder (CD), and Attention Deficit Hyperactivity Disorder (ADHD). According to the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision (DSM-IV-TR, APA, 2000), the essential feature of Oppositional Defiant Disorder (ODD) is "a recurrent pattern of negativistic, defiant, disobedient, and hostile behavior toward

authority figures that [has] persisted for at least 6 months" (p. 100). Children who meet criteria for ODD present with at least four of the following behaviors: loses temper, argues with adults, actively defies or refuses to comply with adult's requests or rules, deliberately does things to annoy others, blames others for his or her own mistakes or misbehavior, is touchy or easily annoyed by others, is angry or resentful, or is spiteful or vindictive. Children with ODD engage in these behaviors more frequently than is typical of same-aged peers, and these behaviors contribute to significant impairment in child functioning in social and academic settings. The DSM-IV-TR reports prevalence rates between 2% to 16% for ODD.

Children diagnosed with Conduct Disorder (CD) engage in "a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate norms or rules are violated (p. 93; APA, 2000)." These behaviors are classified by the following four groups: aggressive conduct that causes or threatens physical harm to people or animals, non-aggressive conduct that causes property loss or damage, deceitfulness and theft, and serious violations of rules. To meet criteria for a diagnosis of CD, three or more of the characteristic behaviors must have occurred during the past 12 months, with one behavior present in the past 6 months. Children with CD often initiate aggressive behavior and react aggressively to others, and they may display bullying or threatening behavior. They may also use a weapon, such as a brick, bottle, knife, or gun, to cause harm and may be physically cruel to animals. Deliberate fire setting with the intention of destroying property may also be present.

This study will focus on childhood-onset CD, in which at least one criterion characteristic of CD begins before the age of 10 (APA, 2000). The prevalence of CD ranges widely, from 1% to more than 10%, with higher prevalence rates among males (6% to 16%) than females (2% to 9%; APA, 1994).

Children with ODD or CD often present with co-morbid Attention Deficit Hyperactivity Disorder (ADHD). Estimates of co-occurrence range widely depending on the sample and assessment methods. In a review of the literature, Jensen, Martin, and Cantwell (1997) reported a range from 42.7% to 93%. Though these estimates were derived mainly from clinical samples, Jensen et al. (1997) noted that the available data suggest a relatively high rate of comorbidity between ADHD and ODD/CD. Alone, prevalence rates for ADHD also vary considerably, depending on the age and nature of the sample. The DSM-IV reports estimates between 3% and 5% for school-age children (APA, 2000). For preschool children, prevalence rates range from 2% (Lavigne et al., 1996) to as high as 59% (Conners, 2002). Children meeting diagnostic criteria for ADHD present with a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than is typically observed in same-age peers (APA, 2000). According to the DSM, a child must meet six or more of the inattentive and/or hyperactive-impulsive symptoms, and these symptoms must have persisted for at least 6 months at a maladaptive and inappropriate developmental level to warrant a diagnosis of ADHD (see Table 1-1). Depending on his or her presentation, a child can be predominantly inattentive, predominantly hyperactive-impulsive, or combined type.

Risk Factors for the Development of Disruptive Behaviors in Children

A review of the literature revealed that most applications of multilevel modeling have been in the developmental psychopathology literature. Specifically, researchers interested in the development of disruptive behavior have used multilevel modeling to map the developmental trajectories of these behaviors in children (Broidy et al., 2003; Owens & Shaw, 2003; Spieker, Larson, Lewis, Keller, & Gilchrist, 1999). As mentioned above, similar developmental trajectories have been found across multiple samples (Broidy et al., 2003), particularly an early starter pathway first described by Patterson (Patterson, Capaldi, & Bank, 1991) and Moffitt

(1993), in which a child exhibits high levels of disruptive behaviors from an early age that persist into adolescence and adulthood. Recently, Broidy and colleagues conducted a six-site, cross-national study to examine the developmental course of physical aggression in childhood and its association with violent offending in adolescence. They found remarkable similarity in developmental trajectories across countries, with a small percentage of school-age boys and girls from each sample (4% to 11%) engaging in consistently high levels of physical aggression over time. The description of this persistent, high-level trajectory appeared consistent with the early starter pathway (Patterson, Capaldi, & Bank, 1991) described above. Essentially, the persistent, high-level trajectory in the study was characterized by the early onset of disruptive behavior, specifically aggressive behavior (approximately around age 6), which persisted into adolescence and carried the most negative long-term prognosis in terms of predicting later violent offending.

Although Broidy et al. (2003) demonstrated the presence of an early starter pathway in their samples, the ages at which most of the sites began assessing problem behaviors was age 6. Findings from studies with preschool children (Campbell, 1995) suggest that disruptive behaviors that begin before school entry are predictive of disruptive behavior in the school years. Therefore, researchers have also examined the trajectories of preschool age children, citing this age range as critical for the development of later conduct problems. Evidence from studies examining the developmental trajectories of disruptive behaviors in preschool-age children and predictors that effect the development and maintenance of disruptive behavior problems into school age are discussed below.

Similar trajectories have been found in preschool-age samples as those found in school-age samples. Shaw, Gilliom, Ingoldsby, and Nagin (2003) examined the trajectories of 284 low-income boys ages 2 to 8 and identified four developmental pathways similar to those found in

research with older children: a persistent problem pathway; a high-level desister pathway; a moderate-level desister pathway; and a low-level problem pathway. The persistent problem pathway closely relates to Patterson's early starter pathway. Six percent of the sample from the Shaw et al. (2003) study followed the persistent problem pathway. These boys exhibited relatively severe and persistent behavior problems from age 2 to age 8. Thirty-eight percent of the sample fell within the high-level desister group. This pathway was characterized by a higher level of disruptive behavior compared to the first two groups that showed a steady decline to the end of the study. The rest of the sample followed the low and moderate level desister pathways, in which problem behaviors resolved on their own.

What factors differentiate the toddler who will outgrow the terrible twos, as the children who follow the high-level desister pathway do, and the child who will persist with development, as the early starters do? Shaw et al. (2003) and others (Owens and Shaw, 2003; Spieker, Larson, Lewis, Keller, and Gilchrist, 1999; Munson, McMahon, and Spieker, 2001; DeVito and Hopkins, 2001; Moffit and Caspi, 2001) have examined predictors from three domains and their relation to the onset and development of disruptive behavior in preschool children. The first domain includes characteristics of the child, such as child temperament, child gender, and hyperactivity. The second domain includes parent characteristics, such as parent stress and psychopathology. The third domain includes family characteristics, such as socioeconomic status and family structure (single versus two-parent family).

Child Risk Factors

Child characteristics, such as temperament and hyperactivity, have been linked to the onset of disruptive behavior and are predictive of poor long-term outcomes (McMahon, 1994). Difficult temperament in infancy, in combination with maternal perception of child difficulty,

male gender, prematurity, and low socioeconomic status, best predicted disruptive behavior during the preschool period (Sanson, Oberklaid, Pedlow, & Prior, 1991).

Hyperactivity has been found to predict future development of disruptive behaviors. Hinshaw, Lahey, and Hart (1993) found that children who display both hyperactivity and disruptive behavior exhibit more severe levels of disruptive behavior and have a poorer prognosis than children with either problem alone. In a follow-up study of hyperactive children ages 4 to 12 years, Barkley, Fischer, Edelbrock, and Smallish (1990) found that children with co-occurring conduct problems had more severe and persistent problems in adolescence and adulthood. Other researchers (Loeber, 1988; Moffitt, 1993b) have also found associations between hyperactivity and poor impulse control with more severe and chronic forms of disruptive behavior.

Gender has also been examined as a risk factor for development of disruptive behavior. Webster-Stratton (1996) noted that despite findings regarding the stability of behavior problems in preschoolers, little is known about developmental pathways for disruptive behaviors in terms of gender. The body of literature on gender differences has shown that boys are at higher risk than girls for developing disruptive behavior; however, few studies exist have examined girls' developmental pathways and whether similar risk factors are involved in the development of disruptive behaviors in girls as in boys.

In a community sample, Moffitt and Caspi (2001) found the male-to-female ratio of childhood onset antisocial behavior was 10:1, indicating that fewer females in their sample followed the childhood-onset pathway; however, girls with childhood-onset antisocial behavior had similar high-risk backgrounds as childhood-onset boys. In a service utilizing sample, McKabe and colleagues (2004) also found that fewer girls than boys met criteria for childhood

onset conduct disorder, but their results revealed similar risk factors, including family history of mental illness, family history of antisocial behavior, and history of maltreatment. Broidy et al. (2003) also examined developmental trajectories by gender and found that girls exhibited lower mean levels of physical aggression than did boys across the four sites that included girls in their samples; however, girls were found to follow similar trajectories as boys.

Gender has been examined in trajectory studies (Munson, McMahon, & Spieker, 2001; Spieker, Larson, Lewis, Keller & Gilchrist, 1999) focusing on how certain child, parent and family variables influence the level and rate of change in disruptive behaviors in preschoolers over time. In both studies, child sex was related to the level of behavior problems, but results differed in terms of which gender was found to have higher levels of behavior problems. Spieker et al. (1999) found that boys had higher levels of behavior problems compared to girls. Munson et al. (2001) found the opposite, with girls in their sample having higher levels of disruptive behavior. Despite differences in level of behavior problems between boys and girls, child sex was not related to the rate of change in behavior problems in either study, suggesting that both boys and girls were changing in disruptive behaviors at the same rate over the course of each study (Spieker et al., 1999; Munson et al., 2001).

Parent Risk Factors

A number of parent factors have been studied as risk factors for the onset and development of disruptive behavior. Parenting stress and maternal depression are of particular interest to this study. Parents of children with disruptive behavior report higher levels of parenting stress than parents of non-disruptive children (Morgan, Robinson, & Aldridge, 2002), and levels of parenting stress influence disciplinary practices that directly promote and escalate aggressive and oppositional child behavior (Patterson, Reid, & Dishion, 1992). Moreover, parent stress appears to increase parent attention to deviant behavior and to increase the likelihood of a parent

initiating or maintaining aversive interchanges with their child (Patterson, 1988; Patterson & Forgatch, 1990; Wahler & Dumas, 1989). Campbell, Shaw, and Gilliom (2000) also noted that parents who are stressed are more likely to engage in harsh or inconsistent parenting, which in turn exacerbates early parent-child struggles over autonomy and control.

Williford, Calkins, and Keane (2007) examined patterns of change maternal parenting stress in a sample of boys and girls, from ages 2 to 5, at risk for externalizing behavior problems. They found that higher levels of disruptive behavior, anger proneness and emotional dysregulation in children predicted higher parenting stress in toddlerhood. They also found that mothers of children who displayed high levels of disruptive behaviors across all time points of the study (ages 2, 4 and 5) displayed high levels of parenting stress across time. In other words, patterns of change for mothers of children with stable, significant levels of disruptive behaviors during toddlerhood, also remained relatively stable (demonstrated less change over time) in levels of parenting stress.

Developmental trajectory studies have examined other factors that are influenced by parenting stress, such as ineffective parenting practices. Shaw et al. (2003) examined whether rejecting parenting differentiated between boys who followed an early starter, persistent trajectory and boys who followed a high-level, desister trajectory. Rejecting parenting was found to reliably distinguish these two trajectories. Spieker et al. (1999) examined the effect of negative maternal control on development of child disruptive behavior and found negative maternal control to significantly relate to the rate of change in child disruptive behavior in preschoolers, with children of mothers who reported frequent yelling, threatening and spanking during conflict maintaining high levels of disruptive behavior over time. Owens and Shaw (2003) examined effects of parent conflict and maternal acceptance on development of disruptive

behaviors in preschoolers and found that preschoolers of families with high parent conflict and low maternal acceptance maintained higher levels of externalizing behaviors across time.

Findings from these studies provide support for the relation between ineffective parenting practices, parenting stress and the development and maintenance of disruptive behaviors in children. Parenting stress has been shown to negatively affect parenting practices, which in turn predict the development and maintenance of disruptive behaviors in preschoolers. In addition, Williford and colleagues (2007) demonstrated an association between change in parenting stress and changes in child disruptive behavior, with minimal change in significant child disruptive behaviors predicting stable, high levels of parenting stress during toddlerhood. It is anticipated that levels of parenting stress will also affect change in disruptive behaviors during treatment, which will be explored further in the following section that discusses predictors of therapeutic change.

Regarding parent psychopathology, paternal antisocial behavior and maternal depression has been two of the best predictors of disruptive behavior in boys (Frick, Lahey, Loeber, Stouthamer-Loeber, Christ, & Hanson, 1992). Studies of children of affectively distressed parents suggest that these children are prone to detrimental outcomes (Cummings & Davies, 1994; Dodge, 1990; Gelfand & Teti, 1990). Maternal depression has been associated with disruptions in parenting behavior, including parental uninvolvment, lack of responsivity, and lack of emotional support (Downey & Coyne, 1990) as well as increased hostility and criticism (Webster-Stratton & Hammond, 1988).

Recent developmental trajectory studies have examined the relation between levels of and changes in maternal depression over time and the development of disruptive behaviors in children. Findings from these studies provide compelling evidence for the relation between

maternal depression and development of child disruptive behaviors. Shaw et al. (2003) found that high levels of maternal depression during the toddler period differentiated children who followed an early starter or high-level desister trajectory from children who followed moderate and low-level desister trajectories. Other developmental trajectory studies have found high levels of maternal depression to predict high levels of disruptive behaviors from preschool to school age (Munson et al., 2001; Owens & Shaw, 2003; Spieker et al., 1999). Munson et al. (2001) examined the relation between maternal depression and the rate of change in child disruptive behavior and found that children of mothers who report greater levels of depression developed disruptive behaviors at a faster rate over time and had higher levels of disruptive behavior at age 9 years. Munson and colleagues also found that changes in maternal depression were related to changes in maternal ratings of disruptive behavior, with increases in ratings of maternal depression associated with increases in ratings of child disruptive behaviors. (Author notes that this finding was specific to children in their study who were assessed as having avoidant, insecure attachments to their mothers).

Findings from these studies provide evidence that maternal depression is a significant risk factor for both the development of disruptive behaviors and maintenance of these behaviors into school age. As will be discussed in the next section, maternal depression has also been found to adversely affect change in treatment. Changes in maternal depression during treatment may also affect change in disruptive behavior during treatment. This study aims to examine this possibility.

Family Risk Factors

With regard to family risk factors, socioeconomic status (SES) has been implicated as a risk factor in the onset and prognosis in disruptive behavior. Moffit (1990) found that boys in the life-course persistent group, which is similar to Patterson's (1982) early starter pathway,

came from families marked by chronic family adversity, as measured by low parental education and occupational status and low income. Aguilar, Sroufe, Egeland, and Carlson (2000) reported similar findings, with socioeconomic status differentiating between persistently disruptive children from children who were never disruptive or had adolescent-onset behavior problems. DeVito and Hopkins (2001) found socioeconomic status to significantly predict disruptive behaviors in children.

Some researchers have examined the relationship between SES and parenting stress in parents of children with disruptive behavior (Mash & Johnston, 1990; Baker, 1994). Findings are not conclusive. Mash and Johnston (1990) found that low SES predicted higher levels of parenting stress, while Baker (1994) found higher SES to be associated with higher levels of parenting stress. Baker attempted to explain this conflict in findings by suggesting that both high and low SES groups face a specific set of stressors that can heighten parent-child conflict, thereby increasing parent stress. This study aims to investigate the association between SES and changes in parenting stress during the course of treatment. Evidence supporting a link between socioeconomic disadvantage and therapeutic change will be discussed in detail below.

Cumulative Risk Factor Models

Child, parent, and family variables appear to play a significant role in the onset and persistence of disruptive behavior in children. In isolation, child, parent and family risk factors appear to have consistent associations with level of child disruptive behavior; however, recent studies in the developmental psychopathology literature have shifted away from studying isolated risk factors and moved toward analyzing the cumulative models of risk (DeVito & Hopkins, 2001; Munson et al., 2001; Owens & Shaw, 2003; Shaw et al., 2003; Spieker et al., 1999).

DeVito and Hopkins (2001) examined the cumulative effects of child attachment, permissive parenting, and marital dissatisfaction on disruptive behavior in preschoolers. Sixty mother-child dyads attended a single 90 minute appointment, during which mothers completed an interview and rating forms and dyads participated in a strange situation paradigm from which attachment style was assessed. The predictors of interest were entered into a hierarchical regression model and findings indicated that children in coercively attached dyads whose mothers experienced less marital satisfaction and used more permissive parenting practices exhibited higher levels of disruptive behavior.

Cumulative predictor models have also been examined in developmental trajectory studies. Munson, McMahon and Spieker (2001) examined the effects of infant attachment, maternal depression, and child sex on the development of disruptive behaviors. They found that children with avoidant insecure attachment styles at age 1whose mothers reported higher levels of maternal depression across time had higher levels of externalizing problems at age 9. In addition, they found that increases in mothers' ratings of depression at a yearly assessment were associated with increases in mothers' ratings of disruptive behavior at that same time point.

Owens and Shaw (2003) examined the cumulative effects of infant negative emotionality, maternal depression, maternal acceptance, and parental conflict on the development of disruptive behaviors in boys, ages 2 to 6, from low-income families. Certain combinations of the four risk factors predicted higher levels of externalizing behaviors. The combination of high infant negative emotionality and high maternal depression resulted in less improvement in disruptive behavior over time and higher rates of externalizing behaviors between ages 2 and 6. The combination of high parent conflict and low acceptance also resulted in less improvement of disruptive behavior over time and higher rates of externalizing behaviors between 2 and 6 years.

The combination of maternal acceptance and maternal depression was not statistically significant; however, high maternal depression with either high or low maternal acceptance resulted in a trend of higher levels of externalizing behavior at age 6.

Research on trajectories of development of disruptive behavior disorders has consistently linked child, parent, and family risk factors in the onset and development of disruptive behaviors. Recent studies provide evidence for an early starter trajectory across various samples of preschool age children and have elucidated specific child, parent, and family risk factors that differentiate children who follow an early starter trajectory and whose behaviors persist into school age (Spieker et al., 1999; Shaw et al., 2003). These studies suggest that children who display conduct problems during the preschool years appear to be at increased risk for developing subsequent conduct problems as they get older. Findings from these studies also highlight the benefit of early identification and intervention to prevent these children from progressing toward subsequent conduct problems as they age and offset potentially worse outcomes. Shaw et al. (2003) notes that the more serious forms of conduct problems in school age children and adolescence have been found to be more resistant to change, with few interventions proven consistently effective (Kazdin, 1995 as cited by Shaw et al., 2003). Early intervention, meaning intervention during the preschool years, prior to school entry, captures families during a critical period of development, during which interventions have been shown to have higher probabilities of success (Dishion and Patternson, 1992). By targeting these behaviors early, children are prevented from progressing along a trajectory that leads to more costly consequences (such as juvenile delinquency) down the road.

Developmental trajectory studies have linked specific child, parent, and family risk factors to the development of disruptive behaviors in children. Findings from these studies have shown

that a sub-set of preschool age children develop significant levels of disruptive behaviors that persist into school age and adolescence. This sub-set of preschoolers can be differentiated to follow a high level, persistent trajectory according to specific risk factors. Specifically, child factors such as hyperactivity and gender, parent factors such as maternal depression, and family factors such as socioeconomic disadvantage appear to contribute to onset and persistence of disruptive behaviors over time. Would these same predictors have a similar adverse effect on therapeutic change over the course of an intervention?

Predictors of Therapeutic Change and Premature Termination from Treatment

An extensive literature exists on the predictors of onset and development of disruptive behavior disorders. The treatment outcome and therapeutic change literature in child disruptive behavior has examined the same domains of risk factors in relation to treatment outcome, and associations have emerged between certain child, parent, and family predictors and therapeutic change. A number of treatments have been developed to address disruptive behavior disorders in young children, and studies have shown positive therapeutic changes in children's disruptive behavior as a result of these treatments (Brestan & Eyberg, 1998; Hartman, Stage, & Webster-Stratton, 2003; Kazdin, 1995; Nixon, 2001). Premature termination from treatment, however, is a common and significant challenge in research and practice. Rates for psychotherapy dropout have been reported to range from 40% to 60% (Wierzbicki & Perkarik, 1993), indicating that around half of families who enter treatment leave prematurely. Specific child factors (initial severity of disruptive behavior, comorbid diagnoses), parent factors (depression, parenting stress), and family factors (socioeconomic disadvantage, perceived barriers to treatment participation) have been found to predict premature termination (Dumas & Whaler, 1983; Kazdin, Holland, & Crowley, 1997; Webster-Stratton & Hammond, 1997); however, predictors of therapeutic change are less well understood and have been studied less extensively (Kazdin

and Wassell, 1998). A more extensive review of predictors of therapeutic change and premature termination is discussed below.

Child Factors

Child factors, such as severity of child disruptive behavior, has been linked to poor outcomes in treatment, with children who display more severe forms of conduct problems leaving treatment prematurely and showing less change in treatment (McMahon, 1994). Kazdin and colleagues have conducted a number of studies examining predictors of therapeutic change and premature termination from treatment and found that greater severity of child dysfunction -- a general domain defined by total number of disruptive and comorbid symptoms -- predicted both less improvement in child disruptive behaviors for those who remained in treatment (Kazdin, 1995; Kazdin & Wassell, 1999, 2000), as well as dropout from treatment (Kazdin & Mazurick, 1994; Kazdin, Mazurick, & Bass, 1993; Kazdin & Wassell, 1998), with children who drop out from treatment exhibiting more severe forms of disruptive behavior at start of treatment.

Comorbidity has also been examined as a predictor of therapeutic change, though less frequently than other child factors and with inconclusive findings (Abikoff & Klein, 1992). A comorbid diagnosis of ADHD is common among children with ODD, with estimates of co-occurrence in ADHD clinical samples ranging from 20% (Barkley, 1990) to 60% (Biederman, Munir, & Knee, 1987). Studies have shown that parents of children with comorbid ADHD and ODD have high rates of psychopathology, poor parenting skills, and marital discord (Lahey, Piacentini, McBurnett, Stone, Hartdagen, & Hynd, 1988; Schachar & Wachsmuth, 1990). These findings suggest that a comorbid diagnosis of ADHD may have a negative impact on therapeutic change and potentially increase the risk for dropout from treatment. Results from the multisite, multimodal study of children with ADHD (MTA; Jensen et al., 2001) demonstrated that children with comorbid ADHD and ODD/CD responded poorly to behavioral interventions compared to

children with only ADHD. Kazdin, Mazurick, and Bass (1993) found that multiple diagnoses were associated with premature termination from treatment. Together, these findings suggest that comorbid ADHD may have a negative influence on therapeutic change and may predict dropout.

Child gender has not been widely investigated in treatment outcome studies, despite the inclusion of girls in samples discussed here (Kazdin & Wassell, 1998, 2000; Nixon, 2001). In a review of 82 psychosocial interventions for conduct problems for children and adolescents, Brestan and Eyberg (1998) noted that there was no information on gender differences in therapeutic change at the time, despite girls representing a significant minority of referrals for mental health services.

Webster-Stratton (1996) attempted to address this problem in the literature by exploring the effect of gender on therapeutic change. She did not find a gender by time effect in her study, suggesting that boys and girls improved similarly in disruptive behaviors during treatment. She did find, however, a main effect for gender at pre-treatment, with mothers' perceiving boys as having more disruptive behaviors than girls.

One study was found (Hartman, Stage, & Webster-Stratton, 2003) that used multilevel modeling to examine the influence of child factors, specifically inattention, impulsivity, and hyperactivity, on patterns of change in treatment in children with disruptive behavior. Hartman et al. (2003) found that children with attention problems changed their disruptive behavior at a faster rate over the course of treatment and showed better improvement in disruptive behavior at one-year follow-up compared to children without attention problems. Though this finding contradicts earlier research findings, it is important to note that the children in this study did not carry a DSM diagnosis of ADHD; therefore, it is possible that the findings for attention problems

may reflect a maternal perception bias, in which the mothers' perceived their children as less attentive because they were so disruptive. However, the opposite could also be true, in which mothers perceive their children as more disruptive because they are less attentive and more active. Overall findings from this one study of patterns of change in child disruptive behavior suggest that children with co-morbid inattention symptoms may not have different patterns of change. Children with co-morbid attention symptoms or ADHD may improve at faster rates than children with only disruptive behaviors, especially if the behaviors are secondary to their difficulty with paying attention and sitting still. The current study proposes to examine the effect of child ADHD on patterns of change to determine if differences exist in the rates of change between children with and without ADHD.

Parent Factors

The effects of parent factors such as maternal depression and parenting stress have been examined as predictors of therapeutic change in treatment and dropout. Maternal depressive symptoms have predicted reduced responsiveness to treatment in children with disruptive behaviors (Kazdin, 1995; Kazdin & Wassell, 1999; Webster-Stratton & Hammond, 1990). Webster-Stratton and Hammond (1990) found that high levels of maternal depression predicted more negative parental perceptions of child adjustment at post-treatment. Kazdin and colleagues (Kazdin, 1995; Kazdin & Wassell, 1999, 2000) found that greater parent psychopathology predicted less therapeutic change in child disruptive behavior from pre to post-treatment. In the another study examining the relation between treatment completion and therapeutic change, Kazdin and Wassell(1998) found that children who responded favorably to treatment had parents who were less depressed compared to children who did not respond favorably to treatment.

Studies have also examined the effect of child therapy on parent outcomes. Kazdin and Wassel (2000) examined whether parent outcomes improved during treatment of children with

disruptive behaviors. They predicted that parent functioning, including maternal depression, would improve over the course of treatment, given the bidirectional, reciprocal and interdependent relationship between parent factors and child disruptive behaviors (Munson et al, 2003). They found that levels of maternal depression significantly decreased from pre to post-treatment and that the magnitude of therapeutic change was small to medium. These improvements in maternal depression were not a result of an enhanced component. Families received standard forms of treatment, yet improvements in child symptoms were correlated with improvements in maternal depression, providing support for the relation between changes in maternal depression and changes in child disruptive behavior during treatment.

Sanders and McFarland (2000) did include an enhanced component specifically designed to treat symptoms of depression in mothers, in addition to treating child disruptive behaviors. Mothers and children in both forms of behavioral family intervention (BFI and cognitive BFI) demonstrated both statistically and clinically significant improvements in depression and disruptive behavior at post-treatment. Though there were no differences between treatment conditions, Sanders and McFarland found that a larger percentage of mothers and children who participated in the enhanced component demonstrated clinically significant and reliable concurrent change in maternal depression and child disruptive behaviors, again supporting an association between changes in maternal depression and changes in child disruptive behavior.

In an earlier PCIT study, mothers who were experiencing severe parenting stress were more likely to drop out of PCIT (Werba, Eyberg, Boggs, & Algina, in press). Kazdin and colleagues also examined the effects of parenting stress on therapeutic change and found that high levels of parenting stress predicted increased risk for premature dropout from treatment (Kazdin, Mazurick, and Bass, 1993), as well as predicted less therapeutic change for families

who completed treatment (Kazdin and Wassell, 1999, 2000). In a study examining predictors of early versus late dropout from treatment, Kazdin and Mazurick (1994) found that parenting stress differentiated between families who dropped out of treatment early (completed fewer than six sessions) and families who completed treatment, with early dropouts reporting greater levels of stress compared to completers.

In 2003, Kazdin and Whitley published results of a study examining the effect of an enhanced component designed to treat parenting stress while treating child disruptive behaviors. Though they found no significant differences in change in parenting stress or child disruptive behavior between families who received the enhancement and those who did not, they did find that families who received the enhancement experienced greater reductions in parenting stress over the course of treatment. Families who received the enhancement also demonstrated greater change in child disruptive behaviors compared to families who did not receive the enhancement. These findings match results from a previous study that demonstrated small to medium effects in changes in parenting stress during the course of treatment without enhancements (Kazdin and Wassell, 2000) and provide support for associations between changes in parenting stress and changes in child disruptive behavior.

Lack of maternal social support has also been associated with less change in treatment. Dumas and Wahler (1983) examined maternal insularity, defined as number of community contacts, and found a steady increase in the probability of treatment failure under conditions of maternal insularity. However, recent studies have demonstrated associations between improvements in social support during treatment and improvements in child disruptive behaviors. Harwood and Eyberg (2004) examined predictors of change in mother-child functioning during the Child Directed Interaction phase of PCIT. They found that pre-treatment

ratings of adequate maternal social support predicted greater improvements in mother-child functioning from start to end of CDI in PCIT. Kazdin and colleagues (Kazdin & Wassell, 2000; Kazdin & Whitley, 2003) found that mothers' ratings of perceived social support significantly improved from pre- to post-treatment in their studies, with improvements in social support (and other variables of parent and family functioning) associated with improvements in child disruptive behavior during treatment. Overall, findings from these studies suggest a relation between changes in child disruptive behavior and changes in maternal social support.

In a study examining patterns of change in child disruptive behavior, Hartman et al. (2003) did not find pre-treatment levels of maternal depression or parenting stress to predict different patterns of change in child disruptive behavior during treatment. They noted that the lack of significant findings for depression and stress could have been due to the minimal levels of depression and stress reported by mothers at pre-treatment in their sample. Fourteen percent of their sample of mothers reported mild depressive symptoms and 4% fell within the moderate range. The remaining 72% of mothers rated minimal symptoms of depression, and only 1% of the sample reported negative life events within the clinical range. Hence their lack of significant findings was likely related to the fact that mothers in their sample were not severely depressed or stressed.

Taken together, findings from studies reviewed here suggest a relation between parent factors and therapeutic change, as well as dropout from therapy. Greater levels of maternal depression and parenting stress , as well as low levels of maternal support, are associated with less change in therapy and greater risk for dropout, particularly early on in treatment. However, evidence from studies of therapeutic change reviewed here suggests that treatment also has a positive effect on parent factors, with changes in maternal depression and stress associated with

changes in child disruptive behavior for families who remain in treatment (Kazdin & Wassell, 2000). This study aims to further investigate the nature of the associations between changes in maternal depression and changes in parenting stress and child disruptive behavior during treatment and to determine whether differences in patterns of change in parenting stress can predict change in specific child and parent outcomes, including changes in attachment, perceived social support, and dropout from PCIT.

Family Factors

Family variables, such as socioeconomic disadvantage and perceived barriers to treatment, have also emerged as significant predictors of negative treatment progress and premature termination. Dumas and Wahler (1983) found that low socioeconomic status (SES) increased the probability of treatment failure in a sample of mothers seeking help with their children's oppositional behavior. Webster-Stratton and Hammond (1990) found similar results in their sample of mothers and fathers involved in parent training for their children's behavior problems, with low SES predicting poorer long-term outcome.

Recent studies have continued to link socioeconomic disadvantage to dropout and lower rate of change in treatment (Kazdin, 1995a; Webster-Stratton & Hammond, 1990). Kazdin and Wassell (1998, 1999) examined the association between treatment completion and therapeutic change in the context of child, parenting, and family risk factors known to predict dropout in treatment. In their sample of 3- to 13-year-olds referred for outpatient treatment of disruptive behavior, they found that greater socioeconomic disadvantage predicted less therapeutic improvement both in child disruptive behavior and in parent functioning (depression and stress) from pre- to post-treatment.

Hartman et al. (2003) examined the effect socioeconomic status on patterns of change in child disruptive behavior during treatment and found that SES did not predict different rates of

change in child disruptive behavior during treatment. They did find SES to predict differences in severity of disruptive behaviors at pre-treatment, with children from more disadvantaged families exhibiting greater levels of disruptive behaviors; however children changed at similar rates during the course of treatment.

Socioeconomic disadvantage has been linked to a greater number of perceived barriers to treatment participation (Kazdin & Wassell, 1998). Studies have shown that families who report a high number of barriers to treatment participation show less therapeutic change in both child disruptive behaviors and parent functioning (depression and stress; Kazdin & Wassell, 1999). Families who report high number of barriers are also at higher risk for dropout (Kazdin, Holland, & Crowley, 1997) and have poorer treatment attendance (more canceled, no-show, or late arrival appointments; Kazdin & Wassell, 1998). Families who drop out of treatment tend to perceive treatment as more demanding and less relevant compared to families who complete, and they tend to report less alliance and bonding to the therapist (Kazdin & Wassell, 1998).

Given results from studies reviewed here, family factors are significant predictors of therapeutic change and dropout from treatment. Though Hartman et al. (2003) returned non-significant findings for SES in their sample, the evidence from other studies of therapeutic change implicate SES as an important predictor of change; hence, it will be included as a predictor of patterns of change in child disruptive behavior and parenting stress in this study to determine if differences exist in this sample. Treatment protocol for the larger study from which the data for this study comes included components within each treatment session to address potential barriers to participation in treatment, which have been shown to adversely affect therapeutic change and treatment completion in past studies reviewed above. Hence, ratings of

perceived barriers to participation in treatment will be examined as a predictor of patterns of change in child disruptive behavior and parenting stress as well.

Summary

The literature on child, parent, and family factors that affect change in treatment and dropout is extensive; however, a limited number of studies exist that have examined the effect of these factors on patterns of change in child disruptive behavior and parenting stress during treatment and whether patterns of change in child disruptive behavior and parenting stress can predict specific child, parent, and family outcomes, including dropout. This study aims to examine patterns of change in child disruptive behavior and parenting stress, through application of multilevel modeling statistical procedures, and investigate the effects of certain child, parent, and family predictors on patterns of change during PCIT. Child predictors of patterns of change to be investigated include gender and diagnosis of ADHD. Maternal depression will also be examined as a predictor of patterns of change, specifically changes in maternal depression from pre- to mid- to post-treatment predicting changes in child disruptive behavior and parenting stress. Family predictors of patterns of change include SES and barriers to participation in treatment.

A secondary aim of this study is to determine whether patterns of change in child disruptive behavior and parenting stress predict change in specific child and parent outcomes. Pattern of change in child disruptive behavior will be examined as a predictor in change in attachment and change in perceived maternal social support from pre- to post-treatment. Patterns of change in parenting stress will be examined as a predictor in change in attachment and change in child disruptive behavior. Finally, patterns of change in child disruptive behavior will be examined as a predictor of dropout from PCIT. Prior to discussion of specific hypotheses, a review of Parent Child Interaction Therapy is first discussed below.

Parent Child Interaction Therapy

Parent Child Interaction Therapy (PCIT) is an evidence-based treatment specifically designed to address behavior problems commonly seen in children with disruptive behavior disorders (ODD, CD) and ADHD. The behaviors associated with these disorders are the ones most commonly referred to child mental health services (Kazdin, Siegel, & Bass, 1990). PCIT is based in developmental theory and draws from both attachment theory and social learning theory in its principles of change.

PCIT aims to change parent-child interactions by promoting more optimal styles of parenting. Baumrind's (1967, 1991) developmental theory proposed three styles of parenting that resulted in better or worse outcomes for children. She later reformulated her theory along two dimensions of parent responsiveness and parent demandingness. The authoritative parenting style, under this new typology, was one in which parents are both highly demanding and highly responsive. Baumrind's research and subsequent studies have consistently found an association between specific parenting styles and child behavior problems (Azar & Wolfe, 1989; Calzada & Eyberg, in press; Olson, Bates, & Bayles, 1990). Based on these findings, PCIT focuses on changing maladaptive parent-child interactions into ones reflecting an authoritative parenting style. It draws on both attachment theory and social learning theory in its principles of change and utilizes a behavioral approach to change parent child interactions.

Attachment theory asserts that children whose parents respond to them reciprocally and with nurturance are more likely to develop a secure attachment to their parents, leading to positive social, emotional, and behavioral outcomes. Conversely, children whose parents are intolerant and unresponsive to their child's need and distress are more likely to develop a maladaptive, or insecure, attachment to their parents. Maladaptive attachments have been associated with the development of disruptive behavior in children (, DeVito & Hopkins, 2001;

Fagot & Pears, 1996; Greenberg, Speltz, DeKlyen, & Endriga, 1992). The combination of maladaptive parent-child attachment and poor parenting practices has been consistently linked to the severity of disruptive behavior (Patterson, 1982; Loeber & Schmaling, 1985). Therefore, the first phase of PCIT, the child-directed interaction phase (CDI), focuses on developing a secure parent-child relationship. Parents are coached to use skills that restructure the play interaction in ways designed to create a secure attachment. Social learning theory emphasizes the contingencies that shape the dysfunctional parent-child interactions seen in disruptive children and their parents. Patterson's (1982) coercion theory provides a transactional account of early conduct problems (Eyberg, Schumann, & Rey, 1988) in which children's behavior problems are inadvertently established or maintained by maladaptive parent child interactions. These coercive interactions between disruptive children and their parents are characterized by mutual and escalating aversive behaviors resulting from the attempts of both the parent and child to control each other's behaviors. Unhealthy patterns result when the parent either withdraws from the conflict, thereby reinforcing the child's disruptive behavior (crying, whining, yelling, or hitting), or engages in parenting practices that could harm the child. The second phase of PCIT, the parent directed interaction (PDI), aims to interrupt these coercive cycles by teaching the parents to be more consistent, firm, and clear in their limit setting. In PDI, the parents are taught specific behavior management techniques that work to establish consistent contingencies for child misbehavior in the context of a positive parent child attachment.

The goals of PCIT are (a) to improve the parent child attachment and (b) to improve parental behavior management skills. Each phase of PCIT begins with a teaching session, in which the skills are introduced and modeled for the parents. The teaching sessions are then followed by coaching sessions, in which the parents are coached on these skills over a bug-in-

the-ear-device as the therapist observes from an observation room behind a one-way mirror. In the CDI phase, parents are coached on a specific set of skills until they reach mastery criteria. Once they reach mastery criteria, they move on to the PDI phase of PCIT. Parents remain in PDI until the child's behavior has decreased to within the normal range and the parents' demonstrate mastery of the PDI skills.

In the CDI phase, parents learn to follow their child's lead in play and incorporate the PRIDE skills. Parents are coached to give positive attention to their children by praising their behavior, reflecting their statements, imitating and describing their play, and using enthusiasm. In the event their child misbehaves during the play, they are coached to ignore the negative behavior until it ceases. Through the application of differential social attention, parents teach their child that prosocial behavior is rewarded with their praise and attention while negative behaviors result in the removal of their attention. Parents are also directed to avoid behaviors that attempt to lead the play, such as asking questions, giving commands, and criticizing the child. These behaviors are conceptualized as potentially introducing negativity into the play, and the goal of CDI is to create or enhance a warm, secure parent-child relationship. In addition to practicing these skills in sessions, parents are asked to practice the PRIDE skills each day at home, which consists of a 5-minute "special time" during which the parent follows the child's lead in the play and uses only the PRIDE skills to communicate with the child. Parents are provided a handout to record how each home practice session goes.

Parents remain in CDI until they demonstrate mastery of the CDI skills. Mastery is defined by the number of PRIDE skills (, the number of labeled and unlabeled praises, reflective and descriptive statements) observed within a 5-minute coding period at the start of each session. To reach mastery criteria in CDI, parents must demonstrate (a) 10 behavioral descriptions, (b) 10

reflective statements, (c) 10 labeled praises, and (d) no more than 3 total questions, commands, or criticisms within the 5-minute coding period. Once the parents have met CDI criteria, they move on to the PDI phase of treatment. However, parents continue to practice CDI at home and the therapist continues to code and coach CDI prior to PDI in the latter sessions of PCIT should the parents' CDI skills fall below criteria.

The primary goals of PDI are to increase compliance and decrease inappropriate behaviors that do respond to ignoring or are too severe to ignore (, hitting, biting, being destructive with toys). In PDI, parents continue to give their child positive attention, but they now learn to give their child specific directions and to follow through consistently with either praise for compliance or time out for noncompliance. The therapist coaches the parents to give clear, direct commands ("Please hand me the truck in your hand.") rather than criticisms ("Don't you dare throw that truck.") or indirect commands that suggest compliance is optional ("Do you want to hand that truck to me?"). Parents are provided specific steps to follow once they have given a command that help them to avoid delay tactics and remain consistent until the child has obeyed the command.

In PDI, parents are taught a specific time-out procedure that provides them a standard, concrete set of steps to follow after they have given a command. The procedure has three levels: warning, chair, and time-out room. At each level, the child has the opportunity to obey the parent and end the time-out; however, the time-out does not end until the child obeys the parent's command and the parent reinforces the child's compliance with labeled praise. Once the parent gives the child a command, the PDI procedure begins. If the child obeys immediately, the parent is directed to reward the child with a warm and enthusiastic labeled praise for complying to the parent's command immediately. If the child does not obey immediately (within a 5-second

count), the parent is directed to issue a specific warning: “If you don’t [original command], then you will have to sit on the time-out chair.” If the child obeys the warning, then parent gives the child a labeled praise and the play continues.

If the child does not obey the warning (within the 5-second time limit), the parent is directed to take the child to the chair while calmly explaining, “You didn’t [original command], so you have to sit on the chair.” This statement serves to remind the child of the reason for punishment and reiterates the connection between noncompliance and a negative consequence. After placing the child on the chair, the parent says, “Stay on the chair until I tell you that you can get off.” This statement serves to establish the parent’s control during the time out procedure. The parent is directed to ignore all negative child behaviors that occur while the child is in time out. This can prove to be difficult for the parent as the child often engages in various forms of attention-getting behavior, such as emotional manipulation (, “I don’t love you anymore,” “My stomach hurts,” and “I’m sorry, I promise I’ll listen”) or negative physical behavior (, wetting pants). The child is required to sit on the chair for 3 minutes, plus 5 seconds of quiet at the end. These 5 seconds of quiet ensure that the child does not come away from the time out with the impression that his or her behavior on the chair was the cause for ending time out.

Once the 5 seconds of quiet has elapsed, the parent is instructed to walk over to the child and ask, “Are you read to [original command]?” If the child says no, begins to argue, or ignores the parent, the parent says, “All right, then stay on the chair until I tell you that you can get off.” The parent then immediately leaves the area of the chair and begins the 3-minute time period again. If the child indicates that he or she is ready to obey, either by saying “yes” or by getting off the chair in a compliant manner, the parent walks the child back to the task. The parent then

indicates to the child to obey the command (, pointing to the block that the child was originally instructed to put in its box). When the child obeys, the parent only gives a brief acknowledgement ("Fine."). Because the child had to be sent to timeout before complying, a labeled praise is not given. Instead, the parent follows up with another direct command. At this point, the child is likely to obey the command, allowing the parent the opportunity to give an enthusiastic labeled praise for minding immediately, to explain the reason that the child's compliance is good, and to return to a CDI.

In the event that the child does not remain in the chair during timeout, a back-up procedure is used to shape the child's behavior to remain in the chair. This back-up procedure is the time-out room, an empty room that is easily accessible from the playroom. In the home, parents are instructed to find a room at least 4 feet by 4 feet in size that can be lighted, to use as a time-out room. Common choices are utility rooms, bathrooms, or walk-in closets that can be cleared out for a few weeks.

If the child gets off the chair before the 3 minutes elapse, the parent is instructed to give a time-out room warning one time ever, saying, "You got off the chair before I told you that you could. If you get off the chair again, you will have to go to the time-out room." After the room warning, if the child leaves the chair again before the parent gives permission, the child goes to the time-out room. The parent says, "You got off the chair before I told you could, so you have to go to the time-out room." Once the child is in the room, the parent closes the door and begins the one-minute, plus 5 seconds of quiet, time period. After the time has elapsed, the child is escorted back to the chair and told, "Stay in the chair until I tell you that you can get off." The 3-minute time out on the chair then begins again. The purpose of the time-out room is to serve as a back-up time procedure used only to teach the child to remain on the time-out chair until given

permission to get off. If the child were allowed to get off the time-out chair without permission, the chair would be ineffective for use in the time-out procedure. The child must remain on the chair until the parent gives permission, by asking the child if he or she is ready to obey the original command.

After the parents have practiced and gained experience with the PDI procedure in session, they are directed to begin practicing the PDI at home, first in the context of their daily CDI home sessions. Specifically, parents begin practicing PDI at the end of the CDI special time, during which they direct the child in putting away the toys that were used during the play. As parents begin to feel confident following through with the PDI procedures at home, they are instructed to use direct commands at specific times throughout the day with the intent to follow through with a labeled praise if the child complies or the timeout procedure if the child does not comply. In treatment sessions, the parents' PDI skills are coded during the first 5 minutes to assess their progress toward mastery. If 75% of the parent's commands are given correctly and the parent follows through with praise or timeout correctly at least 75% of the time, then they have met mastery criteria for PDI.

Several studies have provided empirical support for the effectiveness of PCIT for treating children with disruptive behavior. Studies have compared PCIT to wait-list controls (McNeil, Capage, Bahl, & Blanc, 1999; Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998), classroom controls (McNeil, Eyberg, Eisenstadt, Newcomb, & Funderburk, 1991), modified PCIT (Nixon, Sweeney, Erickson, & Touyz, 2003), and group parent training (Eyberg & Matarazzo, 1980). Outcome studies in PCIT have evidenced changes in parents' behavior toward their children, including increased reflective listening, physical proximity, prosocial verbalization, and decreased criticism and sarcasm (Eisenstadt, Eyberg, McNeil, Newcomb, & Funderburk, 1993).

Significant improvements in parent psychopathology, personal distress, and parenting locus of control have been reported after PCIT as well (Schuhmann et al., 1998). The effects of PCIT have been found to generalize to untreated siblings (Brestan, Eyberg, Boggs, & Algina, 1997; Eyberg & Robinson, 1982), to other settings, such as school (McNeil et al., 1991), and across time (Boggs, Eyberg, Edwards, Rayfield, Jacobs, Hood, & Bagner, 2004; Funderburk et al., 1998; Eyberg et al., 2001; Hood & Eyberg, 2003).

The Schuhmann et al. (1998) study has been the largest PCIT outcome study to date. In the Schuhmann et al. study, following an initial assessment, 64 clinic-referred families of children with ODD were randomly assigned to an immediate treatment (IT) or wait-list control (WL) group. After treatment, parents in the IT group interacted more positively with their child and were more successful in gaining their child's compliance than parents in the WL group. Parents in the IT group also reported less parenting stress and a more internal locus of control than parents in the WL group. Both clinically and statistically significant improvements were reported in child behavior at the end of treatment. Families that completed treatment reported high levels of satisfaction with both the content and process of PCIT. Four-month follow-up data showed that gains were maintained on all parent-report measures.

Nixon, Sweeney, Erickson, and Touyz (2003) also conducted a large outcome study with 54 disruptive preschool children randomly assigned to one of three conditions: standard PCIT; modified PCIT or no-treatment waitlist control group. The modified PCIT used didactic videotapes, telephone consultations and face-to-face sessions to abbreviate treatment. Children were assessed at pretreatment, posttreatment, and at six-month follow-up. After treatment, mothers in the standard and abbreviated treatment groups reported less oppositional behavior, as measured by the ECBI, compared with the waitlist control group. Mothers in the standard

treatment group also reported less severe behavior problems in the home compared to waitlist controls, though mothers in the abbreviated group did not. Mothers in the standard and abbreviated groups praised their children more and gave fewer commands compared to waitlist controls during parent-child interactions. Additionally, mothers in the standard group also gave fewer criticisms and their children were more compliant compared to waitlist controls. Gains were maintained at 6-month follow-up and clinically significant reductions in number of maternal commands were also maintained in both the abbreviated and standard treatment groups.

Studies have also examined the generalization of treatment effects to the school setting. McNeil et al. (1991) examined the generalization of PCIT treatment effects from the clinic to the school setting in 10 children with disruptive behavior occurring both at home and in the classroom. Families received 14 weeks of PCIT, and no advice or direct classroom intervention regarding school misbehavior was provided. Both teacher ratings and school observational measures indicated significantly greater improvements in disruptive behavior for the treated group than a group of 10 normal controls and a group of 10 behavior problem controls drawn from the classrooms of the treated children. Results were less supportive for generalization on measures of hyperactivity and distractability. Nixon (2001), however, has demonstrated generalization of PCIT to measures of hyperactivity and temperament. He randomly assigned 34 families to either PCIT or a wait-list control group (WL) and compared them to a group of 21 nondisturbed preschoolers at post-treatment and at 6-month follow-up. At post-treatment, the PCIT preschoolers were reported by their mothers to have reduced hyperactivity and more flexible temperament and were less likely to meet criteria for ADHD than the WL group. At 6 months post-treatment, children in the PCIT group were comparable to children in the normal comparison group on measures of oppositional and hyperactive behavior.

Funderburk et al. (1998) conducted 12- and 18-month follow-up school assessments for 12 children, including those who had completed PCIT in the McNeil et al. (1991) study. At the 12-month follow-up, children in the treated group maintained post-treatment improvements in teacher ratings and observational measures of disruptive behavior and showed further improvements in social competency. They were indistinguishable from 72 randomly selected control children from their classrooms on measure of disruptive behavior and social competence. At the 18-month follow-up, children maintained their improvements in compliance but demonstrated declines on other measures into the pre-treatment range.

Generalization of PCIT to family functioning was found in a study conducted by Eyberg and Robinson (1982). In a sample of 7 families that completed PCIT, significant improvements were seen in several aspects of family functioning, as well as child behavior. Mothers showed less anxiety and pessimism, increased involvement and interest in others, and a greater degree of internal control after treatment. Maternal adjustment ratings also improved, as did observed behavior of the children's untreated siblings. Brestan, Eyberg, Boggs, and Algina (1997) examined parent perceptions of untreated siblings after PCIT compared to untreated families. After completing treatment, fathers rated the behavior problems of untreated siblings as occurring less frequently and mothers rated these behaviors as less problematic than ratings from untreated control families.

The effects of PCIT have been shown to last after treatment has ended. In a six-week follow-up of 14 families, all families maintained treatment gains on observation measures of child compliance, parent-rating scale measures of disruptive behavior, internalizing problems, activity level, maternal stress, and child self-report of self-esteem (Eisenstadt et al., 1993). At a 2-year follow-up with these families, parent ratings of child behavior problems, child activity

level, and parenting stress remained similar to post treatment levels, and most children remained free of disruptive behavior diagnoses (Eyberg et al., 2001). The magnitude of the effects in parent ratings of child disruptive behavior and parenting stress at 1- and 2-year follow up were large, ranging from 2.89 to .70, suggesting that the maintenance of gains from PCIT two years out is a legitimate finding. These parents also continued to report high satisfaction with the process and outcome of PCIT.

Boggs et al. (2004) compared outcomes for families who completed PCIT and those who dropped out of the Schuhmann et al. (1998) study. Families were located and telephone and mail assessments were conducted. Length of follow-up ranged from 10 to 30 months after initial treatment intake, with the average length of follow-up just under 20 months. Results indicated significantly poorer long-term outcomes for those who dropped out of treatment. Children and families that completed treatment maintained treatment gains over this period, whereas the dropouts showed disruptive behavior and parenting stress at pre-treatment levels.

Hood and Eyberg (2003) attempted to locate 50 families that had completed PCIT 4 to 6 years earlier. Of the 29 families that could be located, 23 participated in telephone and mail follow-up assessments of child disruptive behavior and parenting locus of control. Results indicated that the significant changes made during treatment were maintained for the children, now ages 6 to 12, and their mothers. Child behavior at post-treatment assessment and length of time since treatment were strong predictors of child behavior at long-term follow-up. The investigators found that children's disruptive behavior decreased with time since treatment.

One study has specifically examined predictors of dropout in PCIT. Werba et al. (in press) explored both observational and self-report data as predictors of treatment outcome and dropout. They found that mothers who were highly demanding during parent child interactions were more

likely to drop out of treatment prematurely. They also found that maternal distress at pretreatment (a composite score consisting of parent stress and depression) differentiated between treatment completers and dropouts, with dropouts having higher levels of maternal distress at pretreatment.

Taken together, findings from the above studies suggest that, despite success in changing both child and parent functioning, treatment outcome in PCIT is vulnerable to similar risk factors reported in other treatment outcome studies in children with disruptive behavior. Studies in PCIT have demonstrated that families who prematurely drop out of PCIT yield poorer outcomes, including child disruptive behavior and parenting stress returning to pretreatment levels (Boggs et al, 2004). One study specifically examined predictors of treatment outcome and dropout in PCIT and found that parent factors, particularly maternal distress and demandingness during play observations, were predictive of premature dropout from PCIT. The larger investigation from which this study was borne attempted to prevent attrition by implementing supportive components into treatment that specifically addressed potential barriers to participation in treatment. Therefore, examining the influence of child, parent, and family factors on therapeutic change and dropout in PCIT is particularly important to see if the supportive component was effective in retaining families in treatment.

Hypotheses

The main aim of this study is to examine the effects of child, parent, and family risk variables on the rate of change in child disruptive behavior and parenting stress during the course of an intervention specifically aimed at affecting change in processes and interactions that have inadvertently reinforced disruptive child behavior. Change in child disruptive behavior and parenting stress will be examined weekly to explore whether rate of change in each phase of treatment and across treatment as a whole in child disruptive behavior and parenting stress varies

by phase of treatment among families referred for disruptive behavior. Differences in rate of change in child disruptive behavior and parenting stress are expected between phases, as number of sessions in each phase of treatment differed from family to family. Certain families completed the CDI phase within five sessions while other families remained in the CDI phase for 10 or more sessions. Families also differed in number of sessions in the PDI phase, with some families graduating from PDI within five sessions and other remaining in PDI for more than 10 sessions. Families who completed each phase of PCIT in fewer number of session are expected to demonstrate steeper rates of change in comparison to families who required more sessions in each phase of treatment. Child, parent, and family risk factors are predicted to explain the differences in rates of change between the CDI phase and PDI phase of PCIT.

A secondary aim of this study is to investigate whether the patterns of change in child disruptive behavior and parenting stress predict change in treatment outcome and dropout in this study. Findings from previous studies (Kazdin & Mazurick, 1994; Pekarik, 1992) examining predictors of dropout from treatment found that early versus late dropout was distinguished by different sets of child, parent, and family predictors. Moreover, Pekarik (1992) found no differences in parent ratings of child disruptive behavior between completers and late dropouts in his sample, suggesting that late dropouts achieved similar gains in treatment as completers. Thus, early dropouts in this study are expected to show patterns of little to no change. Late dropouts are expected to show patterns of change indicative of improvement but at a slower rate when compared to completers.

Two sets of analyses are proposed for the current study. The first set will focus on examination of patterns of change in child disruptive behavior and parenting stress in each phase of PCIT and across treatment as whole, through application of the multilevel model approach.

The following child, parent, and family risk factors will be examined to determine their effect on patterns of change in each phase of treatment and across treatment as whole, in child disruptive behavior and parenting stress: child risk factors include: (a) presence of ADHD and (b) child gender; parent risk factor of interest is maternal depression; family risk factors that will be examined are: (a) socioeconomic status as measured by the Hollingshead Index, and (b) perceived barriers to participation in treatment reported by treatment completers at the posttreatment assessment.

Because premature dropout is a significant problem in child therapy, families who prematurely dropped out of treatment will be included in the multilevel model analysis. Multilevel modeling uses all available data for each participant, even when there are missing data at certain time points for a particular participant. Therefore, trajectories for dropouts will be possible to analyze in context of individual risk factors. It is recognized that only treatment completers have contributed on perceived barriers to participation in treatment; therefore that particular multilevel model analysis will only include data from families who completed treatment.

The second set of analyses will focus on investigating whether patterns of change in child disruptive behavior and parenting stress determined from the first set of analyses can predict change in treatment outcome, including early versus late dropout from treatment. A traditional linear regression approach will be applied to examine whether individual rates of change in child disruptive behavior and parenting stress predict change in four treatment outcome variables: (1) change in attachment security from pre- to post-treatment; (2) change in child disruptive behavior from pre- to post-treatment, (3) change in parenting daily hassles from pre- to post-treatment; and (4) change in maternal ratings of perceived social support from pre- to post-

treatment. A logistic regression approach will be applied to determine whether patterns of change in child disruptive behavior and parenting stress for dropouts can predict early versus late dropout from the study. Below are the hypotheses proposed for this study, organized by set of analysis.

Patterns of Change in Child Disruptive Behavior and Parenting Stress

Termination criteria require that a child be rated within the non-clinical range on a measure of child disruptive behavior (a raw score of 114 which is ½ a standard deviation below the normative mean). Therefore, it is expected that all completers will show improvements in child disruptive behavior over the course of PCIT. Individual differences in the rates of change in child disruptive behavior and parenting stress in each phase of treatment and across treatment as a whole are predicted:

- Hypothesis 1: Children with a co-morbid research diagnosis of ADHD are hypothesized to demonstrate greater changes in levels of child disruptive behavior and in parenting stress in the PDI phase than the CDI phase.
- Hypothesis 2: Children who are more securely attached at pre-treatment are hypothesized to make greater change in the CDI phase than the PDI phase.
- Hypothesis 3: A relationship between changes in maternal depression and changes in child disruptive and parenting stress are hypothesized. High levels of maternal depression at pre-, mid-, and post-treatment are expected to be associated with less change (flatter slope) in child disruptive behavior and parenting stress, whereas levels of maternal depression that decrease from pre- to mid- to post-treatment are expected to be associated with a decrease in child disruptive behavior and parenting stress durint PCIT.
- Hypothesis 4: Patterns of change for boys and girls will be examined separately to determine whether gender differences exist in patterns of change in child disruptive behavior and parenting stress during PCIT.
- Hypothesis 5: Families who retrospectively report a greater number of perceived barriers to participation in treatment are expected to show less change (flatter slope) in PCIT compared to families who report fewere barriers.
- Hypothesis 6: Children from socioeconomically disadvantaged homes are hypothesized to show flatter slope of change in child disruptive behavior during PCIT compared to children from less disadvantaged homes.

- Hypothesis 7: Mothers who are socioeconomically disadvantaged and retrospectively report greater number of barriers to participation in treatement are hypothesized to show a flatter slope of change in parenting stress during PCIT, compared to mothers whoe report fewer barriers and are not socioeconomically disadvantaged.

Predicting Treatment Outcome from Patterns of Change in Child Disruptive Behavior and Parenting Stress

- Hypothesis 1: Children who show steeper patterns of change in child disruptive behavior in CDI than PDI will show greater change in attachment security from pre- to post-treatment.

- Hypothesis 2: Children who show steeper patterns fo change in child disruptive behavior during PCIT will show greater change in maternal ratings of parenting stress from pre- to post-treatment, compared to children who show flatter slopes during PCIT.

- Hypothesis 3: Mothers who show steeper patterns of change in parenting stress related to perceptions of child as difficult to manage during CDI than PDI will show greater change in attachment security from pre- to post-treatment.

- Hypothesis 4: Mothers who show steeper patterns of change in parenting stress related to dysfunctional parent child interactions and perceptions of child as difficult to manage in PCT will show greater change in child disruptieve behavior from pre- to post-treatment.

- Hypothesis 5: Mothers who show steeper patterns of change in parenting stress related to dysfunctional parent child interactions and distress related to parenting role during PCIT will show greater change in maternal ratings of perceived social support from pre- to post-treatment.

Predicting Early versus Late Dropout in PCIT from Patterns of Change

- Hypothesis 6: It is hypothesized that families who demonstrate flatter patterns of change in child disruptive behavior, parenting stress related to dysfunctional parent child interactions, and prenting stress related to perceptions of having a difficult child will be more likely to drop out of treatment in the CDI phase.

Table 1-1 DSM-IV-TR Criteria for ADHD	
Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder	
Either (1) or (2): six or more of the following symptoms persisting at least 6 months to a degree which is maladaptive and inconsistent with developmental level	
Inattention	**Hyperactivity-Impulsivity**
Often fails to give close attention to detail	Often fidgets with hands or feet or squirms in seat
Often has difficulty sustaining attention in tasks or play activities	Often leaves seat in classroom or in other situations in which remaining in seat is expected
Often does not seem to listen when spoken to directly	Often runs about or climbs excessively in which it is inappropriate
Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace	Often has difficulty playing or engaging in leisure activities quietly
Often has difficulty organizing tasks and activities	Is often “on the go” or often play acts as if “driven by a motor”
Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort	Often talks excessively
Often loses things necessary for tasks or activities	Often blurts out answers before questions have been completed
Is often easily distracted by extraneous stimuli	Often has difficulty awaiting turn
Is often forgetful in daily activities	Often interrupts or intrudes on others

CHAPTER 2
METHOD

Participants

Participants were 100 boys and girls between the ages of 3 and 6 years who were enrolled in a larger treatment outcome study of PCIT. Inclusion criteria in the larger study included meeting diagnostic criteria for a DSM-IV diagnosis of Oppositional Defiant Disorder and living with at least one parent able to participate in treatment. A diagnosis of ODD was determined by a combination of the Diagnostic Interview Schedule for Children (DISC) criteria for ODD and a Child Behavior Checklist (CBCL) aggression scale cutoff score of $T \geq 61$. Both child and parent were also required to obtain a standard score (SS) of 75 or higher on a cognitive screening measure. Children with a history of severe sensory or mental impairment (e.g., deaf, blind, autistic) were excluded from the study. However, children who had been stable on a psychoactive medication for a 30-day period prior to screening and who did not plan to change their medication regimen during treatment were included. Children diagnosed with co-morbid childhood disorders, such as ADHD, CD and Separation Anxiety Disorder, were not excluded from the study.

Thirty-one girls and 69 boys were enrolled in the study. Sixty-four families completed treatment, and 36 families dropped out of treatment. Mean ages for all participants are as follows: children (n = 100), 4.8 years (range 3 to 6 years); mothers (n = 100), 35 years; and fathers (n = 54) 38 years. Eighty-one percent of children are identified as white, 7% are identified as black, and 10% are identified as bi-racial and 2% as Hispanic. Eighty-two percent of mothers and 51% of fathers identified themselves as white. Of the mothers and fathers who participated in treatment, 57% and 91%, respectively, were married. Seventeen percent of the mothers were single, another 17% were divorced, and 6% were separated.

Measures

Demographic Questionnaires

Parent questionnaires were used to collect demographic information about the child and family including age, gender, ethnicity, parent occupation and education, and marital status. These questionnaires were filled out by mothers and fathers at the pre-treatment evaluation.

Child Cognitive Status

The *Peabody Picture Vocabulary Test – Third Edition* (PPVT-III; Dunn & Dunn, 1997) is a well-standardized test that measures receptive language in individuals, ages 2.6 years through adulthood. Raw scores are converted to standard scores (SS) with a mean of 100 and a standard deviation of $\pm$ 15. Split half reliability coefficients for children range from .86 to .97, with a median of .94. Test-retest reliabilities range from .91 to .94. The correlation between the PPVT-III and the WISC-III Full Scale IQ is .90. The standard score of the PPVT-III was used to determine a child's eligibility to participate in the larger study.

Parent Cognitive Status

The *Wonderlic Personnel Test* (WPT; Dodrill, 1981) is a 51-item test designed as a screening scale of adult's intellectual abilities. The test score is the number of items answered correctly in 12 minutes. In a sample of 120 normal adults, the Wonderlic estimate of intelligence correlated .93 with the WAIS Full Scale IQ score, and the Wonderlic score was within 10 points of the WAIS IQ score for 90% of the participants. Sex, education, level of intelligence and emotional adjustment were not found to affect the observed correlations. These findings were replicated by Dodrill and Warner (1988) and have been extended to psychiatric (Hawkins, Faraone, Pepple, & Seidman, 1990) and academic settings (McKelvie, 1989). The Wonderlic standard score was used to determine parent eligibility to participate in the study.

Outcome Variables

Patterns of Change

Child Disruptive Behavior: The *Eyberg Child Behavior Inventory* (ECBI; Eyberg & Pincus, 1999) a 36-item parent rating scale of disruptive behaviors in children between the ages of 2 and 16, will be used to measure changes in child disruptive behavior over the course of treatment. It contains two scales: The Intensity Scale measures the frequency of children's behavior on a 7-point scale from (1) *never*, to (7) *always,* and the Problem Scale measures the degree to which the child's behaviors are problematic for the parent on a *yes-no* scale. The Intensity and Problem Scales of the ECBI have shown internal consistency coefficients of .95 and .93; inter-rater (mother-father) reliability coefficients of .69 and .61; and test-retest reliability coefficients of .80 and .85 across 12 weeks. Cronbach's alpha for the sample in this study was .82 for the Intensity Scale.

Treatment outcome results from several studies have shown the ECBI to be a sensitive measure of treatment change in clinic-referred children (Webster-Stratton & Hammond, 1997). A recent study (Funderburk, Eyberg, Rich, & Behar, 2003) examined test-retest reliability of the ECBI across a longer interval (10 months) in an untreated school sample and yielded reliability estimates of .75 for both Intensity and Problem scales. In addition, paired –*t*-tests showed that scores were as likely to decrease as to increase over time for the intensity score. Demonstration of long-term stability of the ECBI provides evidence of measurement stability over longer periods of time and provides reassurance that changes in ECBI scores over time reflect meaningful change rather than measurement error.

The ECBI was administered at the pre-treatment evaluation and at the beginning of each session during the course of treatment. The ECBI was also used as a criterion measure to determine a family's readiness to complete treatment. The completion criterion for graduation

was an Intensity Scale raw score of $\leq$ 114, which is ½ a standard deviation (*SD*) above the normative mean (Colvin, Eyberg, & Adams, 1999). Intensity Scale raw scores collected at each session will be used to examine patterns of change in children's disruptive behavior over the course of treatment.

Parenting Stress. The short form of the *Parenting Stress Index* (PSI-SF; Abidin, 1995) is a 36-item parent self-report scale containing three factor-analytically derived subscales (Parental Distress, Parent-Child Dysfunctional Interaction, and Difficult Child). The short form subscales have shown Cronbach's alphas of .80 to .91 and 6-month test-retest reliabilities of .68 to .85. On the long form of the PSI, higher scores have been associated with increased severity of conduct-disordered behavior (Eyberg, Boggs, & Rodriguez, 1992; Ross, Blanc, McNeil, Eyberg, & Hembree-Kigin. 1998). The PSI-SF was collected at the pre-treatment evaluation and at each treatment session.

Change in Parent and Child Outcomes

Change in Child Behavior Problems. The Child Behavior Checklists (CBCL/2-3; Achenbach, 1992 and CBCL 4-18; Achenbach, 1991a) were administered at the pre-treatment evaluations and the CBCL aggression scale on both forms was used to determine a research diagnosis of ODD.

The CBCL/4-18 is a comprehensive instrument designed to assess the frequency of a variety of child behaviors during the past 6-month period. It consists of 118 behavior-problems items rated by the parent on a 3-point scale from (0) not true, to (2) very true or often true. The CBCL/2-3 is similar in format to the CBCL/4-18 and consists of 99 items. Both questionnaires include factor analyzed narrow band scales (e.g., Anxious/Depressed, Delinquent, and Aggressive) and two broadband scales of externalizing and internalizing behavior problems.

The broadband problem scales of the CBCL/4-18 have mean test-retest reliabilities of .89 and .75 over a one-week and one-year period, respectively. Test-retest reliability for the CBCL/2-3 has been reported to range from .79 to .92 for the problem scales over a one-week period and .56 to .76 over a one-year period (Crawford & Lee, 1991). The pre-treatment CBCL Externalizing T score will be subtracted from the post-treatment CBCL Externalizing T score to obtain a change score for each child. The CBCL Externalizing change score will be examined as an outcome variable in the regression analyses.

Change in Maternal Stress. The *Parent Daily Hassles* (PDH; Crnic & Greenberg, 1990) is a 20-item self-report questionnaire measuring stressful events in parenting and parent-child interactions. Parents rate the frequency, degree, and intensity of each hassle. The Frequency and Intensity scales have internal consistency coefficients of .81 and .90. The authors found that the cumulative effects of relatively minor stresses were important predictors of conduct-disordered behavior in a non-referred sample. Greater mother-reported hassles have also been related to greater difficulty managing toddler behavior (Belsky, Woodworth, & Crnic, 1996). The pre-treatment PDH intensity scale will be used to measure level of maternal stress and it relationship with rate of change in child disruptive behavior.

Change in Maternal Perceived Social Support. The *Multidimensional Scale of Perceived Social Support* (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1998) is a 12-item self-report questionnaire designed to assess the perceived adequacy of social support from family, friends, and significant others. Items are scored on a 7-point scale that ranges from "very strongly disagree" to "very strongly agree". Cronbach's alpha for the three subscales ranges from .85 to .98 in various samples (Dahlem, Zimet, & Walker, 1991). Internal reliability for the total score has ranged from .80 to .92. Test-retest reliability over three months ranged from .72

to .85 for the subscales and was .85 for the total scale. Factor validity has been demonstrated for the three-subscale factor structure and concurrent validity for two of the three subscales has been shown. The pre-treatment maternal ratings of total perceived social support will be used to examine the effect of perceived social support on the rate of change in child disruptive behavior and parenting stress over the course of treatment.

Change in Attachment Security. The Attachment Q Sort task was used to assess the quality of attachment between mother and child, as rated by the mother, at pre-, mid- and post-treatment. The Q sort consists of a 90 cards that describe a specific behavior characteristic of children between the ages of 12 months to 4 years of age. Mothers were asked to consider their child's typical behavior and rate their child on each specific behavior by sorting the card into one of several piles ranging from "most like my child" to "least like my child." The mothers were asked to complete three different sorts. In the first sorting task, mothers were able to put as many cards in a particular pile, based on their observations of their child's behavior. They were then asked to resort the cards again, placing the card in the pile they felt most appropriately described their child. In the final sort, mothers were limited to the number of cards they could put in each pile (10 cards per pile with 9 piles total). Mothers' sorting were then compared to an ideal prototypical secure child derived from expert sorting and rated a score from -1 to +1. The Q sort score is a correlation indicating the strength of the relationship between the profile derived from the mothers' sort and the ideal profile and it reflects the similarity of the rated child's profile to the ideal secure child profile.

In a meta-analytic study examining the reliability and validity of the attachment Q sort measure across 139 studies and 13,835 children, van Ijzendoorn and colleagues (van Ijzendoorn, Vereijken, Bakermans-Kranenburg, and Riksen-Walraven, 2004) found adequate convergent

validity (r = .23) with the strange situation paradigm and discriminant t validity (r = .16) with a measure of temperament. They also found that average ratings of attachment were .10 points higher in clinical samples (.31) compared to normative samples of children (.21). It is important to note that these findings were based on observer ratings rather than self-report ratings, which demonstrated weak convergent reliability to the strange situation paradigm (r = .16) and poor discriminant validity from a measure of temperament (r = .36).

Change in Q sort was examined as an outcome, based on patterns of change in child disruptive behavior and parenting stress in CDI and PDI. Pre-treatment scores were substracted from post-treatment scores to obtain change scores.

Treatment Completion, Early versus Late Dropout. Patterns of change in child disruptive behavior and parenting stress will be examined as predictors of treatment completion and premature termination. Treatment status and dropout status were coded dichotomously (0 = dropout, 1 = completer and 0 = CDI dropout and 1 = PDI dropout).

Predictors of Patterns of Change

Child Factors

Child co-morbidity: The *Diagnostic Interview Schedule for Children* (NIMH DISC-IV-P; Shaffer, Fisher, Dulcan, Davies, Piacentini, Schwab-Stone, Lahey, Bourdon, Jenson, Bird, Canino, & Reiger, 1996) is a structured diagnostic interview for administration to parents. It includes all common disorders of children in accordance with the DSM-IV that are not dependent on specialized observations or test procedures. Individual modules can be administered separately. One-week test-retest reliability on administration to parents of 9 to 17 year old children has been reported at .79 for ADHD, .54 for ODD, and .54 for CD (Fischer, Rolf, Hasazi, and Cummings, 1998). A comorbid diagnosis of ADHD will be examined as child

factor to test whether a co-morbid diagnosis of ADHD influences the rate of change in child disruptive behavior over the course of treatment.

Child gender: Child gender will be examined as a dichotomous predictor in the multilevel models of change in child disruptive behavior and parenting stress. Boys were assigned a value of 0 and girls assigned a value of 1.

Parent Factors

Maternal Depression: The *Beck Depression Inventory-II* (BDI-II; Beck, Steer & Brown, 1996) is a 21-item self-report scale of adult depressive symptomatology. The BDI-II was modified from its previous version to make it more consistent with the DSM-IV criteria in item content and time frame. Severity of depression can be scored according to four levels: minimal (0-13), mild (14-19), moderate (20-28) and severe (29-63) (Beck, Steer, Ball, & Ranieri, 1996). Internal consistency (.91) and one-week test-retest reliability (.93) have been reported for the BDI-II. The BDI was collected a pre-, mid-, and post-treatment. These ratings will be entered as a co-varying predictor to determine whether changes in maternal depression across PCIT were associated with patterns of change in child disruptive behavior and parenting stress.

Family Factors

Socioeconomic Status: Socioeconomic status (SES) will be calculated according to the *Hollingshead Index of Social Status* (Hollingshead, 1975). The Hollingshead index is computed according to a four-factor index that includes parent educational attainment and occupation. Pre-treatment SES was entered into the multilevel model as a predictor of patterns of change in child disruptive behavior and parenting stress.

Perceived Barriers to Participation in Treatment. The *Barriers to Participation in Treatment Scale* (BTPS; Kazdin, Holland, Crowley, & Breton, 1997) assesses perceived barriers to attending and completing treatment. The 52-item scale can be administered in person or by

telephone. Items can be divided into four subscales, including (a) stressors and obstacles that compete with treatment, (b) treatment demands and issues, (c) perceived relevance of treatment, and (d) relationship with the therapist; however, results from a preliminary factor analysis found that most items loaded onto a single factor of perceived barriers. Therefore, only a total score will be calculated for this study. Internal consistency for the total barriers score for the parent-completed BTPS was .86. In other studies, the BTPS has predicted higher rates of attrition, fewer weeks in treatment, and higher rates of cancellations and no shows (e.g., Kazdin & Wassell, 1998). Ideally, differences between completers and dropouts should be examined; however, few dropouts have returned the BTPS. Therefore, relationships between the BTPS total score with rate of change over the course of treatment will be examined in completers.

Procedures

Families were referred to the Child Study Laboratory from the University of Florida Health Science Center Psychology Clinic. Primary referral sources included pediatric neurology, child psychiatry, and general pediatric practices. Families were also referred from community mental health practitioners and preschools. A few families were self-referred. Before their first evaluation appointment, each family was sent a welcome packet that included directions to the Health Science Center, a parking pass, and a demographic questionnaire. At the first of two pretreatment assessment visits, informed consent was obtained from all families and the limits of confidentiality were reviewed. Parents and children were then screened to determine if they met inclusion criteria. Screening measures included the aggression scale of the CBCL, which was scored to determine the first of the combination criteria necessary for a research diagnosis of ODD. If the CBCL aggression score was at or above a *T* score of 61, the family proceeded with the screening. Clinical and structured diagnostic interviews were completed, and the assessor determined if the child met DSM criteria for a diagnosis of ODD. The parent and the child were

then administered a cognitive screening measure, which required a SS of 75 or higher. If a family failed to meet any of the inclusion criteria (CBCL aggression scale T score ≥ 61, DISC ODD diagnosis, and cognitive screening standard scores ≥ 75), they were referred back to the Psychology Clinic.

During the pre-treatment evaluation, multiple measures of child, parent and family functioning were collected. During the structured diagnostic interview, used in screening, information was also obtained on four additional Axis 1 disorders: Attention Deficit Hyperactivity Disorder (ADHD), Separation Anxiety Disorder (SAD), Conduct Disorder (CD) and Major Depressive Disorder (MDD). The first assessment visit also included observations of the parent-child interaction in three structured play situations. In between the first and second pre-treatment evaluations, the family was contacted by telephone over five consecutive days to obtain daily diary information on behavior problems and discipline and to administer several questionnaires. For children enrolled in school, school evaluation was conducted also during the pre-treatment evaluation and consisted of direct behavior observations in the classroom and administration of teacher questionnaires. During the second evaluation appointment, parents were administered a structured interview of prior service utilization, including medication management, other forms of child or family therapy, and school services such as individualized education plans and special classroom placement. The mother was also administered a card sorting task to assess the child's attachment, and another set of parent child interaction observations was conducted.

A mid-assessment evaluation was conducted between the CDI and PDI phase of treatment. The mid-assessment evaluation included administration of the card-sorting task to assess the child's attachment after CDI and parent questionnaires, including the BDI and other measures

not examined in this study. At the completion of treatment, families underwent the post-treatment evaluation, which was similar in structure and content to the pre-treatment evaluations, including clinical interview, diagnostic interview, play observations, school observations if the child was in school at pre-treatment, and parent questionnaires and rating scales.

Once families completed the pre-treatment evaluation, they began treatment. Families remained in treatment until (a) parents met both CDI and PDI criteria, (b) the ECBI Intensity raw score was $\leq$ 114, (c) children were rated by parents as meeting fewer than 4 ODD symptoms on the DSM-IV ODD Rating Scale, and (d) parents felt ready and confident to end treatment. If these completion criteria were met, the family graduated from treatment and moved into the post-treatment evaluation and follow-up phase of the study. The length of time (as measured by number of total treatment sessions) to complete treatment in this study varied from as few as 9 sessions to as many as 31 sessions. On average, families completed PCIT in 17 sessions, progressing through CDI in 6 sessions (range 3 to 14 CDI sessions) and PDI in 11 sessions (range 5 to 24 PDI sessions).

Analyses

Descriptive Statistics

Characteristics of the sample will be analyzed and descriptive statistics will be reported for child, mother, family, and treatment variables to be analyzed in this study. Mean and standard deviations will be reported for participant characteristics (child and mother age, mother education, family socioeconomic status, child and mother cognitive abilities as measured by screening tools used in the study). Relationships among the rredictor and treatment outcome variables will be explored and reported, in addition to their means,standard deviations, and distributions (skewness/kurtosis). Frequencies will be reported for the following child and mother characteristics: racial/ethnic make-up of the sample, child gender, mother marital status,

child research diagnoses, treatment status, and children taking prescribed psychotropic medication.

Reliability

Sampling reliability statistics will also be reported for the ECBI Intensity Scale and the four PSI-SF scales. Sampling reliability in multilevel modeling is a measure of how reliable the measurements or scores of child disruptive behavior and parenting stress are within each person over time. Generally speaking, sampling reliability improves as variation between participants increases, variation within participants decreases, and the number of occasions of measurements increases. Reliability estimates provided by the multilevel modeling software range between 0 and 1, with estimates closer to 1 indicating adequate sampling reliability of measurements taken for each participant.

Analysis of Change

To model change in child disruptive behavior and parenting stress over the course of treatment, a multilevel model approach will be used to analyze the session-by-session data collected over the course of treatment. More specifically, a random regression coefficient (RRC) model will be used to examine the session-by-session data. These session-by-session data include the Intensity scale raw score on the ECBI and the four subscale *T* scores on the PSI-SF (PSI-SF Total, Parenting Distress subscale, Parent Child Dysfunctional Interaction subscale, and Difficutl Child subscale). Prior to specifying the occasion-specific (level-1) and person-specific (level-2) RRC models that will be used to examine change in PCIT, methodological challenges particular to this study will be discussed, namely, the unbalanced design of the study.

Dealing with the Unbalanced Design

A balanced design refers to a study in which all occasions of measurement are equally spaced apart and all participants have an equal number of measurements with no missing data

points. For example, a longitudinal study assesses participants at baseline, 3 months, 6 months and 12 months, and all participants are assessed at each data point. An unbalanced design is the opposite, in which the occasions of measurement are unequal between participants and participants vary in number of measurements, therefore leading to "missing" data. The design of this study is unbalanced, as spacing between occasions of measurement are unequal among participants, number of occasions varies between participants, and participants are missing data for certain data points.

As is the case in most treatment studies, data for a particular participant at a particular time point may not be available for various reasons. A therapist may have forgotten to administer an ECBI at a given session or a parent may have forgotten to fill out the backside of the questionnaire. Fortunately, multilevel modeling uses all available data for each participant; therefore, participants with missing data will be included in the analysis.

Data for a participant may also be missing due to premature dropout from the study. A type of multilevel modeling, called *pattern-mixture random effects modeling* (Hedeker & Gibbons, 1997), handles such missing data by dividing participants on the basis of their missing-data pattern. The grouping variable is then used to examine the effect of the missing-data pattern on the outcome under investigation.

To examine the relationship between dropout and completer patterns of change over the course of treatment, a grouping variable will be created for dropouts. Thirty-six families prematurely dropped out of PCIT. Of the 36 dropout families, 19 dropped out in the CDI phase, completing an average of 4 sessions (range 1 to 11), and 17 families dropped out in the PDI phase, completing an average of 7 CDI sessions (range 4 to 12) and 7 PDI sessions (range 1 to 20). In the analysis, dropout families will be classified as either an *early* or *late dropout*. The

early dropout group will include families who dropped out before meeting criteria for CDI completion. The *late dropout* group will include families who at least one PDI session.

The second reason for the unbalanced design is related to the time-unlimited and phasic nature of the treatment. PCIT has two phases (CDI and PDI), and families require different numbers of sessions in each phase of treatment before they can move to the next phase or complete treatment. This results in an unequal number of participants per occasion (per session, such that a different set of participants will be providing data for estimation of rate of change at each time point) and an unequal number of occasions (sessions) per participant. In addition, length of time between occasions is unequal. Each treatement session is an occasion. Though it was planned that each participant would be seen on a weekly basis during treatment, cancellations, no-shows, and rescheduling of appointments resulted in varying lengths of time between sessions for each participant. Fortunately, multilevel modeling does not require an equal number of participants at each occasion (session), and it does not assume an equal number of occasions for each participant. In addition, multilevel modeling can accommodate unequal spacing between occasions for each participant. That is, the spacing between occasions and the number of occasions per participant can be specified as random, rather than fixed, effects, meaning that these variables are allowed to vary from person to person (Cudeck & Klebe, 2002). By taking into account that these components vary from person to person, their effects on the outcome variable are essentially controlled. In this study, number of days between sessions will be used to account for the unequal spacing of sessions and will be allowed to vary between participants.

Choosing a Model

Regression plots for all participants should be examined to assist in determining the potential patterns of change over time and thereby assist in determining the most appropriate

model specification for analysis of change over time. Model specification refers to the equation chosen to analyze the pattern of change. Equations can specify whether the pattern of change is linear, quadratic, cubic or non-linear. The most appropriate model specification is one that is both parsimonious and well fitted to the data (Willett, 1988). Examination of individual regression plots provides preliminary information about the shape of the pattern of change and whether the model should include higher-order (i.e. quadratic, cubic, or nonlinear) equations to capture curvilinear or non-linear patterns of change. Studies with large sample sizes ($N \geq 200$), in which examination of each individual trajectory would be burdensome, include high-order equations at the outset and then conduct model comparison tests to determine the best-fit pattern of change model. For this study, the moderate sample size does not hinder examination of individual regression plots to determine the inclusion of higher-order specifications in the model.

Individual regression plots were examined by phase of treatment and across treatment as a whole to determine the necessity of investigating higher order patterns of change. A curvilinear pattern was evaluated initially and was not found to be significant. Hence, higher-order patterns were abandoned in favor of the more parsimonious linear model, which was significant (see Result section).

The Random Regression Coefficient Model

The term *random regression coefficient (RRC) model* refers to a general type of model typically used with within-participants data, such as the kind collected in this study. As with all other types of multilevel models, the RRC model includes two levels – the level 1 model (also referred to as the occasion-specific or within-participants model) and the level 2 model (also referred to as the person-specific or between-participants model). Patterns of change in child disruptive behavior and parenting stress will first be examined without child, parent, or family predictors in the level-1 model. The effects of child, parent, and family predictors will then be

examined in the level-2 or between-participants model. Patterns of change will first be examined by phase at the individual level (level 1), so there will be a trajectory for ECBI scores and PSI-SF scores for CDI and PDI.

The level 1 model

Change in child disruptive behavior and parenting stress will first be modeled at the within-participants level. The general RRC equation for the level-1 model is as follows:

$$Y_{ti} = \pi_{0i} + \pi_{1i}T_{ti} + e_{ti} \tag{2-1}$$

Let Y_{ti} denote the ECBI Intensity scale score or PSI-SF *T* score for the ith participant on the tth occasion, with $t = 1,\ldots,n$. The variable T_{ti} denotes the value in time (elapsed time between sessions) for the tth measurement of participant *i*. Recall that occasions and length of time between occasions varies between participants and are a random effects. The term π_{0i} is the intercept, which is a measure of the participant's average level of disruptive behavior or parenting stress at time 0 (T_{ti} = CDI Teach). The slope, which represents the rate of change in child disruptive behavior and parenting stress over time, is expressed as π_{1i}. Finally, the term e_{ti} denotes the residual variance within participant *i* across *t* observations. A decrease in ECBI Intensity scale scores and PSI-SF subscale scores over time has been hypothesized in this study. Using variable labels instead of letters, the level-1 model to analyze change in child disruptive behavior and parenting stress is:

$$\text{ECBI}_{ti} = \pi_{0i} + \pi_{1i}Time_{ti} + e_{it}$$
$$\text{PSI Total}_{ti} = \pi_{0i} + \pi_{1i}Time_{ti} + e_{it}$$
$$\text{PSI PD}_{ti} = \pi_{0i} + \pi_{1i}Time_{ti} + e_{it}$$
$$\text{PSI PCDI}_{ti} = \pi_{0i} + \pi_{1i}Time_{ti} + e_{it}$$
$$\text{PSI DC}_{ti} = \pi_{0i} + \pi_{1i}Time_{ti} + e_{it}$$

Modeling predictors

The between-participants (level 2) model examines individual differences in change in child disruptive behavior and parenting stress over the course of PCIT. The general RCC equation for the level-2 model is as follows:

$$\pi_{0i} = \beta_{00} + \beta_{01}Z_i + u_{0i} \quad (2\text{-}2)$$
$$\pi_{1i} = \beta_{10} + \beta_{11}Z_i + u_{1i} \quad (2\text{-}3)$$

The first model specifies that the intercept, π_{0i}, is a function of the grand mean, β_{00}, which represents the average ECBI or PSI-SF score at $T_{ti} = 0$ = CDI Teach, the average difference, β_{01}, between individuals in their average ECBI or PSI-SF, and a residual term, u_{0i}, which represents how far each individual deviates from the intercept. The second model specifies the slope, π_{1i}, according to the average slope, β_{10}, for the sample, the average difference, β_{11}, around the slope, and the residual term, u_{1i}, which represents how far each individual deviates from the average slope. The term, Z_i, in both equations refers either to the grouping variable or the predictor variable. In this study, the grouping variable will refer to dropout status (completer versus early dropout versus late dropout). Predictor variables include child factors (presence of comorbid ADHD, gender, and pre-treatment CBCL externalizing *T* score as a measure initial severity of behavior problems), parent factors (maternal BDI II score, PDH Frequency score, and maternal perceived social support score), and family factors (Hollingshead score and perceived barriers to participation in treatment total score.) Using variable labels instead of letters, below is an example of the level-2 model including a predictor of interest:

$$\pi_{0i} = \beta_{00} + \beta_{01}ADHD_i + u_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}ADHD_i + u_{1i}$$

Essentially, these equations result in an intercept and slope according to ADHD diagnosis. The terms, β_{01} and β_{11}, examine whether individual differences in overall level of disruptive behavior and parenting stress and individual differences in rate of change in disruptive behavior

and parenting stress over time can be explained by a co-morbid diagnosis of ADHD. Each predictor variable will be entered into the level-2 model as demonstrated above.

Modeling maternal depression as a time varying covariate

A time-varying covariate is a predictor variable that is also measured at repeated occasions, as maternal depression was measured in this study, at pre-, mid-, and post-treatement. It is hypothesized that changes in maternal depression will be related to changes in child disruptive behavior and parenting stress over the course of treatment. Specifically, an increase in maternal depression as measured by the BDI is expected to result in an increase in child disruptive behavior and parenting stress while a decrease in the BDI is expected to result in a decrease in the ECBI and the PSI-SF. This relationship between the BDI and the ECBI and PSI-SF is modeled as:

$$Y_{ti} = \pi_{0i} + \pi_{1i}T_{ti} + \pi_{2i}\,(X_{ti} - meanX_{ti}) + e_{it} \qquad (2\text{-}4)$$

Similar to the level-1 model presented above, Y_{ti} represents the ECBI intensity scale score or PSI-SF score for participant *i* at occasion *t* and *T* is the value in time. The intercept and slope terms, π_{0i} and π_{1i}, still reflect the average ECBI or PSI-SF score and the average rate of change in scores over time, respectively. The term, X_{ti}, is the time varying covariate, and π_{2i}, represents the rate of change in the outcome variable in relationship to changes in the time varying covariate. In this case, X_{ti} is the total maternal BDI score collected at pre-, mid-, and post-treatment. Each mother's pre-, mid-, and post-treatment BDI score will be subtracted from her overall mean BDI score. This results in a measure of changes in the mother's depression level relative to the mother's overall level of depression across treatment.

Maternal depression will also be examined as a level-2 predictor and the model with maternal depression as a time-varying covariate is below:

$$\pi_{2i} = \beta_{20} + \beta_{21}BDI_i + u_{2i} \qquad (2\text{-}5)$$

The slope, π_{2i}, is defined by the average rate of change in BDI scores for the sample, β_{20}, the average difference in rate of change in BDI scores between participants, β_{21}, and a residual error term, u_{2i}.

Predicting Change in Treatment Outcome and Dropout from Patterns of Change in Child Disruptive Behavior and Parenting Stress

A secondary aim of the study is to investigate whether the patterns of change derived from the multilevel model predict change in treatment outcome and dropout from this study. Relations between patterns of change and change in predictors will be examined using a traditional linear regression approach. Slope estimates from the treatment phase patterns of change will be entered as predictors in a linear regression model. Change scores will be calculated for each four outcome variables (the attachment Qsort, the CBCL, the Parent Daily Hassles Frequency scale, and the MSPSS) measuring change from pre- to post-treatment. A sample equation is presented below:

$$Y_{ti} = \beta_{00} + \beta_{10}(CDI\ Slope)_{ti} + \beta_{20}PDI\ Slope) + \varepsilon \qquad (2\text{-}6)$$

To examine patterns of change that predict early versus late dropout, slope estimates from the patterns of change for dropouts will be entered into a logistic regression model to determine whether patterns of change in CDI versus PDI can predict early versus late dropout from treatment. The equation for the logistic regression model is presented below:

$$Z(prob=1) = 1/1 + e^{-(\beta + \beta\ (slope\ value) + \varepsilon)} \qquad (2\text{-}7)$$
$$e \approx 2.718$$

CHAPTER 3
RESULTS

Descriptive Analyses

Child and mother demographic variables were analyzed with descriptive statistical methods. Descriptive statistics were also calculated for predictor and outcome variable measures. These data are presented in Tables 3-1 and 3-2 located at the end of the chapter.

Thirty-one girls and 69 boys were enrolled in the study. Mean ages for all participants are as follows: children (n = 100), 4.38 years (range 3 to 6 years); mothers (n = 100), 33 years; and fathers (n = 54) 38 years. Seventy-six percent of children are identified as white, 8% are identified as black, 12% are identified as bi-racial, and 3% as Hispanic. Eighty-three percent of mothers and 51% of fathers identified themselves as white. Of the mothers and fathers who participated in treatment, 58% and 91%, respectively, were married. Seventeen percent of the mothers were single, another 17% were divorced, and 6% were separated.

Sixty-four families completed treatment, and 36 families dropped out of treatment. Treatment completers finished PCIT in approximately 17 sessions (CDI sessions, M = 5.76, SD = 1.85, PDI sessions, M = 11.17, SD 4.56). Of those who dropped out of treatment, nineteen families stopped coming to treatment in the CDI phase of PCIT (mean number of sessions = 4.16, SD = 2.56), and 17 families stopped coming to treatment in the PDI phase of PCIT (mean number of sessions = 14.05, SD 6.74). No differences were found in pre-treatment ECBI intensity scale scores or PSI total scores between treatment completers and dropouts, or between early versus late dropouts. Completers had significantly better scores on the final ECBI intensity scale scores and PSI total scores compared to dropouts. No differences were detected in the final ECBI and PSI scores between early and late dropouts; however, maternal report of disruptive behavior in children was closer to the clinical cut-off in the late dropout group (M = 139, SD =

41) compared to the early dropout group (M = 158.63, SD = 31.91). Maternal ratings of total parenting stress remained high in dropout groups (early drop-out M = 101.52, SD 24 and late drop-out, M = 93.11, SD = 28).

Mothers in the sample were found to be of average intelligence (Wonderlic, M = 106.28, SD = 12.36). Twenty-six percent of mothers were college graduates, 6% had graduate education, and 40% received some college or vocational training. Eighteen percent had high school diplomas, 6% had completed some high school, and 2% had completed some middle school education. On average, families in the study earned approximately $2,615/month; however, the range of monthly income between participants was large ($99 to $10,217). Mean SES (Hollingshead Index) for the total sample was 37.2 (SD = 13.1). Comparison of means between completers and dropouts on these demographical variables revealed a significant difference in SES between the two groups (F = 3.83, p = .05).

Maternal ratings of children's disruptive and externalizing behavior prior to treatment were in the clinical range (ECBI Intensity scale score M = 170.4, SD = 26.2, CBCL Externalizing T score M = 72.9, SD = 7.7). Mothers' also reported significant levels of parenting stress (PSI Total score M = 103.8, SD = 17.7, PDH Frequency M = 50.7, SD = 10.1) at pre-treatment. Average ratings of maternal attachment were low (Q-sort M = .03, SD = .21, range -.470 to 1.46), indicating that most children in the sample were not securely attached to their mothers at pre-treatment, and mothers' in general reported low levels of perceived social support prior to treatment (MSPSS M = 33.7, SD = 15.2). Mean ratings of maternal depression at pre (n=100, M =13.5, SD = 15.2, range 0 to 42), mid (n=57, M = 10.4, SD = 7.8, range 0-34), and post-treatment (n = 59, M = 10.4, SD = 7.8, range 0 to 42) were in the minimal range. No differences were detected between treatment completers and dropouts among these variables.

Only treatment completers reported on barriers to participation in treatment. As can be seen in Table 3-2, mean post-treatment BTPS scores for mothers in the treatment completer group overall was 57.10 (SD = 13.4). The mean for the 1997 sample of treatment completers and dropouts in the Kazdin et al. study was 65.97 (SD=13.83), and total score on the BTPS in that sample predicted poor performance in treatment, including higher rate of attrition, fewer weeks in treatment, and higher rates of cancelled appointments.

Children in the study were found to be of average intelligence (PPVT, M = 102.21, SD = 12.91). Inclusion criteria for the study dictated that a child must meet diagnostic criteria for Oppositional Defiant Disorder (ODD), which was determined by the DISC interview and a CBCL externalizing T score ≥ 61. Ninety-eight percent of the sample carried a primary research diagnosis of ODD and 45% of the sample carried a co-morbid research diagnosis of CD. Seventy percent of the sample carried a co-morbid research diagnosis of ADHD, 24% of the sample carried a co-morbid diagnosis of SAD, and 4% of the sample met diagnostic criteria for MDD. Children in the study on average carried 2.45 research diagnoses. Only 20% of the sample carried one diagnosis at pre-treatment while 43% met criteria for three diagnoses and 27% met criteria for two diagnoses. A small number of children met criteria for more than 3 diagnoses (10%). Table 3-1 below presents diagnostic data for the total sample.

Twenty-six percent of the children in the study were on some kind of psychotropic medication prior to entering the study. As noted in the method section, children were required to be on a stable dose of their medication for 30 days prior to being evaluated for eligibility to participate in the study.

Patterns of Change Analyses

Multilevel modeling was used to analyze the patterns of change in children's disruptive behavior and mothers' ratings of parenting stress across treatment and within the CDI and PDI

phases of PCIT. Unconditional models, or models without predictors such as time or treatment phase, were first run to analyze the variation in the outcome variables of interest. Any unexplained variance would provide a basis for inclusion of predictors in the analysis of change models for child disruptive behavior and parenting stress. Results for the unconditional models for the ECBI and PSI scales are listed in Table 3-3 and 3-4.

The unconditional means model examines change in ECBI Intensity Scale and PSI scale scores within individuals across occasions (days between sessions starting with Day 0 = CDI Teach). Time is not included in this model as a within-person or level-1 predictor. Initial status in the ECBI Intensity scale and PSI scale scores at Day 0 are significant ($t = 46.395$, df = 97.368, $p \leq .001$), suggesting that there are significant differences between individuals in initial levels of disruptive behavior and overall parenting stress at the start of treatment. Interclass correlations were calculated to obtain the proportion of total variation in the outcome variables of child disruptive behavior and parenting stress that lies "between" participants. Calculations yielded ρ value of .60 for the ECBI and a ρ value of .72 for the PSI total score. These values indicate that 60% of the total variation in ECBI Intensity Scale and 72% of the PSI total score are attributable to differences between children at the start of treatment. At the bottom of the table are deviance statistics, which provide a measure of the goodness-of-fit of the model to the data. The general rule is the smaller the value the better the fit of the model. As can be seen, the deviance statistics are relatively large in value, indicating the model may not be the most parsimonious in explaining the variance in the outcome measures.

Unconditional means models were also run for the total and subscales of the PSI - the Parent Distress (PD) subscale, the Parent-Child Dysfunctional Interaction (PCDI) subscale, and the Difficult Child (DC) subscale. As can be seen in Table 3-4, seventy-eight percent, 74%, and

63% of the total variation in each the respective subscales are attributable to differences between mothers. The intercept values for each of the subscales also indicate that mothers were experiencing high levels of stress in their parenting role, were experiencing negative interactions with their children, and perceived their children to be difficult to manage.

The next models run in the analyses were unconditional growth models, in which the Time variable was added as a predictor to the model. Time in this study was defined as the number of days in treatment with Day 0 = CDI Teach. Days in between each session were calculated per family to determine the number of the day the next treatment session fell. All families began treatment on Day 0 (CDI Teach). The next treatment session, CDI Coach 1, however, fell on a different day for per family. For example, a number of families completed the CDI Coach 1 session on Day 7, whereas other families completed the same session on Day 10 or Day 5. Hence, the coding of time captured the unequal spacing between occasions (sessions), allowing for time to vary between families in the analysis. Results for these models for each of the outcome measures are listed in Table 3-5.

Comparison of intercept estimates between the unconditional and growth models reveals that some of the intercept estimates for outcome measures of interest increased in value. Hox (2002) notes that the unconditional means-model tends to overestimate the occasion-level variance and underestimate the child-level variance, thereby inflating the intercept parameter estimate. Inclusion of the Time variable models the occasion-level variance in the disruptive behavior and parenting stress measures and results in more realistic estimates for both the occasion-level and child-level variances. The intercept, which is the expected level of child disruptive behavior and parenting stress at Day 0 in treatment, remains statistically significant at the $p \leq .001$ level, suggesting that individual differences remain between children in initial levels

of disruptive behavior and between mothers in initial levels of parenting stress at the start of treatment. Examination of predictors of interest at the next level may explain these differences. Rate of change, or slope, estimates for all outcome measures were also statistically significant at the $p \leq .001$ level and indicate that levels of children's disruptive behavior and mothers' parenting stress are decreasing over time.

The variance components in the unconditional growth models also indicate there is still unexplained residual variance both within-persons and between-subjects. The term, R^2_{ε}, reflects the proportional reduction in the within-person variance component, σ^2_i, between the unconditional means and growth models with the addition of time in the model. Each percentage listed in the table reflects the amount of within-person variation in the ECBI and PSI scales associated with linear time, here conceptualized as treatment. Therefore, fifty-five percent of the within-person variation in the PSI total score, or overall levels of parenting stress, is associated with time in treatment.

The level-2 variance components reflect individual differences between subjects in initial status (σ^2_0) and rates of change (σ^2_1) over time. Variance estimates for initial status should be interpreted with caution because the intercept estimates changed with the addition of time in the model. Variance estimates for rates of change are statistically significant ($\chi^2 \leq .05$) for all outcome measures, suggesting individual differences in rates of change over time in children's disruptive behavior and maternal parenting stress. Examination of predictors of interest may further explain these differences.

Predictor Models

Several hypotheses were proposed about the effects of certain parent and child predictors on patterns of change in disruptive behavior and parenting stress. A few of these hypotheses also proposed predictions about rates of change between treatment phases, CDI versus PDI.

Therefore, a model examining treatment phase was first analyzed to determine if differences exist in the rates of change according to treatment phase. Child and parent predictors of interest were then entered as predictors in the change models to determine whether they explain remaining variation within-persons and between-subjects.

Treatment Phase Model

Treatment phase was entered into the change model as a dichotomous variable (CDI = 1 and PDI = 2). To refresh, all families received treatment in the same order, with the CDI phase first and graduation to the PDI phase once parents' demonstrated mastery of the PRIDE skills. Some families remained in one phase of treatment longer than others; therefore, the number of occasions per treatment phase was conceptualized and analyzed as a time-varying predictor because length of time in each phase of treatment varied between families.

Interpretation of the parameter estimates differs with the inclusion of a time-varying predictor in the level 1 model. The level 1 model equation for this analysis is written below.

$$Y_{it} = \beta_{00} + \beta_{10}\,(\text{Day}_{it}) + \beta_{20}\,(\text{Txphase}_{it}) + \beta_{30}\,(\text{Day X Txphase}_{it}) \qquad (3\text{-}1)$$

The intercept value remains largely similar in interpretation: β_{00} represents the average ECBI or PSI score on the first day of treatment. The slope parameter, $\beta_{10,}$ is now a conditional rate of change and represents the average rate of change in ECBI or PSI scores controlling for the effect of phase of treatment. The time varying predictor, treatment phase (β_{20}), represents the average difference, over time, in ECBI or PSI scores between the CDI and PDI phase and can be conceptualized as a main effect. Last is the interaction term between time (measured as number of the day in treatment) and treatment phase, $\beta_{30.}$ This term looks at whether rate of change in ECBI or PSI scores differs over time between each phase of treatment.

Results of the treatment phase model for each outcome variable are listed in Table 3-6. It is important to note that two models were analyzed: the main effect model which included the

treatment phase variable and the interaction effect model which included the interaction term between time and treatment phase. This follows typical protocol in analyzing multilevel models. In Table 3-6, the results for the interaction effect model are listed for all outcome measures, except the Difficult Child subscale of the PSI. The main effect model for the DC subscale was significant, whereas the inclusion of the interaction term rendered both the main effect and interaction term insignificant. Hence, only the significant finding is shown below. Both the main effect and interaction models yielded non-significant findings for the Total, Parent Distress, and Parent-Child Dysfunctional Interaction subscales, hence, only the interaction model results are shown.

With respect to the ECBI, the effect of treatment phase was found to significantly vary over time, indicating that the rate of change in ECBI scores over time differed between the CDI and PDI phase of treatment. As can be seen in Graph 3-1, the slope for the CDI phase of treatment is steeper than the slope for the PDI phase of treatment. A significant result was also found for the Difficult Child subscale of the PSI, in which treatment phase was found to significantly affect the *average* rate of change over time in mothers' perceptions of their children as difficult to manage between the CDI and PDI phase of treatment. Graph 3-1 illustrates this average .97 point difference in Difficult Child subscale ratings between the CDI and PDI phase of treatment, such that scores changed at a slightly steeper rate in CDI (of an average of .97 points) compared to PDI.

Hypothesis 1: Children with ADHD are hypothesized to demonstrate greater changes in levels of disruptive behavior and parenting stress in PDI than CDI.

To test these hypotheses, the predictor, ADHD, was entered as a level-2 predictor into the existing treatment phase model for the ECBI and DC subscale of the PSI. Results for the ECBI and DC subscale are presented in Table 3-7. A separate model was also run for the other PSI

scales to explore whether a diagnosis of ADHD affected the rate of change in parenting stress over the course of PCIT. These results are presented in Table 3-8.

Results were not supportive of the hypothesis that children with ADHD exhibited greater change in disruptive behavior or that mother's exhibited greater change in maternal stress related to difficulty managing in children in the PDI phase of treatment. Treatment phase remained a significant predictor in both models, suggesting that another substantive level-2 predictor may explain differences in rates of change in each outcome over time between CDI and PDI.

Despite lack of support for the hypothesis, a diagnosis of ADHD was a significant predictor with respect to initial levels of child disruptive behavior at the start of treatment. Further examination of this finding revealed that children with ADHD had significantly higher initial levels of disruptive behavior, as rated by their mothers, at start of treatment compared to children without an ADHD diagnosis. By substituting the actual values into the level-2 model, the average ECBI score at the start of treatment for children with ADHD differed from children without a diagnosis of ADHD by 17.54 (see Graph 3-2). It is important to note that children changed at similar rates over the course of PCIT regardless of a diagnosis of ADHD. This is reflected in the non-significant finding for the term β_{11} (ECBI = .09, p = .74; DC = -.007, p = .702).

For the remaining outcome measures, a diagnosis of ADHD proved to be only significant with respect to initial levels of maternal stress related to the parenting role (PSI PD subscale). Again, mothers of children with a diagnosis of ADHD reported a higher level of parenting distress compared to mothers of children with no diagnosis of ADHD. Actual values of the parameter estimates were entered into the level-2 model and the average point-difference in the Parent Distress subscale is noted in Graph 3-2. Despite this average difference at the start of

treatment, mothers' experienced similar rates of reduction in levels of parent distress over the course of PCIT.

To measure the strength of the effect of the predictor in the model, pseudo-R^2 statistics were calculated for the significant findings. Despite their statistical significance, a diagnosis of ADHD explains approximately 8% of the variation in initial levels of child disruptive behavior and 4% of the variation in initial levels of parenting distress. These percentages, along with the significant variance components, suggest the exploration of other predictors to account for the differences in initial levels and rates of change in all outcome measures.

Hypothesis 2: Children who are more securely attached at pre-treatment are hypothesized to make greater change in CDI than PDI.

Pre-treatment attachment Q sort scores were entered into the treatment phase model as a level-2 predictor to determine whether a child's level of attachment predicted differences in rate of change in child disruptive behavior between phases of treatment. Table 3-9 presents results.

Results were not supportive of the hypothesis that children who were more securely attached at pre-treatment would demonstrate greater change in CDI versus PDI. In addition, pre-treatment attachment did not affect the average rate of change in child disruptive behavior over the course of PCIT ($\beta_{11} = -.18$, $p = .72$) nor did it explain any differences in initial levels of child disruptive behavior ($\beta_{01} = -27.45$, $p = 11$). The interaction between days in treatment and phase of treatment (β_{20}) remained significant, suggesting that other predictors may explain the differences in rate of change between the CDI and PDI phase of treatment.

Hypothesis 4: The patterns of change for boys and girls will be examined separately to determine whether gender differences exist in the pattern of change in child disruptive behavior and parenting stress during PCIT.

Gender was entered into the unconditional growth model to determine whether gender differences exist in the patterns of change in child disruptive behavior and parenting stress during PCIT. Results for gender are presented in Table 3-10.

Gender was not a significant predictor with respect to initial levels and rates of change in child disruptive behavior or parenting stress related to parent-child dysfunctional interactions and difficulty managing children's behavior. Gender did, however, significantly predict differences in initial levels of overall parenting stress and in stress related to the parenting role, with mothers of girls reporting higher levels of stress on both outcome measures than mothers of boys. Graph 3-3 for these significant findings are presented at the end of the chapter.

Despite the statistical significance of these findings, the effect sizes for gender are relatively small. Gender explained 5% of the variation in initial levels of overall parenting stress between boys and girls and 6% of the variation in initial levels of stress related to the parenting role between boys and girls. These percentages suggest that other substantive predictors can be included in the model to further explain variation in initial levels of parenting stress. In addition, the variance components for rate of change remain significant, also indicating the need to explore other predictors to account for the variation in rates of change over the course of PCIT.

Hypothesis 5: Families who report a greater number of barriers to treatment participation are expected to show less change (a flatter slope of change) in PCIT compared to families who report fewer barriers.

Families who successfully completed treatment filled out the Barriers to Participation in Treatment (BPTS) questionnaire at post-treatment. These retrospective scores were entered as predictors into the change model to determine whether families who reported greater number of barriers demonstrate less change in PCIT compared to families who reported fewer barriers. The

Time variable was re-coded to reflect the retrospective nature of this particular analysis. In previous and subsequent analyses, Day 0 represents the first day in treatment and the number of the day of the following session indicates forward movement in time. Time was re-coded so that Day 0 represents the last day in treatment. This allows for the post-treatment ratings to predict differences in patterns of change toward final status in PCIT and accurately reflects the retrospective nature of this analysis.

Post-treatment ratings of barriers to participation in treatment were found to significantly affect rates of change in children's disruptive behavior over the course of PCIT. To determine the direction of the prediction, the estimate values for rate of change were entered in the level-2 model equation below:

$$\pi_{2i} = \beta_{10} + \beta_{11}(\text{BPTS}_i) + \varepsilon \qquad (3\text{-}2)$$

As the BPTS score is a continuous variable with no determined cut-off in the literature to delineate better or worse scores, the sample mean, plus or minus the sample standard deviation (57.10 ± 13.4), was used to delineate a high (70.5), average (57.1), and low score (43.7) on the BPTS. These values were plugged in to the level-2 equation above to calculate prototypical slope values at each level:

$\pi_{2i} = 1.02 - .01\ (70.5) = .31$
$\pi_{2i} = 1.02 - .01\ (57.1) = .45$
$\pi_{2i} = 1.02 - .01\ (43.7) = .58$

A high BPTS score, which reflects a mother's perception of greater number of barriers to participation in treatment, predicted less change over the course of treatment, compared to a low BPTS score, as seen in the estimated slope values of .31 and .58. This finding supports the proposed hypothesis; however, it is also evident by the estimated slope values that families at all levels of perceived barriers demonstrated promising reductions in children's disruptive behavior

over the course of PCIT. . In addition to the significant finding, retrospective report of perceived barriers to treatment accounted for 26% of the variation in rate of change in child disruptive behavior. Graph 3-4 provides a visual depiction of the rates of change at each level of perceived barriers to participation in treatment. Estimates for the change model are presented in Table 3-11

Hypothesis 6: Children from socioeconomically disadvantaged homes are hypothesized to show a flatter slope of change in PCIT compared to children who are from less disadvantaged homes.

Socioeconomic status was found to significantly predict individual differences in initial status in children's disruptive behavior but not in rates of change of disruptive behavior over the course of treatment. Results are presented in Table 3-12. To calculate meaningful scores to interpret the direction of the prediction with respect to initial status, the Hollingshead Index score was also divided in the same manner as the BPTS score.

$$\pi_{1i} = \beta_{00} + \beta_{01} (SES_i) + \varepsilon \qquad (3\text{-}3)$$

High and low values were calculated by plugging in the sample mean, plus or minus the sample standard deviation, into the above equation:

π_{1i} = 180.13 - .57 (24.15) = 166.36
π_{1i} = 180.13 - .57 (37.94) = 158.5
π_{1i} = 180.13 - .57 (51.73) = 150.64

As could be anticipated, an inverse relationship is seen between SES and children's disruptive behavior, with a low Hollingshead Index (24.15) associated with a worse (more disruptive) initial ECBI score and initial ECBI score improving as SES index improves. Despite these differences in initial status, children changed at similar rates over the course of treatment. Low, average, and high values were also calculated for the slopes to demonstrate this phenomenon (see Graph 3-5).

π_{2i} = -.51 + .003 (24.15) = -.44
π_{2i} = -.51 + .003 (37.94) = -.40
π_{2i} = -.51 + .003 (51.73) = -.35

Hypothesis 7: Mothers who are socioeconomically disadvantaged and report a greater number of barriers to treatment participation are hypothesized to show a flatter slope of change in PCIT on parenting stress ratings compared to mothers who report fewer barriers to treatment participation and who are not socioeconomically disadvantaged.

Separate change models were analyzed to examine SES and BPTS as predictors of patterns of change in parenting stress, due to the retrospective nature of the BPTS ratings. The reverse coding of the *Time* variable (Day 0 = final day in treatment) was used to analyze BPTS as predictors of patterns of change in parenting stress. The prospective coding of *Time* (Day 0 = first day in treatment) was used to analyze SES as predictor of patterns of change in parenting stress.

Socioeconomic status was not found to be a significant predictor in the model with respect to rate of change or initial status for any of the PSI scales. Non-significant findings are presented in Table A-6 in Appendix A. The Barriers to Participation in Treatment (BPTS) did significantly predict differences in rate of change for all the parenting stress scales, as well as approach significance with respect to initial levels of parent distress. Results are presented in Table 3-13. To determine the direction of the prediction, the sample mean, plus and minus the sample standard deviation were entered into the level 2 equation below to calculate meaningful high and low values for the BTPS.

$$\pi_{2i} = \beta_{10} + \beta_{11} (\text{BPTS}_i) \qquad (3\text{-}2)$$

Values for each of the total and subscales are listed below. For the Total PSI Scale:

π_{2i} = .42 - .005 (43.7) = .20
π_{2i} = .42 - .005 (51.7) = .17
π_{2i} =.42 - .005 (70.5) = .07

For the Parent Distress Subscale:

π_{2i} = .11 - .001 (43.7) = .07
π_{2i} = .11 - .001 (51.7) = .06
π_{2i} = .11 - .001 (70.5) = .04

For the Parent-Child Dysfunctional Interaction Scale:

π_{2i} = .11 - .001 (43.7) = .07
π_{2i} = .11 - .001 (51.7) = .06
π_{2i} = .11 - .001 (70.5) = .04

For the Difficult Child Subscale:

π_{2i} = .21 - .002 (43.7) = .12
π_{2i} = .21 - .002 (51.7) = .11
π_{2i} = .21 - .002 (70.5) = .07

As hypothesized, mothers who reported a greater number of barriers demonstrated slower change (flatter slopes as indicated by the values of .07 for the total and DC scales and .04 for the PD and PCDI scales) in overall and specific levels of parenting stress; however, all mothers demonstrated change in the desired direction on all the scales of the PSI. Graph 3-6 provides a visual illustration of the patterns of change for each parenting stress scale.

With respect to the significant findings in this model, pseudo-R^2 statistics demonstrate the proportion of variance these predictors account for in the outcome measures. Socioeconomic status accounts for 18% of the variation in initial levels of overall parenting stress, and barriers to participation in treatment accounts for 7% of the variation in rate of change in overall parenting stress. For the Parent Distress subscale, barriers to participation in treatment accounted for 4% of the variation in initial levels and 25% of the variation in rate of change. Finally, the BPTS accounted for 32% and 13% of the variation in rate of change for the PCDI and DC subscales of the PSI, respectively.

Hypothesis 3: A relationship between changes in maternal depression and changes in child disruptive behavior and parenting stress are hypothesized. High BDI scores at pre-, mid-, and post-treatment are expected to be associated with less change (flatter slope) in child disruptive behavior and parenting stress, whereas BDI scores that decrease over the course of treatment are expected to be associated with a decrease in child disruptive behavior and parenting stress over the course of PCIT.

Maternal ratings of depression were collected on three occasions during the course of treatment: at the pre-treatment assessment, at the mid-treatment assessment, and at the post-treatment assessment. These individual ratings were subtracted from each mother's pre-treatment depression score to obtain a within-person centered value at each time point, representing each mother's deviation from her initial rating of depressive symptoms. Hence, the predictor, maternal depression, was allowed to vary over time. Depression was entered into the change model as a time-varying predictor to determine whether changes in ratings of maternal depression were related to changes in children's disruptive behavior and in parenting stress during PCIT. Only subjects with complete data were included in this analysis (n = 63), as missing data was not well tolerated in the level-1 model. Results are presented in Tables 3-14 and 3-15.

Interpretation of the parameter estimates differs with the inclusion of a time-varying predictor in the level 1 model. The level 1 model equation for this analysis is written below.

$$Y_{it} = \beta_{00} + \beta_{10}\,(\text{Day}_{it}) + \beta_{20}\,(\text{Centered BDI}_{it}) + \beta_{30}\,(\text{Day X BDI}_{it}) \qquad (3\text{-}4)$$

The intercept value remains largely similar in interpretation: β_{00} represents the average ECBI or PSI score on the first day of treatment. The slope parameter, $\beta_{10,}$ is now a conditional rate of change and represents the average rate of change in ECBI or PSI scores controlling for the effect of maternal depression. The pre-treatment BDI score is entered into the model (β_{20}) and controls for the effect of initial depression ratings on changes in ECBI scores over time. The time varying predictor, β_{20}, represents the average difference, over time, in ECBI or PSI scores

as mothers' BDI scores increase or decrease. Last is the interaction term between time (measured in days) and the time-varying predictor of maternal depression, $\beta_{30.}$ This term looks at whether rate of change in ECBI or PSI scores differs over time in association with changes in mothers' depression (as hypothesized).

Regarding children's disruptive behavior, changes in maternal depression were found to significantly affect the *average* rate of change in ECBI scores over time, but its effect on ECBI scores was not found to vary over time, such that rate of change in ECBI scores did not vary in relation to changes in maternal depression. On average, children's ECBI ratings were found to decrease at a rate of -.34 over the course of treatment, controlling for the effects of maternal depression. Controlling for the effect of time (treatment) and mothers' pre-treatment BDI score, a one unit change in mothers' depression was associated with an average 1.30 point-difference in children's ECBI scores over time. The direction of this point-difference is dependent on the direction of the unit change in maternal depression. A decrease in mothers' ratings would result in a negative number, which would render the value for the point-difference negative (and in the direction desired) for the average ECBI score. For the most part, mothers' depression ratings decreased with time; however, if there was no change in mother's BDI score (equaling a value of 0 for β_{20}), the average ECBI score changed at a rate of -.34. An increase in mothers' depression ratings, which rarely occurred, resulted in a positive value for the point-difference and was associated with less change in the average ECBI score over time.

Graph 3-7 demonstrate the effect of maternal depression on change in children's disruptive behavior, according to mothers' initial levels of depression and change in mothers' depression over the course of treatment. As can be seen in the graphs, children's initial levels of disruptive behavior increased with severity of maternal ratings of depressive symptoms. Decreases in

mothers' ratings of depression were associated with reduction of disruptive behaviors, with greater decreases in maternal depression resulting in greater reductions in children's disruptive behavior. Less change in mothers' ratings of depression over the course of treatment resulted in flatter slopes for the ECBI over the course of treatment.

The parenting stress models yielded slightly different results than the ECBI model. The main effect model, which only looked at the effect of maternal depression on the *average* rate of change in PSI scores over time, was significant for the total and individual subscales of the PSI. The interaction effect between the centered BDI scores and time (days in treatment) was significant only with respect to the Difficult Child Subscale of the PSI and rendered the main effect of maternal depression on this subscale non-significant. The effect of maternal depression on the Difficult Child subscale did vary over time and the rate of change on this subscale did change in relationship to changes in mothers' depression over time, providing support for the hypothesis. Overall, decreases in mothers' depression ratings were associated with decreases in mothers' ratings of stress related to difficulty managing their child's behavior (see Graphs 3-8).

Though the effect of maternal depression did not vary over time with respect to individual changes in ECBI scores, a significant association was present between changes in maternal depression and average change in children's disruptive behavior over time. This association was in the predicted direction, with less change in mothers' depression resulting in less overall change for ECBI scores. For the PSI scales in which the interaction term was not significant, similar results were noted for the main effect of maternal depression. Support for the interaction effect was found with respect to the Difficult Child subscale of the PSI, which measures parenting stress related to mothers' perception of how difficult her child is to manage. Mothers', who experienced a decrease in depressive symptoms over the course of treatment, reported an

improved perception of the manageability of their child. This and the main effect findings with the ECBI and other PSI scales provide support for the supposition that children's behavior in this study changed not only in relationship to treatment but also in association with changes in maternal depression, a variable in the literature that has been proposed to affect not only the development of disruptive behavior in children, but also successful outcome in treatment of disruptive behavior (Kazdin, 1999; Webster-Stratton and Hammond, 1990).

Predicting Treatment Outcome from Patterns of Change

The second set of hypotheses in this study focused on whether patterns of change that emerged from the first set of analyses could predict specific outcomes in treatment. A few of the hypotheses proposed greater change in certain outcome measures based on differences in rate of change between the CDI and PDI phases of treatment. The predicted slope estimates calculated for each participant were entered into linear regression models, as proposed, to determine if patterns of change predicted change in treatment outcome; however, certain analyses failed to run or ran into issues with tolerance limits being met or predictors being removed from the regression model due to being constants. Hence, the results from these analyses are not presented below.

To evaluate changes in treatment outcomes based on patterns of change in child disruptive behavior and parenting stress, two sets of alternative analyses were conducted – a multilevel analysis in which the intercept was redefined to represent final status at the end of treatment and traditional linear regression analyses. Both statistical approaches address the questions presented in the hypotheses in different respects. The multilevel model conceptualizes an association between patterns of change in child disruptive behavior and parenting stress in CDI and PDI and change in treatment outcome from pre- to post-treatment. It is expected that different patterns of change between CDI and PDI will predict outcomes on specific parent and child variables.

Traditional regression similarly examines the predictive relation between changes in predictors and change in treatment outcome. Traditional regression is limited to including only treatment completers and change is modeled on a limited number time points (pre- to post CDI and pre- to post PDI for ECBI and PSI scores and pre- to post-treatment for specific outcomes).

For the multilevel model approach, the *Time* variable was re-coded to reflect the aim of predicting specific child and parent outcomes; hence, *Time* was re-coded to direct focus on predictors of patterns of change toward final status in treatment. With the *Time* coding reversed (Day 0 = final day in treatment), the intercept, (β_{00}), now represents the average level of child disruptive behavior and parenting stress at the final session of PCIT. Rates of change in child disruptive behavior and parenting stress are conditional rates of change and represent the average rate of change in ECBI or PSI scores controlling for the effect of phase of treatment. Treatment phase (β_{20}) remains a time varying predictors and represents the average difference, over time, in ECBI or PSI scores between the CDI and PDI phase and can be conceptualized as a main effect. Last is the interaction term between time (measured as number of the day in treatment) and treatment phase, $\beta_{30.}$ This term looks at whether rate of change in ECBI or PSI scores differs over time between each phase of treatment.

To examine whether patterns of change in child disruptive behavior and parenting stress predict therapeutic change in treatment outcome, change scores for the specific parent and child outcomes were calculated and entered into the multilevel model as predictors. A significant relationship between the intercept (final status) and/or pattern of change in child disruptive behavior and parenting stress and the change score would suggest that patterns of change during PCIT relate to therapeutic change in treatment outcomes. The outcomes of interest include change in parent-child attachment from pre- to post-treatment, change in child disruptive

behavior from pre- to post-treatment, change in parent daily hassles from pre- to post-treatment, and change in perceived social support from pre- to post-treatment.

Five multilevel models examining the effects of treatment phase and specific outcomes on patterns of change in child disruptive behavior and parenting stress were analyzed. The unconditional growth model including only the re-coded *Time* variable was first analyzed and found to be significant, as noted in Table 3-16, suggesting differences in patterns of change and final status in child disruptive behavior and parenting stress during PCIT. Treatment phase and the specific outcome predictors were then entered into the unconditional growth model. Two models returned promising findings in the predicted direction. The three remaining models were non-significant (results presented in Appendix A). Promising findings are discussed below.

Hypothesis 1: Children who show a steeper slope on the ECBI Intensity Scale in CDI than PDI will show greater change in attachment security from pre- to post-treatment.

Change in attachment security from pre- to post-treatment and treatment phase were entered as predictors into the pattern of change model for child disruptive behavior. Results are presented in Table 3-17. A trend was found between patterns of change in child disruptive behavior and change in attachment security from pre- to post-treatment. Treatment phase did not predict differences in patterns of change as noted below. An interaction effect between treatment phase and change in attachment was also examined and returned non-significant findings (B_{21} = -3.53, SE = 9.79, t = -.361, p = .719). Only the main effects model with the trend finding is presented in the table below.

It was hypothesized that children who demonstrate faster change in CDI than PDI would demonstrate greater change in attachment security from pre- to post-treatment. Given that patterns of change in child disruptive behavior did not differ by treatment phase, differences in patterns of change for child disruptive behavior were examined across treatment as a whole.

Prototypical slopes were calculated in order to determine the direction of the prediction in the multilevel model. A low and high value for the attachment security (Qsort) change score was calculated by adding and subtracting the sample standard deviation for the Qsort change score from the sample Qsort change score mean (M = .232 $\pm$ .305). These values were entered into the level-2 model equations for slope (rate of change) estimates.

$$\pi_{2i} = \beta_{10} + \beta_{11}(\text{Qsort}_i) + \varepsilon \qquad (3\text{-}6)$$
$$\pi_{2i} = .24 + .29\ (-.023) = .23$$
$$\pi_{2i} = .24 + .29\ (.587) = .40$$

The intercept estimate (β_{00} = 132.35) reflects the average level of child disruptive behavior at the completion of PCIT, and the slope estimate (β_{10} = .24), reflects the average rate of change in disruptive behavior during PCIT. Families who experienced greater change in attachment from pre- to post-treatment were found experience faster behavior change (π_{2i} = .40) during PCIT, compared to families who experienced less change in attachment from pre to post-treatment (π_{2i} = .23). Though change in attachment did not predict significant differences in final status at the end of PCIT, plugging the same low and high values into the level 2 intercept model demonstrates that families who experienced greater change in attachment from pre- to post-treatment completed treatment with levels of disruptive behavior well within the normative range (π_{1i} = 119) compared to families who experienced less change in attachment (π_{2i} = 133), whose children were one point above the clinical cut-off. Graph 3-9 provides a visual presentation of the relation between patterns of change in child disruptive behavior and change in attachment security from pre- to post-treatment.

Hypothesis 3: Mothers who show steeper slope on the Parent-Child Dysfunctional Interaction subscale of the PSI-SF during CDI than PDI will show greater change on attachment security during PCIT.

Change in attachment security from pre- to post-treatment and treatment phase were entered into the pattern of change model for the PCDI subscale of the parenting stress measure.

A trend was found for the interaction effect between treatment phase and change in attachment security. Results for the model are presented in Table 3-18.

High and low values for the Qsort change score were entered into the level 2 equation for the interaction term, treatment phase x change in Qsort, to determine the direction of the trend. As can be seen by the prototypical estimates calculated below, families who experienced greater change in attachment from pre to post-treatment demonstrated faster change in parent-child dysfunctional interaction. Graph 3-10 below depicts this trend.

$$\pi_{2i} = \beta_{20}\,(\text{Tx Phase}) + \beta_{21}\,(\text{Qsort}_i) + \varepsilon \qquad (3\text{-}7)$$

Treatment Phase CDI (1)

π_{2i} = .062 (1) – 2.05 (-.023) (1) = .05
π_{2i} = .062 (1) – 2.05 (.587) (1) = -1.21

Treatment Phase PDI (2)

π_{2i} = .062 (2) – 2.05 (-.023) (2) = .09
π_{2i} = .062 (2) – 2.05 (.587) (2) = -2.41

Though the prototypical slope values suggest that mothers demonstrated faster change in parent-child dysfunctional interaction in PDI, this effect was not statistically significant, as noted by the non-significant main effect for treatment phase in the table above. The interaction trend appears to be driven by change in attachment from pre- to post-treatment, with mothers who demonstrate greater change in attachment experiencing faster change in parent-child dysfunctional interaction during PCIT as a whole; however, it is also important to note the main effect for change in attachment was also not significant, raising concern that the interaction trend may be a spurious finding.

Traditional Linear Regression Analyses

Traditional linear regression models were also analyzed to examine whether change in child disruptive behavior and parenting stress in CDI and PDI predicted change in specific

outcomes. Change scores for CDI and PDI were calculated for ECBI and the three subscales of the PSI-SF (PD, PCDI, and DC) by subtracting the score from the CDI and PDI Teach session from the score from the final CDI and PDI session. The CDI change score and the PDI change score were entered as predictors in the linear regression models. Change scores were also calculated for the four outcomes of interest: change in attachment security (Qsort), change in child disruptive behavior (CBCL Externalizing scale), change in parenting stress (PDH), and change in perceived social support (MSPSS).

The first regression model examined whether change in child disruptive behavior in CDI and PDI predicted change in attachment security from pre- to post-treatment. Both predictors, the CDI ECBI change score and the PDI ECBI change score, were entered simultaneously into the linear regression model. Change in ECBI during CDI was found to significantly predict change in attachment security from pre- to post-treatment ($\beta = .34$, $t = 2.286$, $p = .03$, $R^2 = .12$). Change in ECBI in PDI was not found to predict change in attachment security from pre- to post-treatment ($\beta = .16$, $t = 1.05$, $p = .30$). The value of the regression coefficient ($\beta = .34$) for CDI ECBI change suggests a positive linear relationship between change in child disruptive behavior and change in attachment security, such that as change in child disruptive behavior increases, change in attachment security also increases. Results are presented in Table 3-19.

Change in Parent-Child Dysfunctional Interaction (PCDI) in CDI and PDI was also examined as predictors of change in attachment security from pre- to post-treatment. The CDI and PDI change score in PCDI were not significant predictors of change in attachment security (CDI change, $\beta = -.14$, $t = -.92$, $p = .36$; PDI Change, $\beta = .15$, $t = 1.01$, $p = .32$).

Change in Parent Child Dysfunctional Interaction in CDI and PDI was also examined as predictors of change in child disruptive behavior from pre to post-treatment. Both the CDI ($\beta =$

.36, $t = 2.67$, $p = .01$) and PDI change scores ($\beta = -.33$, $t = -2.42$, $p = .02$) were found to significantly predict change in child disruptive behavior as measured by the CBCL Externalizing scale and accounted for 25% of the variance in change in child disruptive behavior. The inverse relationship between CDI change and change in child disruptive behavior suggests that given a .36 unit increase in change in PCDI, change in CBCL decreases by 1 unit. Examination of the mean CDI change in PCDI reveals little change in PCDI during PCIT (M = .50, $\pm$ 4.3, range -4 to 5); hence, it predicted minimal change in child disruptive behavior. The negative regression coefficient for PDI change suggests a negative linear relationship between change in PCDI during PDI and change in child disruptive behavior, with a decrease in mothers' ratings of parent child dysfunctional interaction associated with a decrease in child disruptive behavior. Results are presented in Table 3-20.

Change in the Difficult Child subscale in CDI and PDI was also examined as predictors of change in child disruptive behavior; however, CDI and PDI change in DC was not found to significantly predict change in child disruptive behavior. Inspection of the mean change in CDI reveals little change in the Difficult Child subscale (M = 2.5, $\pm$ 4.4, range -2 to 7) during CDI. Mean change in PDI was only slightly larger (M = 6.2, $\pm$ 7.3, range -1 to 13).

Change in Parent Distress in CDI and PDI was examined as predictors of change in maternal ratings of perceived social support (MSPSS) from pre- to post-treatment. Change in CDI and PDI in parent distress was not found to significantly predict change in maternal ratings of perceived social support (CDI, $\beta = .12$, $t = .77$, $p = .45$; PDI, $\beta = .15$, $t = .95$, $p = .35$). Results presented in Table 3-21.

It is important to note that the sample sizes for each of the five linear regression models were reduced due to missing data. Sample sizes for each model discussed above were as

follows: 44, 44, 45, 45, and 43. These sample sizes are significantly reduced from the larger sample (N = 100). One reason for the deletion of more than half of the sample from the analysis was attrition. Another reason for deletion of cases was missing data for unidentified reasons (failure to gather data during session, failure of mother to correctly fill out questionnaire). Hence, the results from the traditional linear regression analyses focus on only a sub-sample.

Predicting Dropout from Patterns of Change

A noted advantage of multilevel modeling is its ability to use all available data, including data collected on participants who prematurely dropped out of the study. Hence, the data from treatment dropouts were included in the growth and phase of treatment models run earlier, and their individual rates of change were estimated along with treatment completers. (A few cases were dropped from these analyses due to incomplete data. Three were dropouts and one a completer.) The individual slope estimates for dropouts (N=35) were entered as a predictor into the logistic regression analysis below. The dropouts in the sample were further classified as either early (0) or late dropouts (1), corresponding with the phase of treatment in which the family dropped out. It was hypothesized that families who show less change on the ECBI Intensity Scale, the Difficult Child and Parent-Child Dysfunctional Interaction subscales in CDI would be more likely to drop out of treatment in CDI.

The logistic regression model did not yield significant results, suggesting that the CDI slopes for dropouts were not predictive of attrition in the CDI phase of treatment. In addition, the model only correctly classified 19% (or 3 out of 16) of the early dropouts

A traditional logistic regression analysis was also run, examining whether change in ECBI Intensity Scale, Difficult Child, and Parent-Child Dysfunctional Interaction subscales by treatment phase predicted early versus late dropout in PCIT. Change scores were calculated for each of the independent variables according to phase of treatment; hence, the predictors included

the CDI change score and PDI change score for the ECBI, DC, and PCDI scales of the PSI-SF. Three separate models were run for each of the predictors. The CDI and PDI change scores were entered simultaneously into the logistic regression model.

None of the models returned significant findings, suggesting that patterns of change in child disruptive behavior and parenting stress do not predict premature dropout from PCIT. Results are presented in Table 3-22. The ECBI change model (N = 26) correctly classified 77% of families (10 out of 13) who dropped from treatment during CDI and 54% of families (7 out of 13) who dropped from treatment during PDI. The PCDI change model (N = 25) also correctly classified 77% of families (10 out of 13) who dropped from treatment during CDI and 58% of families (7 out of 12) who dropped from PDI. The DC change model (N = 24) correctly classified 69% of families (9 out of 13) who dropped from treatment during CDI and 45% of families (5 out of 11) who dropped from treatment during PDI.

Table 3-1 Sample Characteristics			
Demographic			
Means (S.D.)			
Child Age	4.38 (1.10)		
Mother Age	33.43 (9.44)		
Hollingshead Index	37.20 (13.07)		
Total Monthly Income	2,615.43 (2,139.05)		
Mother Wonderlic Personnel Test	106.28 (12.36)		
Child Peabody Picture Vocabulary Test	102.21 (12.91)		
Frequency			
Child Characteristics		Mother Characteristics	
Gender		Mother Race	
Male	69	White	83
Female	31	Black	7
Child Race		Hispanic	4
White	76	Bi-racial	5
Black	8	Mother Marital Status	
Hispanic	3	Married	58
Asian	1	Separated	6
Bi-racial	12	Divorced	17
		Widowed	1
Children on Medication		Single	17
Yes	26	Mother Education	
No	57	Junior High School	2
		Some High School	6
		High School Diploma	18
		Some College/Technical	40
		College Graduate	26
		Graduate School	6
Table 3-1. Continued			
Treatment Characteristics			
Treatment Status		Number of CDI Sessions Completed	Number of PDI Sessions Completed
Completers	64	5.76 (1.85)	11.17 (4.56)
Dropouts	36		
Dropout Status			
Early	19	4.16 (2.56)	
Late	17		14.05 (6.74)
Child Co-morbid Diagnosis			
ADHD		CD	
Yes	70	Yes	45
No	22	No	51
MDD		SAD	
Yes	3	Yes	24
No	86	No	67

Table 3-2. Correlations for Predictor and Outcome Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Pre ECBI	--																	
2 Pre PSI Tot	**.36**	--																
3 PSI PD	.00	**.52**	--															
4 PSI PCDI	.22	**.59**	**.23**	--														
5 PSI DC	**.47**	**.60**	.19	**.38**	--													
6 SES	-.21	-.13	.17	-.07	-.03	--												
7 Pre Qsort	**-.31**	**-.29**	-.02	**-.35**	**-.29**	.14	--											
8 Post Qsort	-.05	**-.31**	**-.35**	-.15	-.15	.06	.07	--										
9 Pre PDH	.21	**.25**	.16	.17	**.34**	**-.22**	-.20	-.08	--									
10 Post PDH	.22	.19	.20	.01	.22	.08	.13	-.17	.16	--								
11 Pre CBCL	**.55**	**.42**	**.26**	.17	**.36**	**-.23**	**-.25**	.01	.11	.06	--							
12 Post CBCL	.20	**.39**	.26	.11	.01	-.09	-.12	-.16	-.16	**.47**	**.40**	--						
13 Pre MSPSS	.02	**.43**	**.47**	**.24**	**.26**	**-.25**	-.05	-.10	**.30**	.17	**.25**	**.33**	--					
14 Post MSPSS	.16	.23	.26	.04	.13	**-.36**	-.00	-.23	.21	**.27**	**.35**	.19	**.66**	--				
15 Pre BDI	.17	**.58**	**.44**	**.27**	**.33**	-.15	-.13	-.09	**.24**	.03	**.45**	**.33**	**.54**	**.44**	--			
16 Mid BDI	**.31**	**.26**	**.57**	.09	**.33**	-.09	-.18	.00	.20	.13	**.51**	.20	**.64**	**.55**	**.78**	--		
17 Post BDI	.26	.09	-.00	.05	**.29**	-.11	-.19	.07	.26	**.39**	**.37**	.23	**.39**	**.51**	**.41**	**.72**	--	
18 Post BPTS	-.05	-.00	.15	.17	.05	.19	-.00	-.11	.22	**.34**	.17	.03	.09	.17	-.01	.10	.23	--

Table 3-2 continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mean	170.4	103.8	33.9	26.6	43.1	37.2	.03	.31	50.7	40.4	72.9	56.1	33.7	32.4	13.5	10.4	7.02	57.1
SD	26.2	17.7	14.2	6.9	6.4	13.1	.21	.23	10.1	7.4	7.7	9.5	15.2	13.9	9.2	7.8	8.3	13.4
Skewness	-.04	-.22	2.05	.22	.38	.17	1.03	.50	1.28	-.11	-.27	.63	.65	.59	.79	.69	1.97	1.38
SD	.26	.27	.25	.25	.26	.24	.25	.31	.25	.32	.24	.31	.24	.31	.24	.32	.31	.31
Kurtosis	-.23	.38	6.27	-.46	.07	-.74	4.12	1.9	4.54	-.41	.87	-.29	-.04	.64	.43	.08	4.71	1.76
SD	.52	.53	.50	.50	.51	.48	.49	.60	.49	.62	.48	.60	.48	.62	.48	.62	.61	.60
N	83	81	90	90	89	100	96	61	96	57	99	61	100	58	100	57	59	61

Table 3-3. Unconditional Means Models for the ECBI

		Parameter	Unconditional Means (SE)
Fixed Effects			
Initial Status, π_{0i}	Intercept	β_{00}	138.23** (3.03)
Variance Components			
Level 1	Within-person	σ^2_i	560.41 (23.67)
Level 2	In initial status	σ^2_0	819.50† (28.62)
Pseudo R^2 statistics and Goodness-of-fit			
R^2_ε			.59
Deviance			12,432.49

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$. †The chi square statistic is significant at the $p \leq .001$ level.

Table 3-4 –Unconditional Means Models for the PSI Total and Subscales

	Parameter	Unconditional Means (SE)			
		PSI Total	PD	PCDI	DC
Fixed Effects					
Initial Status, π_{0i}	Intercept β_{00}	95.35** (1.87)	29.38** (.88)	26.02** (.68)	39.98** (.73)
Variance Components					
Level 1	Within-person σ^2_i	122.72 (11.08)	19.44 (4.41)	14.49† (.3.81)	27.99† (5.29)
Level 2	In initial status σ^2_0	322.93† (17.97)	71.98† (8.48)	42.56† (6.52)	47.96† (6.92)
Pseudo R^2 statistics and Goodness-of-fit					
R^2_ε		.72	.79	.75	.63
Deviance		10,425.98	8.023.38	7,614.66	8,409.10

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi square statistic significant at the $p \leq .001$ level

Table 3-5. Unconditional Growth Model for the ECBI and PSI Scales

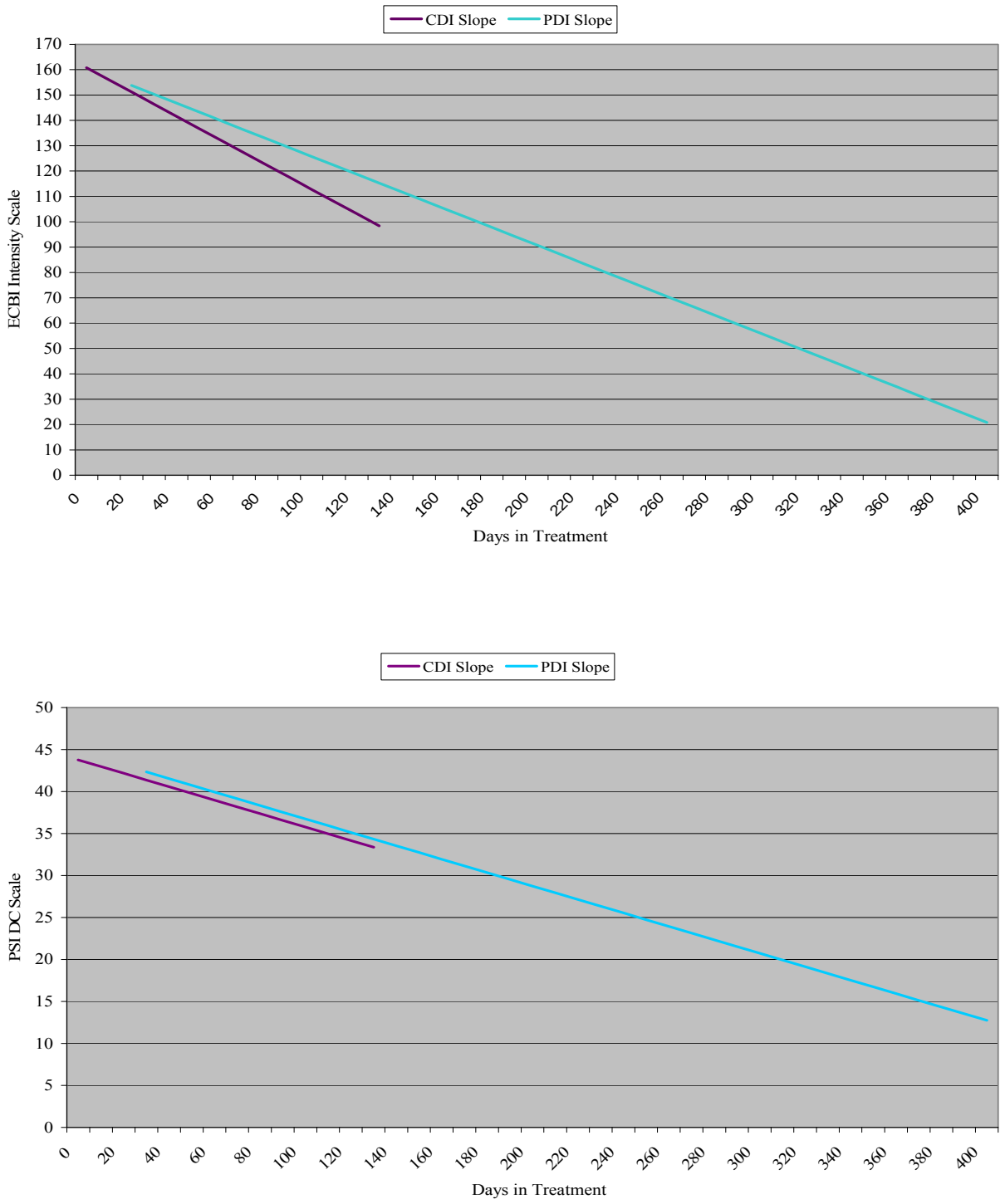
	Parameter	Unconditional Growth Means (SE.)				
		ECBI	PSI Total	PD	PCDI	DC
Fixed Effects						
Initial Status,	Intercept	158.47**	102.91**	31.67**	27.52**	43.78**
π_{0i}	β_{00}	(3.21)	(1.87)	(.94)	(.68)	(.76)
Rate of	Intercept	-.38**	-.15**	-.05**	-.03**	-.07**
Change,	β_{10}	(.04)	(.02)	(.01)	(.006)	(.01)
π_{2i}						
Variance Components						
Level 1	Within-	210.29	54.47	10.94	10.00	11.92
	person σ^2_i	(14.50)	(7.38)	(3.31)	(3.16)	(3.45)
Level 2	In initial	939.22†	321.86†	81.30†	41.65†	51.89†
	σ^2_0status	(30.65)	(17.94)	(9.02)	(6.45)	(7.20)
	In rate of	.12†	.03†	.005†	.003†	.008†
	change σ^2_1	(.35)	(.17)	(.07)	(.05)	(.08)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_{ε}		.62	.56	.44	.31	.57
Deviance		11,469.64	9,672.72	7,536.90	7,339.65	7,616.20

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi square statistic significant at the $p \leq .001$ level

Table 3-6. Phase of Treatment Predictor Model

	Parameter	Change Estimates (S.E.)				
		ECBI	PSI Total	PD subscale	PCDI subscale	DC subscale
Fixed Effects						
Initial Status, π_{0i}	Intercept β_{00}	164.74** (4.49)	101.47** (2.91)	31.55** (1.41)	28.17** (1.03)	42.80** (.90)
Rate of Change, π_{2i}	Time β_{10}	-.61** (.12)	-.15** (.06)	-.06** (.02)	-.04 (.02)	-.08* (.01)
	Tx Phase β_{20}	-3.94 (3.28)	1.35 (1.94)	.87 (.26)	-.52 (.58)	.97* (.48)
	Tx Phase X Time β_{30}	.13* (.07)	-.004 (.03)	.008 (.01)	.006 (.01)	
Variance Components (S.D.)						
Level 1	Within-person σ^2_i	208.55 (14.44)	54.30 (7.37)	10.90 (3.30)	10.03 (3.16)	11.81 (3.43)
Level 2	In initial σ^2_0status	932.27† (30.53)	324.56† (18.02)	82.15† (9.06)	42.10† (6.49)	52.02† (7.21)
	In rate of change σ^2_1	.12† (.34)	.03† (.18)	.004† (.07)	.002† (.05)	.008† (.09)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_ε		.01				.01
Deviance		11,465.55	11,457.40	7,547.58	7,353.75	7,621.65

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi-square statistic significant at the $p \leq .001$ level.



Graph 3-1. Patterns of Change in CDI and PDI. A) Patterns of change in child disruptive behavior in CDI and PDI. B) Patterns of change in parenting stress related to having a difficult child to manage.

Table 3-7. Effect of Diagnosis of ADHD and Treatment Phase on ECBI and PSI DC

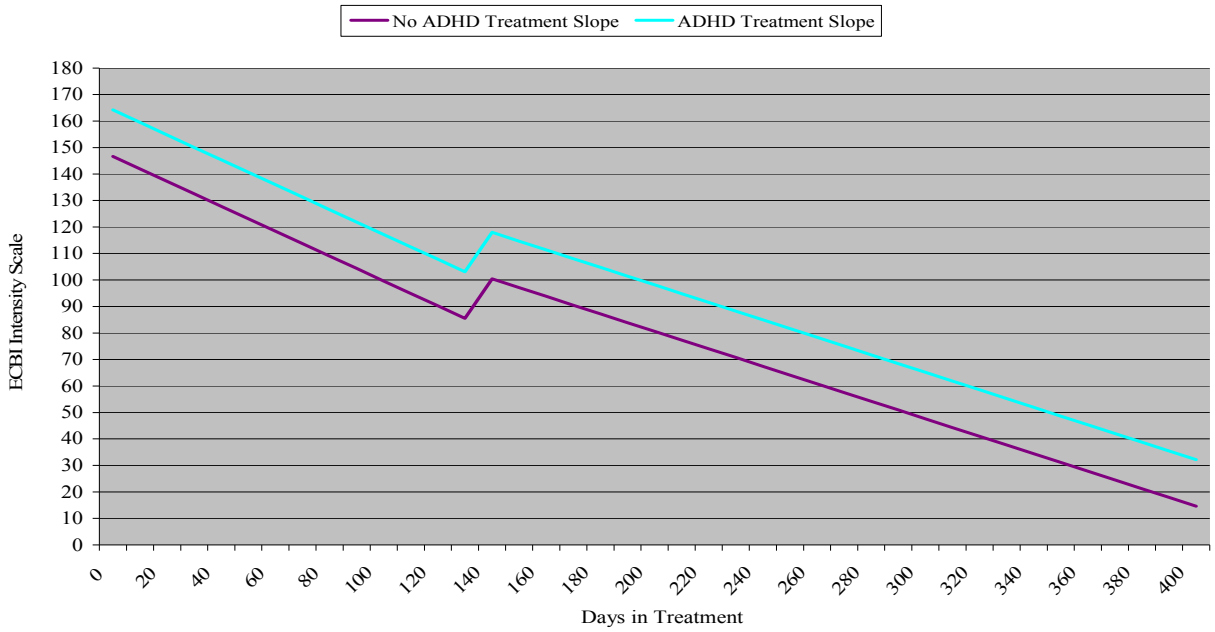
	Parameter		Change Estimates (S.E.)	
			ECBI	DC subscale
Fixed Effects				
Initial Status, π_{0i}	Intercept	β_{00}	146.60**	40.03**
			(6.90)	(1.99)
	ADHD	β_{01}	17.54*	3.68
			(7.65)	(2.22)
Rate of Change, π_{2i}	Slope	β_{10}	-.61**	-.07**
			(.14)	(.02)
	ADHD	β_{11}	.09	-.007
			(.16)	(.02)
	Tx Phase	β_{20}		1.50*
				(.54)
	Tx Phase * Time	β_{30}	.14*	
			(.06)	
	Tx Phase * Time * ADHD	β_{21}	-.07	
			(.08)	
Variance Components				
Level 1	Within-person	σ^2_i	207.81	11.77
			(14.41)	(2.43)
Level 2	In initial status	σ^2_0	859.68†	49.86†
			(29.32)	(7.06)
	In rate of change	σ^2_1	0.12†	.008†
			(.35)	(.08)
Pseudo R^2 statistics and Goodness-of-fit				
R^2_{ε}			.62	.57
R^2_0			.08	.04
R^2_1			.00	.00
Deviance			11,451.27	7,604.59

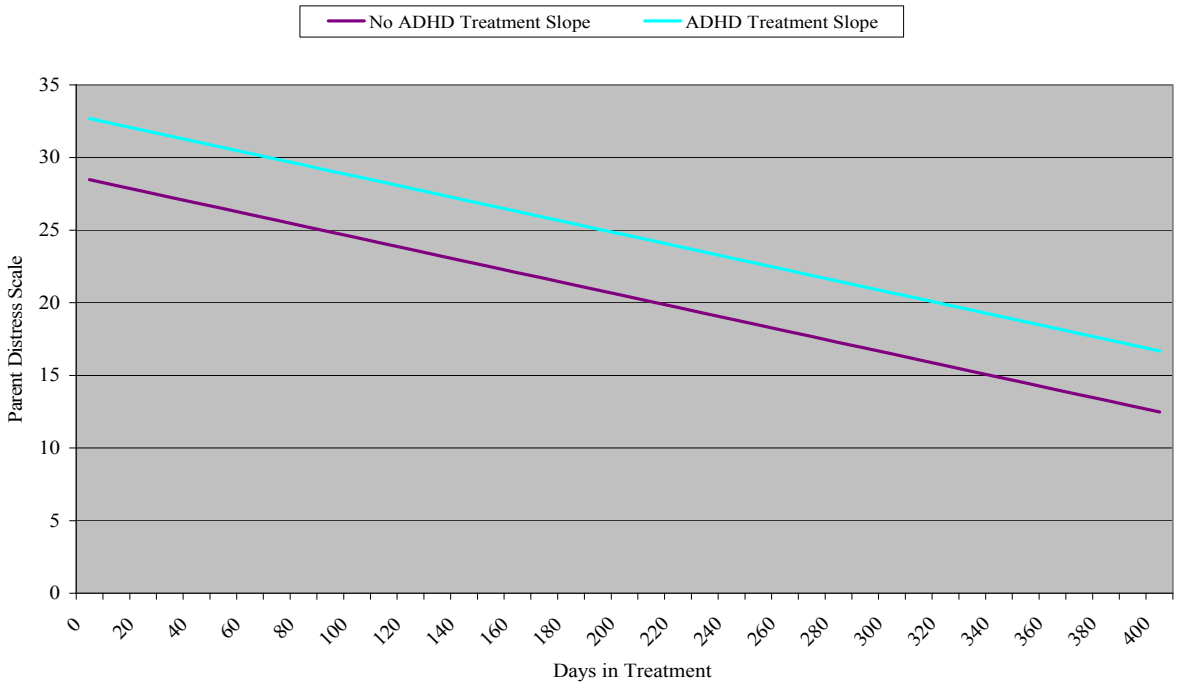
The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † = The chi square statistic significant at the $p \leq .001$ level

Table 3-8. Effect of Diagnosis of ADHD on Total, PD and PCDI PSI Scales

	Parameter		Change Estimates (S.E.)		
			PSI Total	PD	PCDI
Fixed Effects					
Initial Status, π_{0i}	Intercept	β_{00}	97.02**	28.48**	27.03**
			(3.60)	(1.49)	(1.32)
	ADHD	β_{01}	7.74[a]	4.21*	.64
			(4.19)	(1.86)	(1.54)
Rate of Change, π_{2i}	Slope	β_{10}	-.14**	-.04**	-.03*
			(.04)	(.01)	(.01)
	ADHD	β_{11}	-.01	-.005	.006
			(.04)	(.02)	(.01)
Variance Components					
Level 1	Within-person	σ^2_i	54.46	10.94	10.00
			(7.38)	(3.31)	(3.16)
Level 2	In initial status	σ^2_0	311.08[†]	78.08[†]	41.59[†]
			(17.64)	(8.83)	(6.45)
	In rate of change	σ^2_1	.03[†]	.005[†]	.003[†]
			(.18)	(.07)	(.05)
Pseudo R^2 statistics and Goodness-of-fit					
R^2_ε			.56	.44	.31
R^2_0			.03	.04	.00
R^2_1			.00	.00	.00
Deviance			9,669.54	7,532.99	7,339.24

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; [†] = The chi square statistic significant at the $p \leq .001$ level; [a] *p* value approached significant at .07.





Graph 3-2. Patterns of Change by ADHD Diagnosis. A) Patterns of change in child disruptive behavior with and without ADHD diagnosis. B) Pattern of change in parent distress with and without ADHD diagnosis.

Table 3-9. Effect of Attachment Q sort and Phase of Treatment on Child Disruptive Behavior

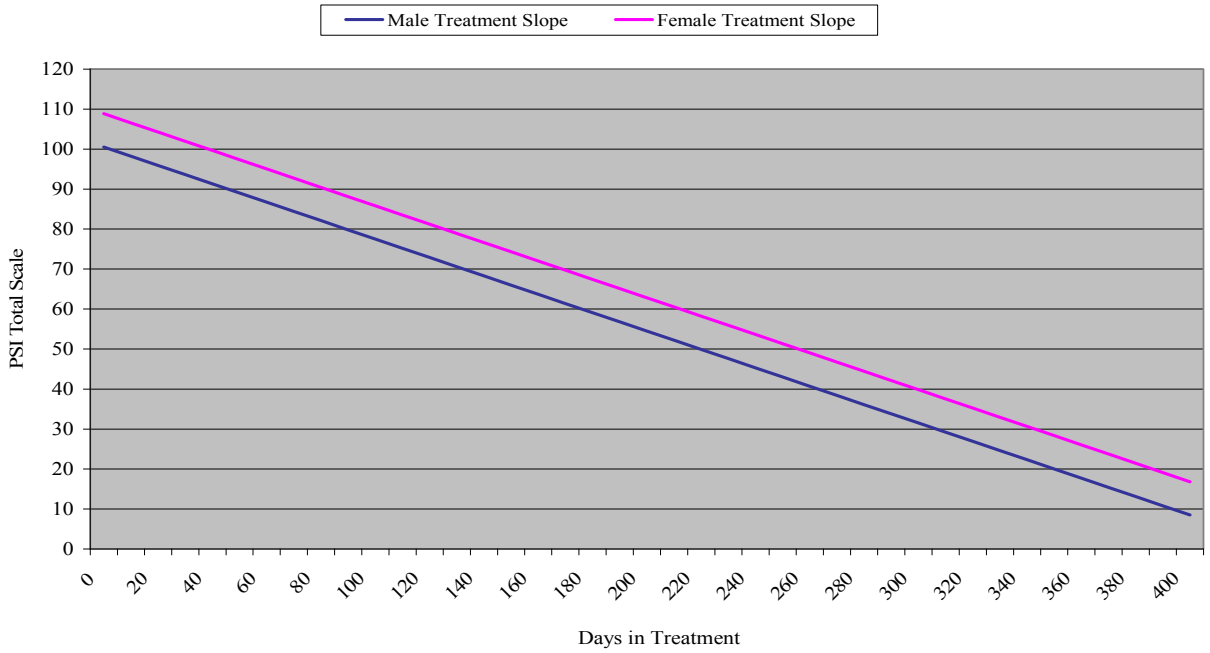
	Parameter		Change Estimates (S.E.)
			ECBI
Fixed Effects			
Initial Status, π_{0i}	Intercept	β_{00}	160.94** (3.01)
	Q-Sort	β_{01}	-27.45 (16.81)
Rate of Change, π_{2i}	Slope	β_{10}	-.55** (.10)
	Q-Sort	β_{11}	-.18 (.50)
	Tx phase * Time	β_{20}	.09* (.04)
	Tx phase * Time * Qsort	β_{21}	.04 (.24)
Variance Components			
Level 1	Within-person	σ^2_i	208.12 (14.43)
Level 2	In initial status	σ^2_0	877.51† (29.62)
	In rate of change	σ^2_1	.12† (.35)
Pseudo R^2 statistics and Goodness-of-fit			
R^2_{ε}			.62
R^2_0			.07
R^2_1			.00
Deviance			11,452.29

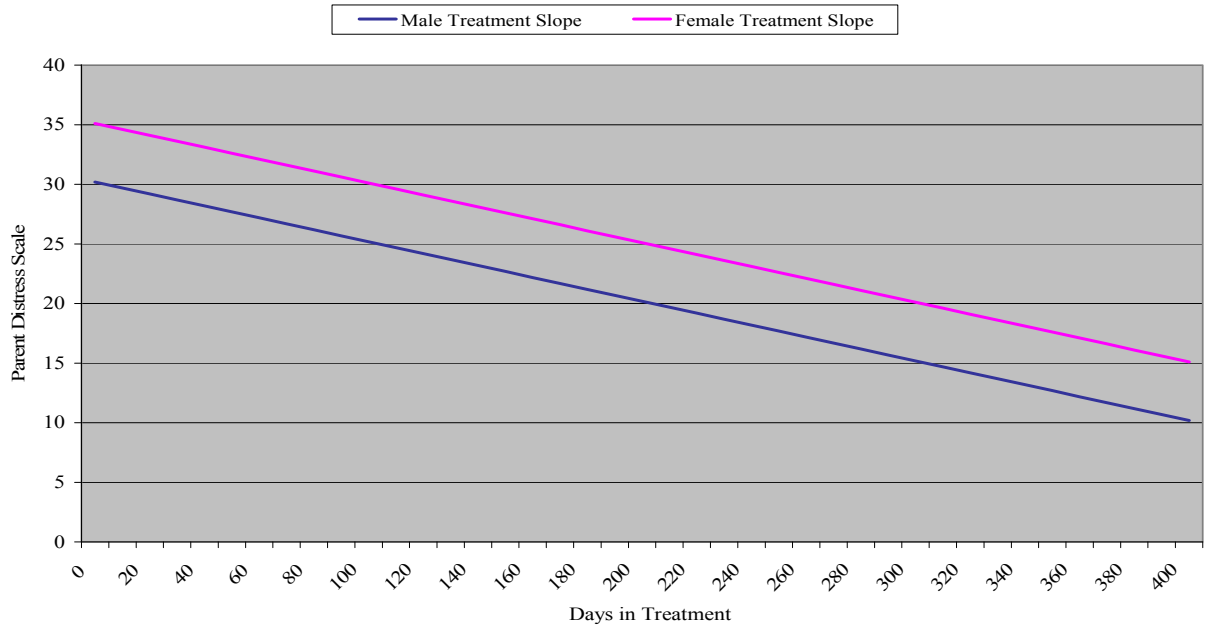
The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi square statistic significant at the $p \leq .001$ level

Table 3-10. Effects of Gender on Change in PCIT

	Parameter	Change Estimates				
		ECBI	PSI Total	PD subscale	PCDI subscale	DC subscale
Fixed Effects						
Initial Status, π_{0i}	Intercept β_{00}	151.28**	92.11**	25.26**	24.75**	40.92**
		(9.43)	(5.41)	(2.71)	(2.00)	(2.25)
	Gender β_{01}	5.54	8.33*	4.92*	2.13	2.21
		(6.13)	(3.65)	(1.88)	(1.36)	(1.54)
Rate of Change, π_{2i}	Days in Treatment β_{10}	-.46**	-.23**	-.05*	-.04*	-.11**
		(.12)	(.06)	(.02)	(.02)	(.03)
	Gender β_{11}	.06	.06	.004	.01	.02
		(.07)	(.04)	(.01)	(.01)	(.03)
Variance Components (S.D)						
Level 1	Within-person σ^2_i	210.32	54.47	10.94	10.00	11.92
		(14.50)	(7.38)	(3.31)	(3.16)	(3.45)
Level 2	In initial status σ^2_0	933.26†	307.31†	76.20†	40.69†	50.84†
		(30.55)	(17.53)	(8.73)	(6.38)	(7.13)
	In rate of change σ^2_1	.12†	.03†	.004†	.003†	.007†
		(.34)	(.18)	(.07)	(.05)	(.09)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_{ε}		.62	.55	.44	.31	.57
R^2_0			.05	.06		
R^2_1			.00	.00		
Deviance		11,467.94	9,665.22	7,529.52	7,335.81	7,611.16

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi-square statistic significant at the $p \leq .001$ level.

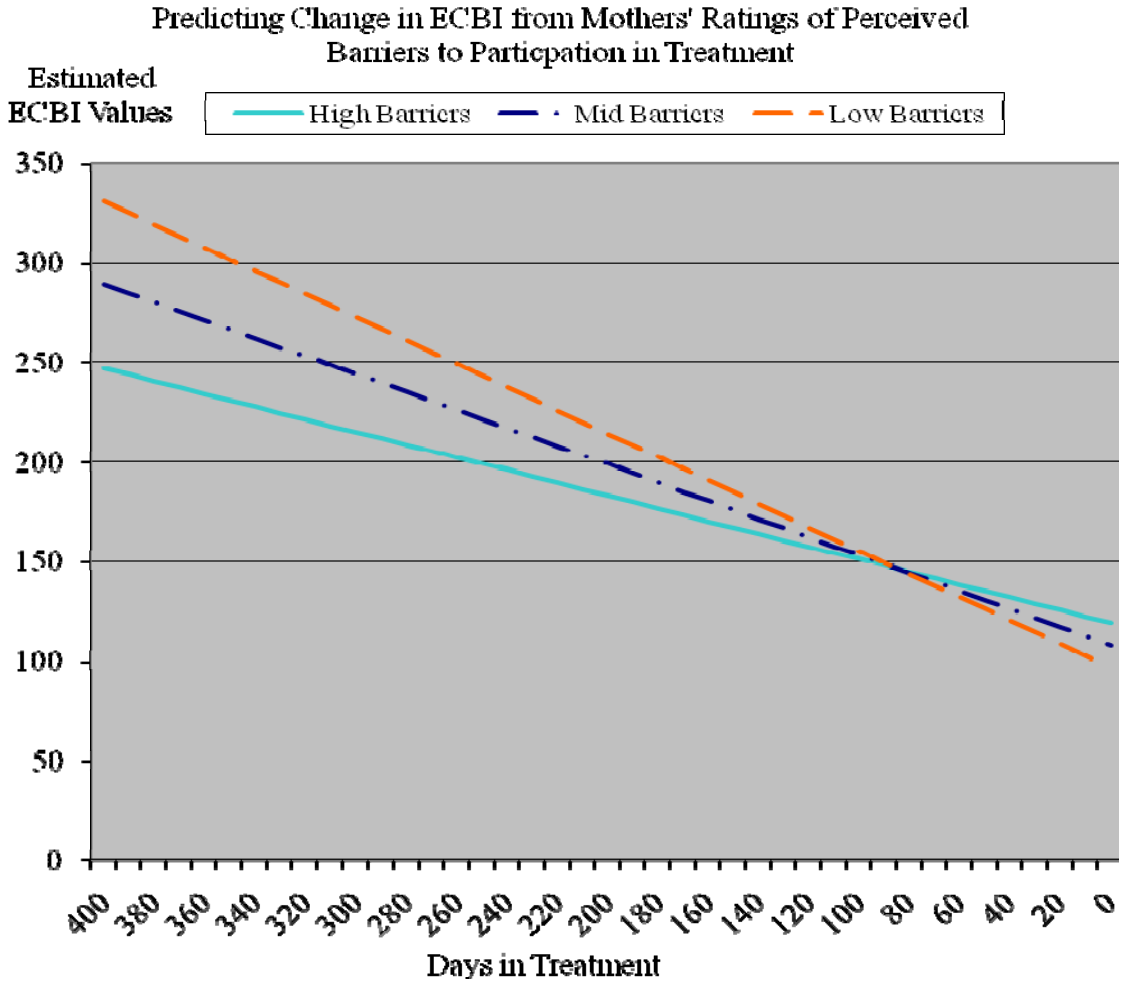




Graph 3-3. Patterns of Change by Gender. A) Patterns of change in overall maternal parenting stress by gender. B) Patterns of change in parent distress by gender.

Table 3-11. Barriers to Participation in Treatment Change Model			
	Parameter		Change Estimates
			ECBI
Fixed Effects			
Initial Status, π_{0i}	Intercept	β_{00}	60.21* (24.35)
	BTPS	β_{01}	.85* (.42)
Rate of Change, π_{2i}	Intercept	β_{10}	1.02** (.20)
	BTPS	β_{11}	-.01** (.002)
Variance Components			
Level 1	Within-person	σ^2_i	218.73 (14.79)
Level 2	In initial status	σ^2_0	793.38† (28.17)
	In rate of change	σ^2_1	.09† (.30)
Pseudo R^2 statistics and Goodness-of-fit			
R^2_ε			.62
R^2_0			.37
R^2_1			.26
Deviance			5,565.31

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi-square statistic significant at the $p \leq .001$ level

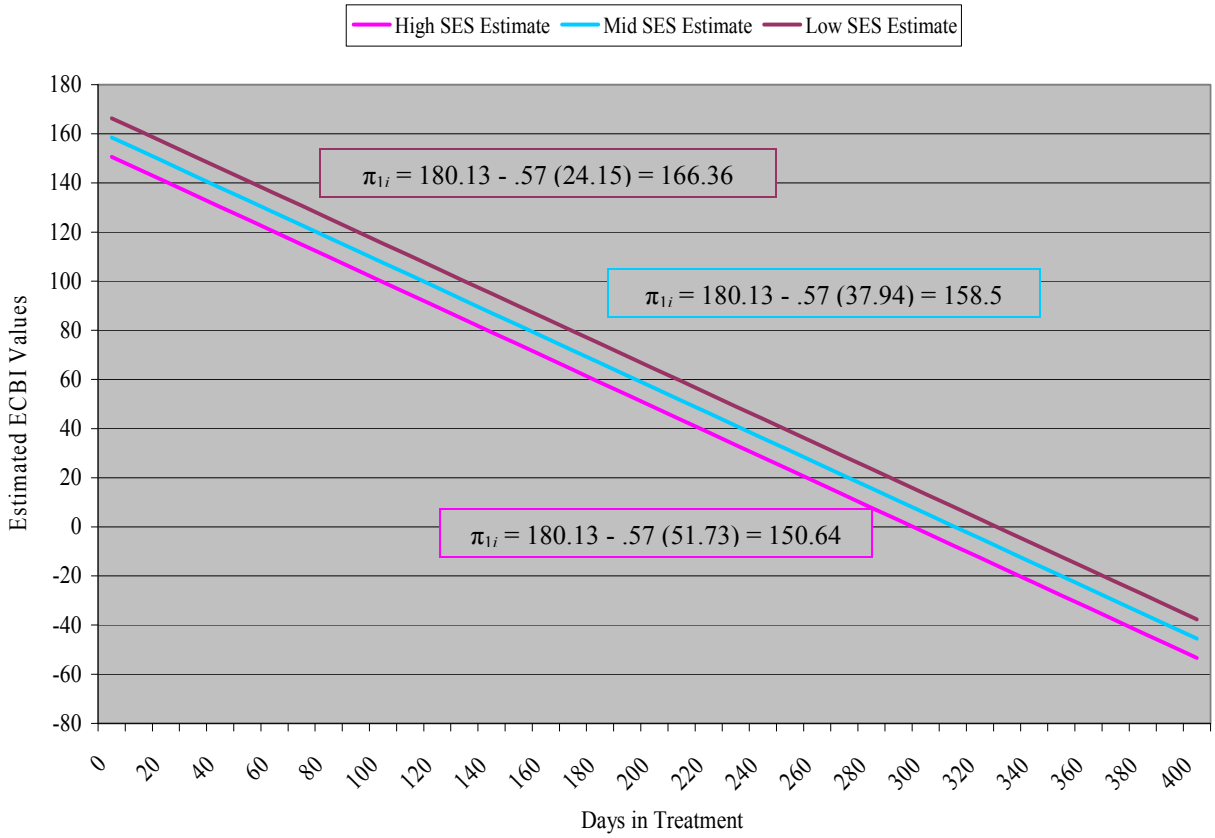


Graph 3-4. Predicting Change in Child Disruptive Behavior from Mothers' Ratings of Barriers to Participation in Treatment.

Table 3-12. Effect of SES on Change in Children's Disruptive Behavior

	Parameter		Change Estimates
			ECBI
Fixed Effects			
Initial Status, π_{0i}	Intercept	β_{00}	180.13** (9.96)
	SES	β_{01}	-.57** (.13)
Rate of Change, π_{2i}	Intercept	β_{10}	-.51** (.13)
	SES	β_{11}	.003 (.002)
Variance Components			
Level 1	Within-person	σ^2_i	210.24† (14.50)
Level 2	In initial status	σ^2_0	877.32† (29.62)
	In rate of change	σ^2_1	.12† (.34)
Pseudo R^2 statistics and Goodness-of-fit			
$R^2_{Y, \hat{Y}}$			
R^2_{ε}			.62
R^2_0			.07
R^2_1			.00
Deviance			11,463.26

The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi-square statistic significant at the $p \leq .001$ level

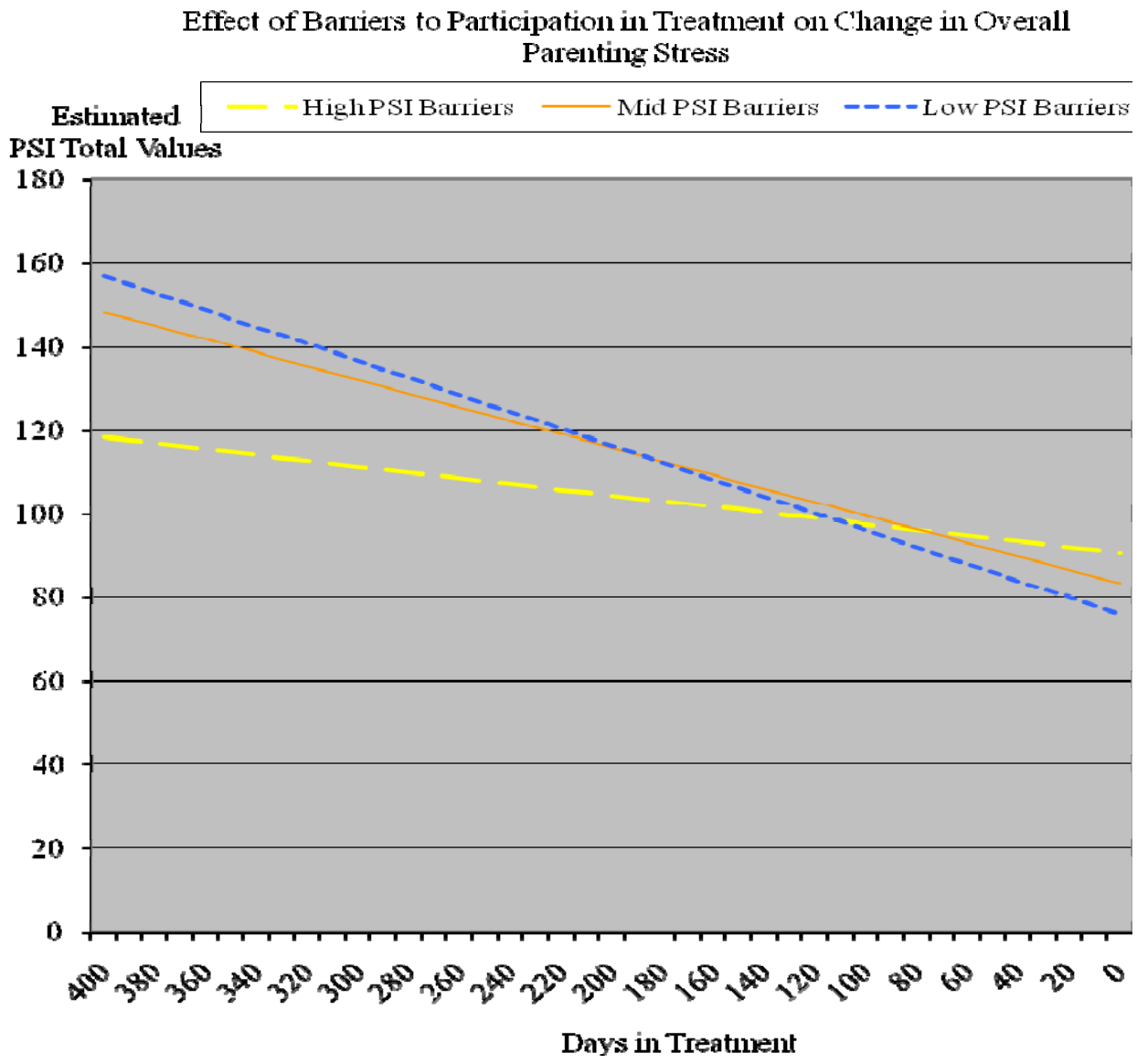


Graph 3-5. Initial Status and Rate of Change in Child Disruptive Behavior by Socioeconomic Status.

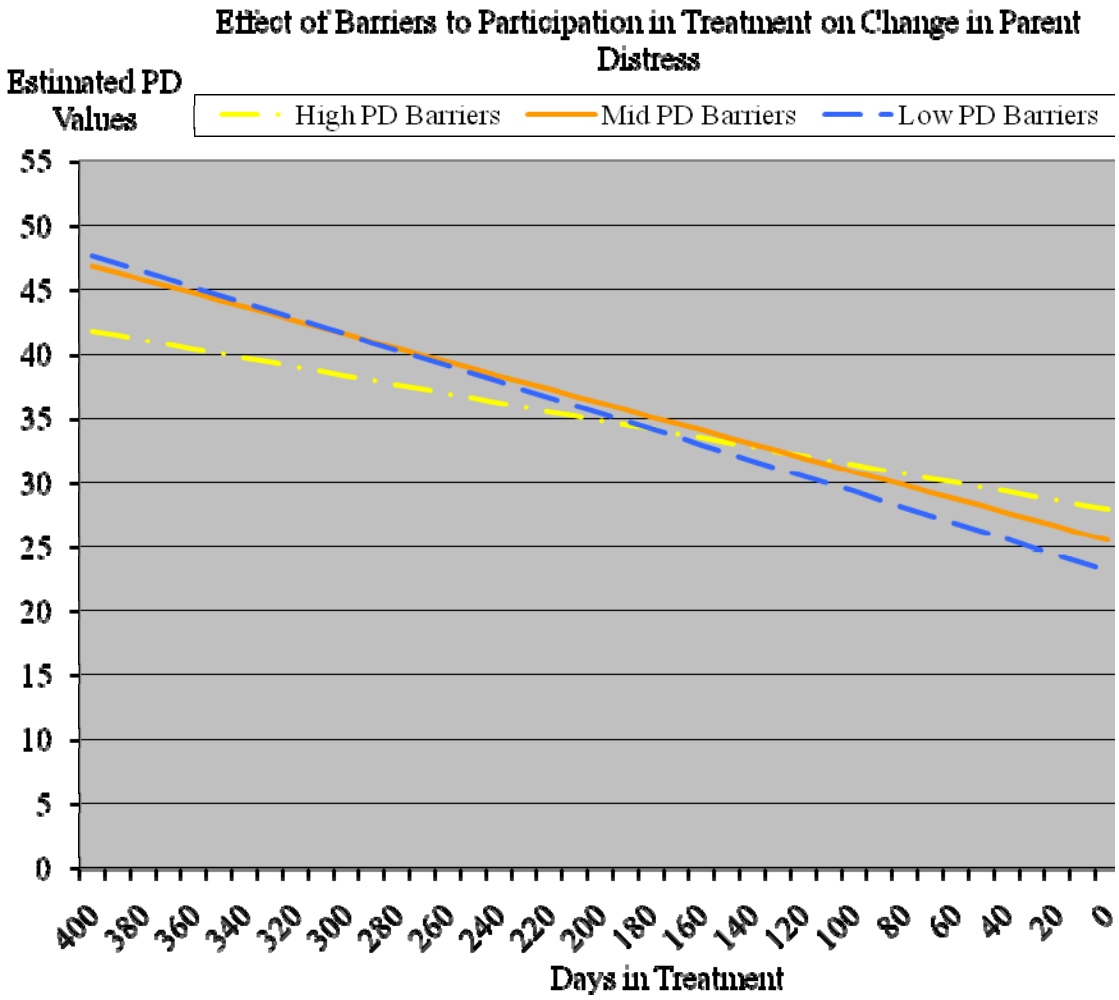
Table3-13. Effect of Perceived Barriers to Participation in Treatment on Change in Parenting Stress

	Parameter	PSI Total	PD subscale	PCDI subscale	DC subscale
Fixed Effects					
Initial Status, π_{0i}	Intercept β_{00}	51.62**	15.25*	14.71*	21.53**
		(12.06)	(4.73)	(4.37)	(4.35)
	BTPS β_{01}	.56*	.18*	.15*	.22*
		(.20)	(.07)	(.07)	(.07)
Rate of Change, π_{2i}	Slope β_{10}	.42**	.11*	.11*	.21**
		(.11)	(.03)	(.03)	(.05)
	BTPS β_{11}	-.005**	-.001*	-.001*	-.002**
		(.002)	(.0004)	(.0004)	(.001)
Variance Components					
Level 1	Within-person σ^2_i	48.41	12.52	5.99	11.56
		(6.96)	(3.54)	(2.45)	(3.40)
Level 2	In initial σ^2_0status	332.06†	75.69†	40.22†	55.48†
		(18.22)	(8.70)	(6.34)	(7.45)
	In rate of change σ^2_1	.02†	.004†	.003†	.005†
		(.15)	(.06)	(.05)	(.07)
Pseudo R^2 statistics and Goodness-of-fit					
R^2_{ε}		.55	.44	.31	.57
R^2_0		.26	.11	.13	.33
R^2_1		.10	.14	.03	.24
Deviance		4,613.21	3,736.35	3,276.66	3,670.86

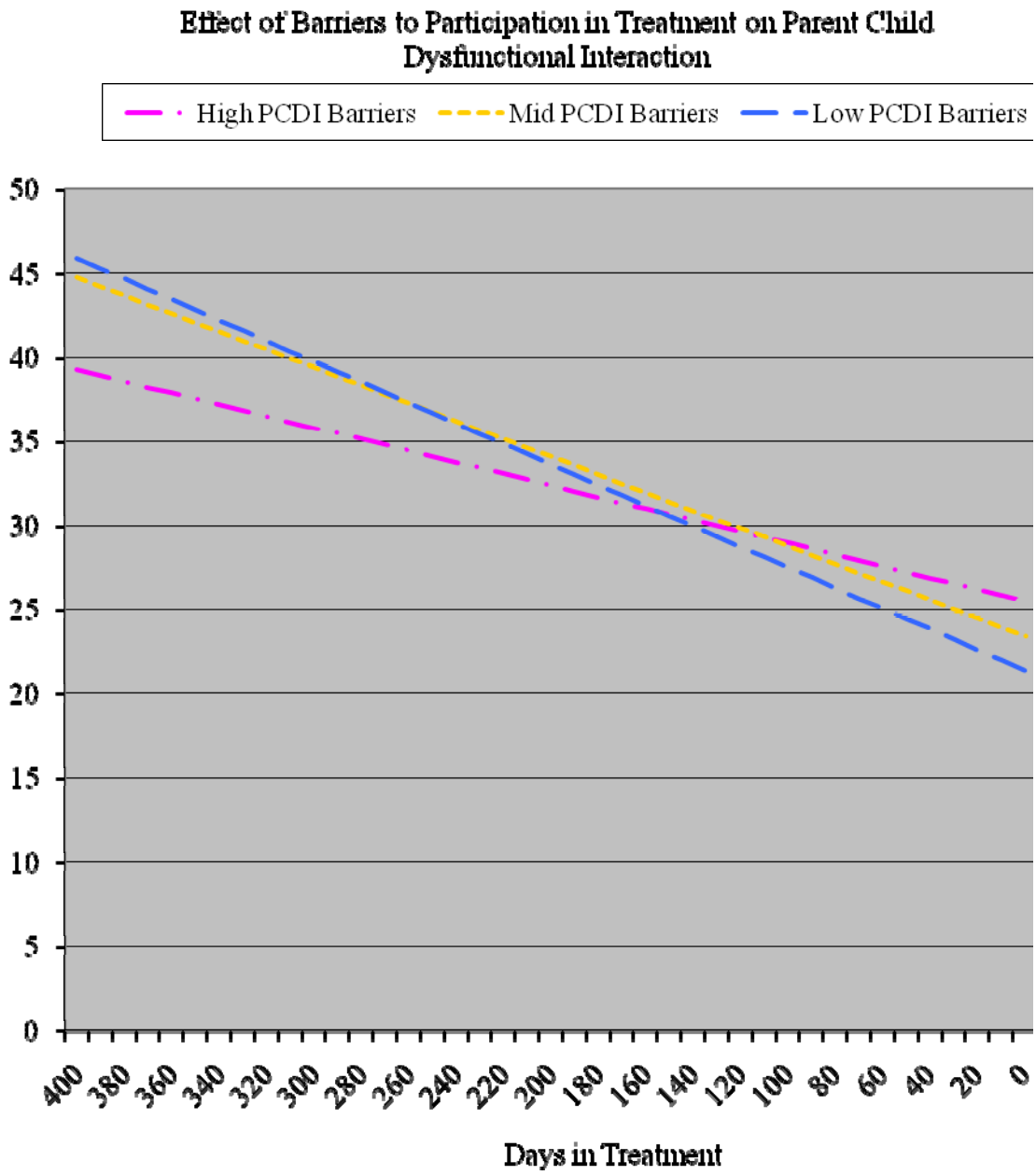
The *t*-statistic is statistically significant at the *$p \leq .05$ or ** $p \leq .001$; † The chi-square statistic significant at the $p \leq .001$ level



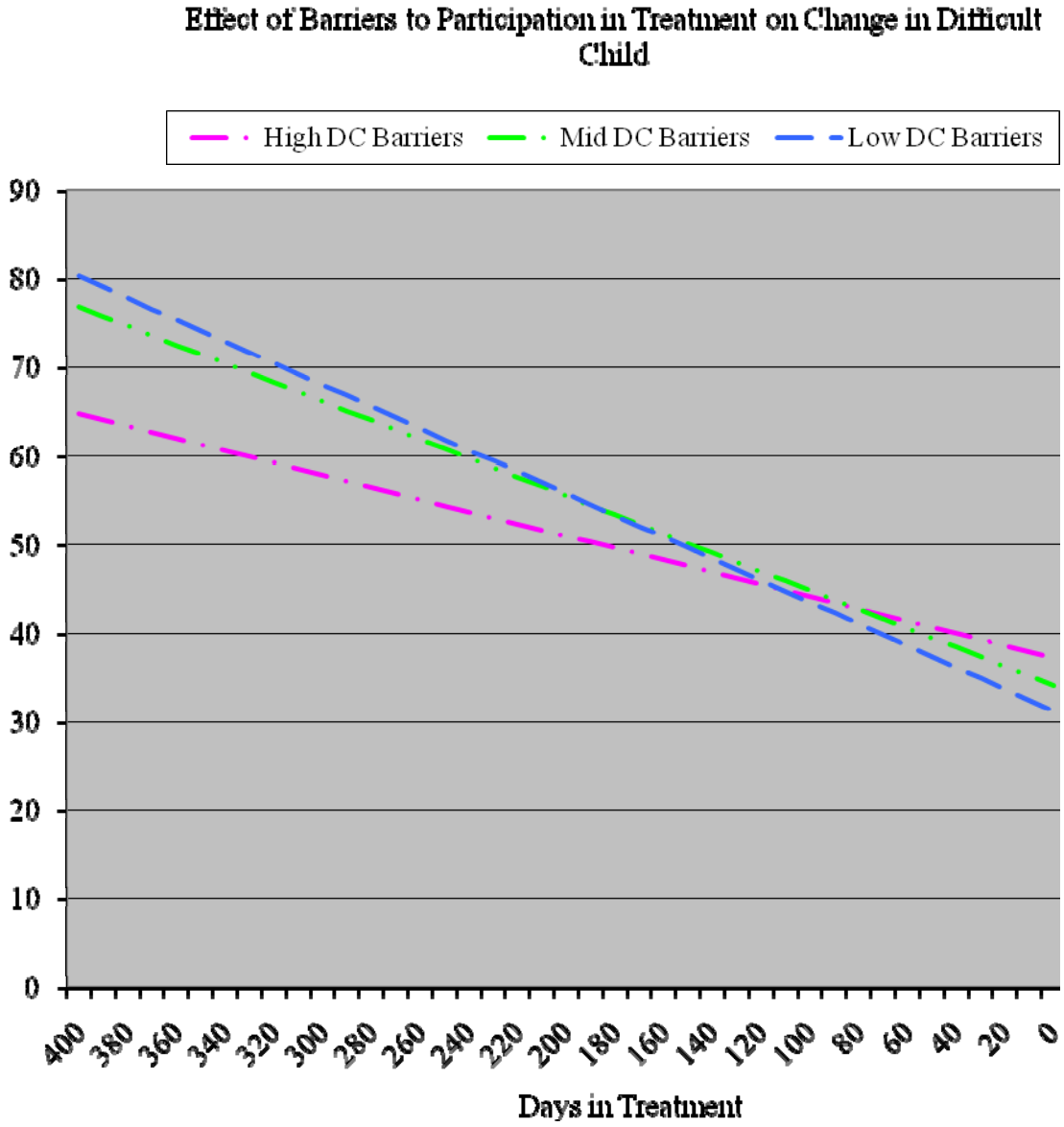
Graph 3-6. Patterns of Change in Parenting Stress by Levels of Barriers to Participation in Treatment. A) Patterns of change in overall maternal parenting stress by levels of barriers to participation. B) Patterns of change in maternal parent distress by levels of barriers to participation. C) Patterns of change in maternal parent child dysfunctional interaction by levels of barriers to participation. D) Patterns of change in maternal ratings of difficult child by levels of barriers to participation.



Graph 3-6. Cotinued.



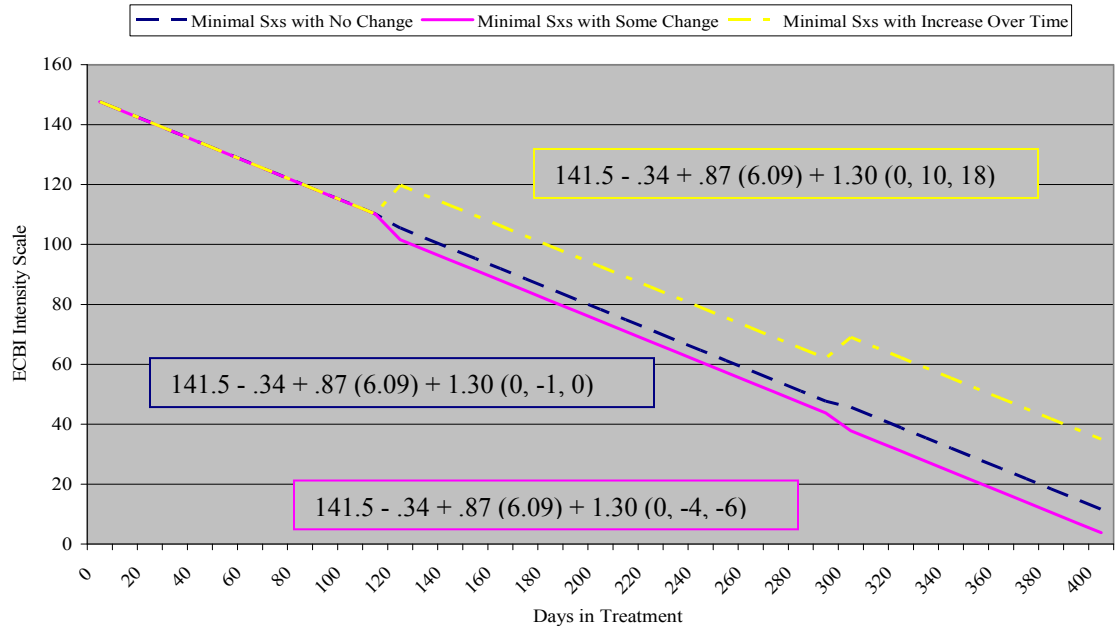
Graph 3-6. Continued.

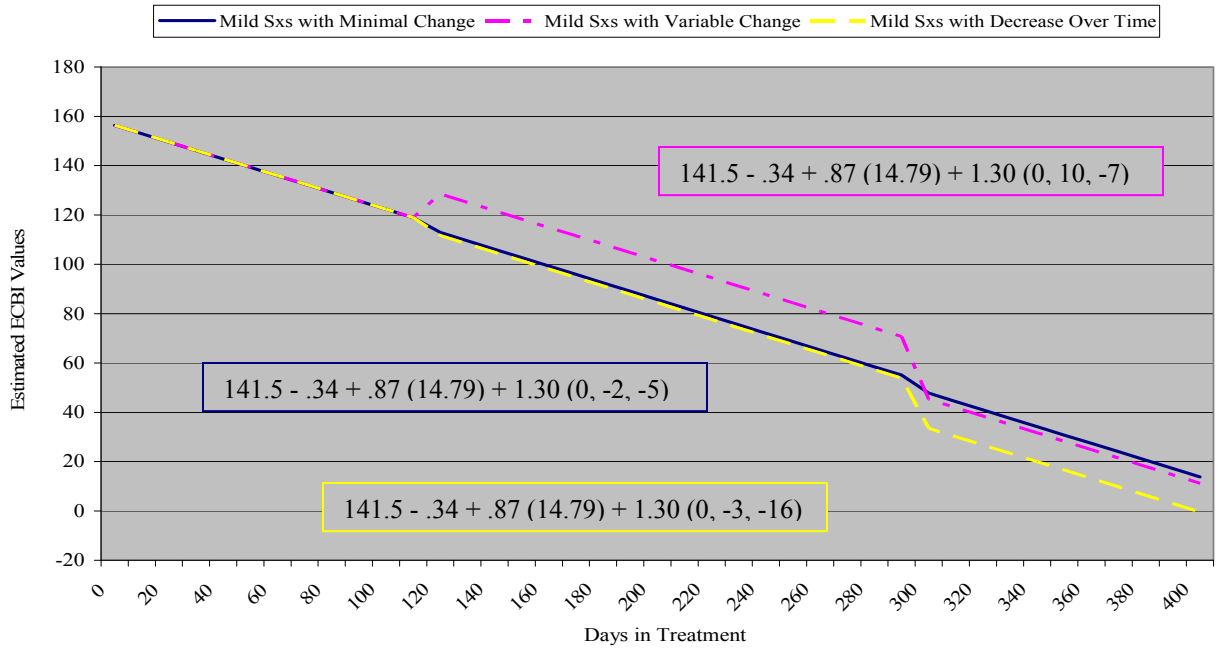


Graph 3-6. Continued.

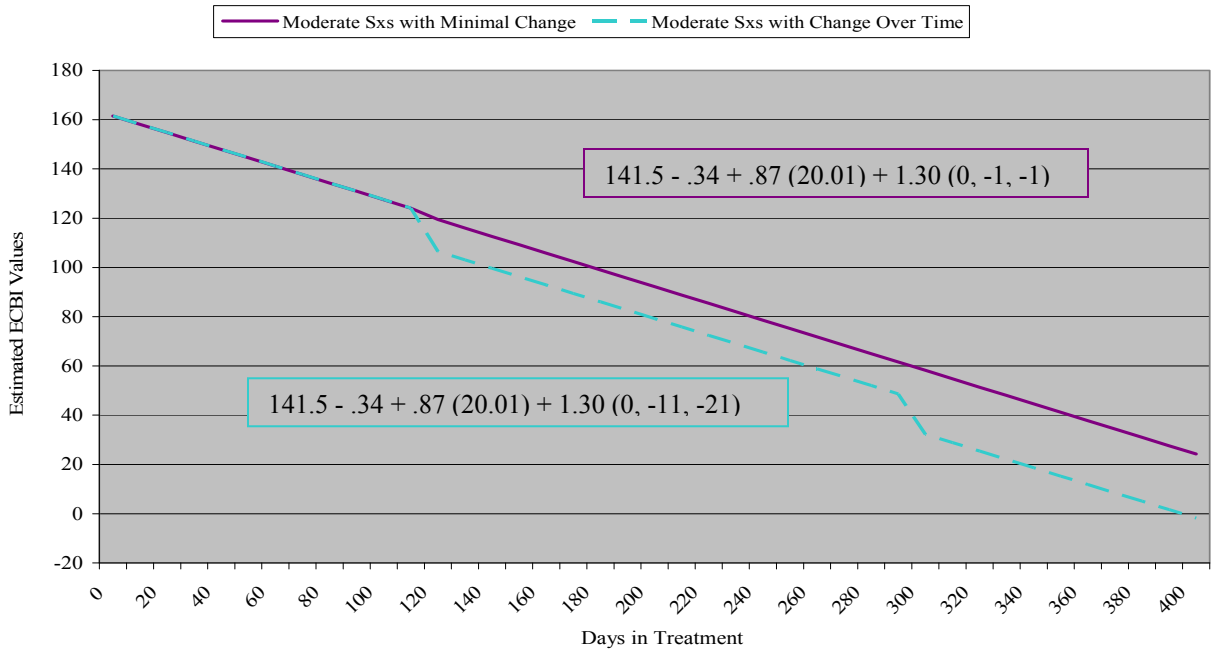
Table 3-14. Effect of Maternal Depression in Children's Disruptive Behavior

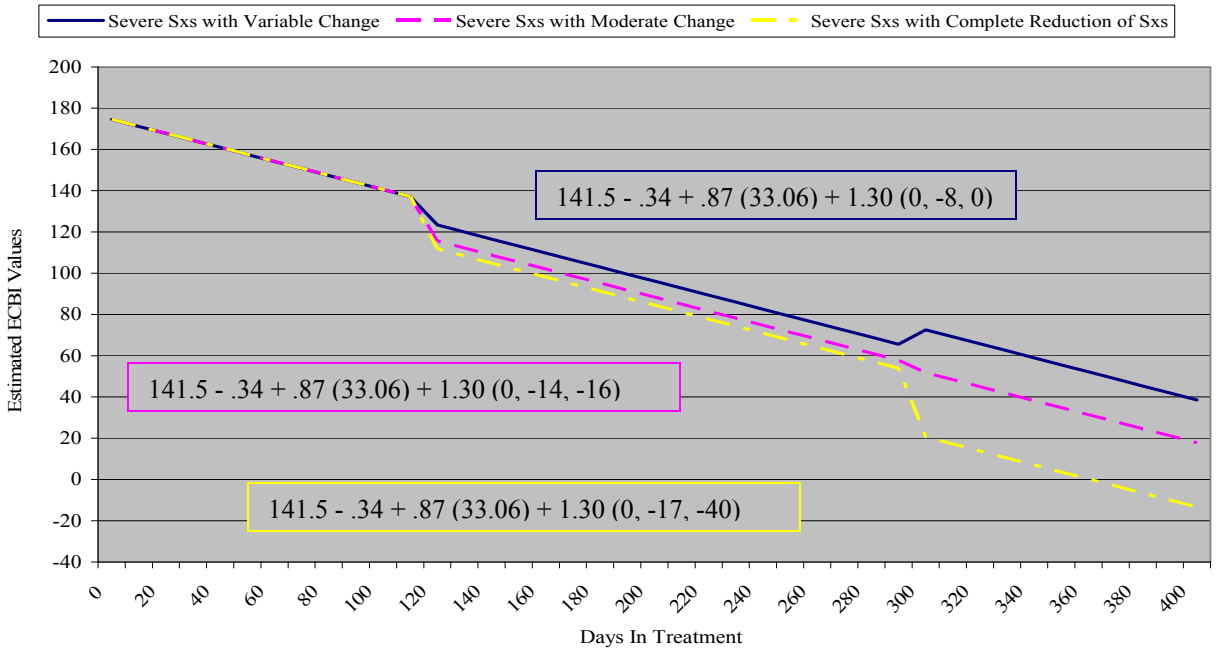
	Parameter		Change Estimates (S.E.)	
			Main Effect Model	Interaction Effect Model
Fixed Effects				
Initial Status, π_{0i}	Intercept	β_{00}	141.50** (6.31)	141.51** (6.37)
Rate of Change, π_{2i}	Slope	β_{10}	-.34** (.04)	-.34** (.04)
	Pre-BDI Score	β_{20}	.87** (.39)	.87** (.40)
	Level-1 Centered BDI	B_{30}	1.30** (.54)	1.32 (.69)
	Time X Centered BDI	β_{40}		-.0002 (.004)
Variance Components (S.D.)				
	Within-person	σ^2_i	459.52 (21.43)	460.15 (21.45)
Level 2	In initial status	σ^2_0	562.72† (23.72)	561.80† (23.70)
	In rate of change	σ^2_1	.15† (.02)	.15† (.02)
Pseudo R^2 statistics and Goodness-of-fit				
R^2_ε			.62	
R^2_0			.40	
R^2_1			.20	
Deviance			1,400.20	1,400.20





Graph 3-7. Patterns of Change in Child Disruptive Behavior by Change in Maternal Depression during PCIT. A) Effect of minimal maternal depressive symptoms on patterns of change. B) Effect of mild maternal depressive symptoms on patterns of change. C) Effect of moderate maternal depressive symptoms on patterns of change. D) Effect of severe maternal depressive symptoms on patterns of change.





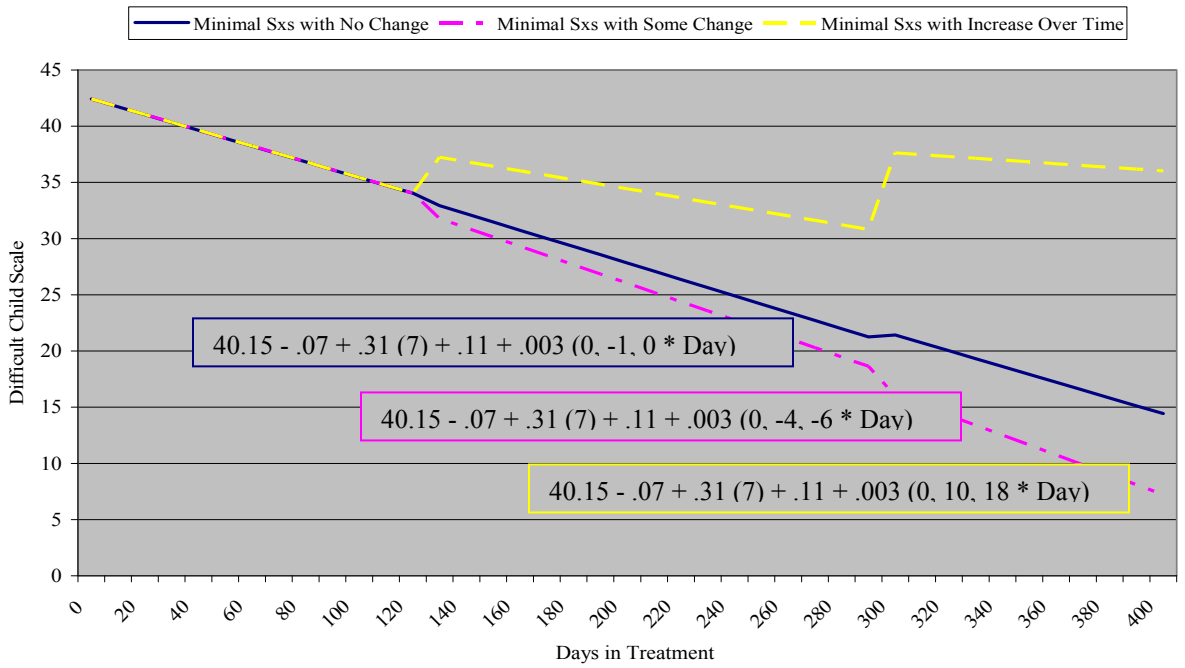
Graph 3-7 Continued.

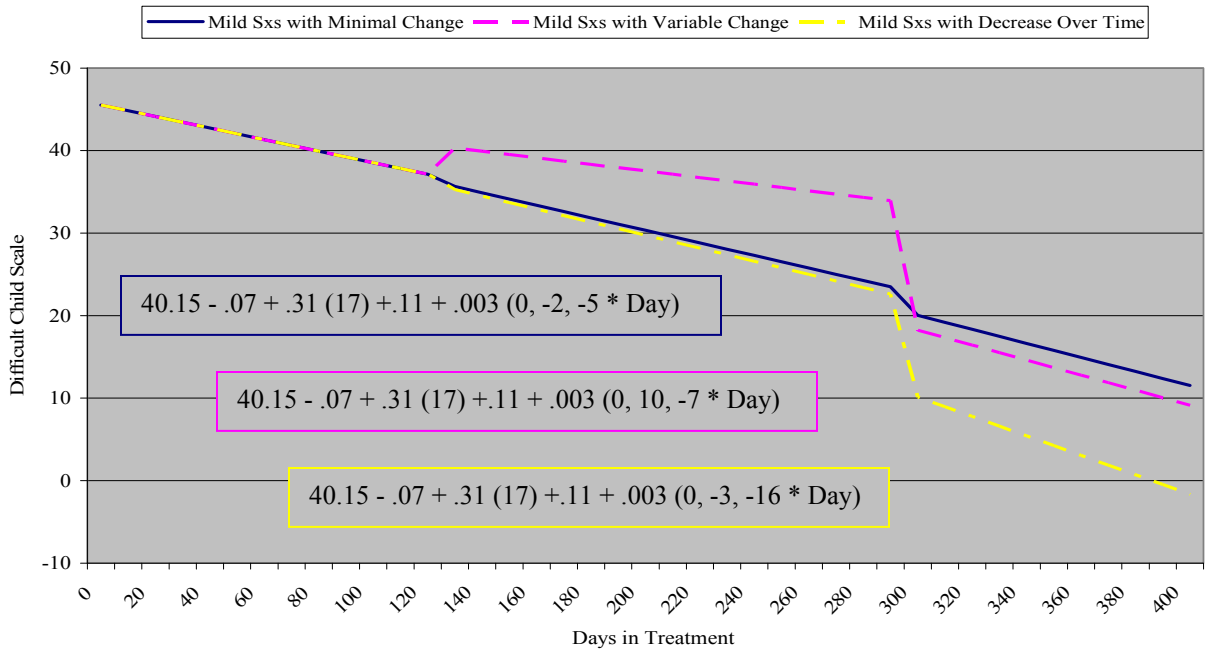
Table 3-15 Effect of Maternal Depression on Parenting Stress

	Parameter		PSI Total		PSI PD	
			Main Effect	Interaction Effect	Main Effect	Interaction Effect
Fixed Effects						
Initial Status, π_{0i}	Intercept	β_{00}	85.92** (3.65))	86.60** (3.63)	22.19** (1.54)	22.32** (1.54)
Rate of Change, π_{2i}	Slope	β_{10}	-.11** (.02)	-.11** (.02)	-.02** (.01)	-.02** (.005)
	Pre-BDI	β_{20}	1.16** (.18)	1.09** (.17)	.65** (.08)	.63** (.08)
	Level-1 Centered BDI	β_{30}	1.10** (.25)	0.62 (.41)	.39** (.09)	.19 (.16)
	Time X Centered BDI	β_{40}		.004 (.003)		.001 (.001)
Variance Components						
Level 1	Within-person	σ^2_i	105.22 (10.26)	94.24 (9.71))	16.01 (4.00)	15.62† (3.95)
Level 2	In initial status	σ^2_0	146.22† (12.09)	153.91† (12.41)	28.86† (5.37)	29.70† (5.45)
	In rate of change	σ^2_1	.07† (.004)	.07† (.01)	.0003 (.02)	.0002 (.01)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_{ε}			.56		.44	
R^2_0			.54		.65	
R^2_1			.57		.94	
Deviance			1,210.46	1,207.40	931.69	927.80

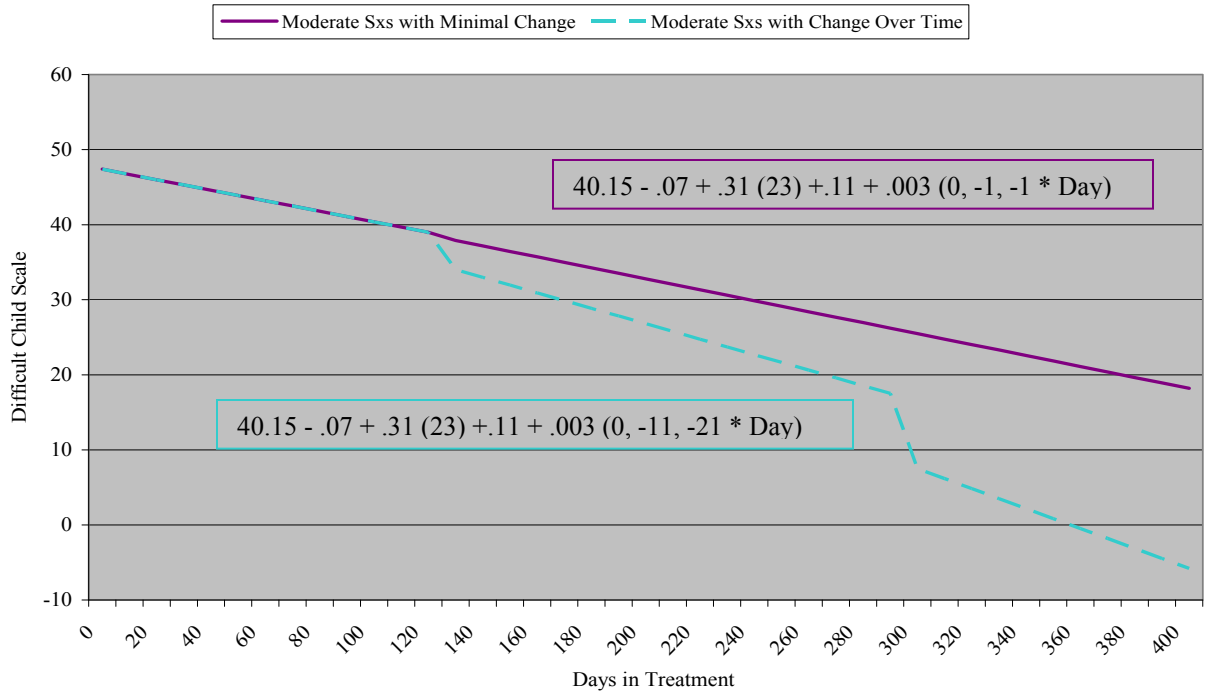
Table 3-15. Continued

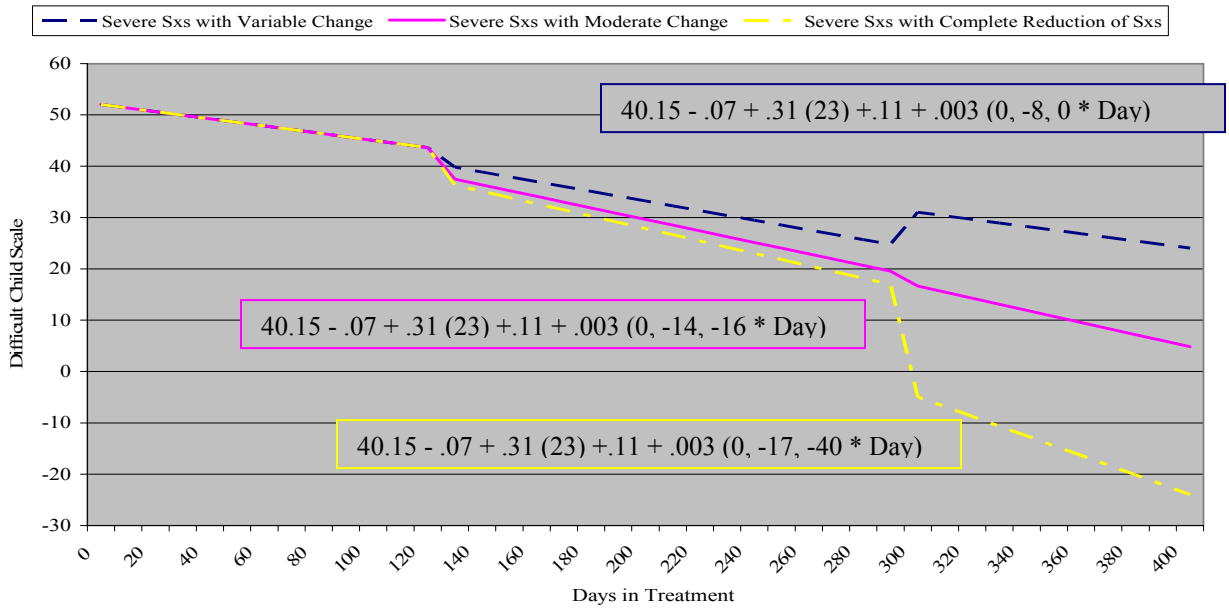
	Parameter		PSI PCDI		PSI DC	
			Main Effect	Interaction Effect	Main Effect	Interaction Effect
Fixed Effects						
Initial Status, π_{0i}	Intercept	β_{00}	24.03** (1.50)	24.02** (1.50)	39.72** (1.61)	40.15** (1.64)
Rate of Change, π_{2i}	Slope	β_{10}	-.02** (.004)	-.02** (.004)	-.07** (.01)	-.07** (.01)
	Pre-BDI	β_{20}	.17** (.08)	.17** (.08)	.35** (.11)	.31** (.11)
	Level-1 Centered BDI	β_{30}	.21** (.07)	.19 (.13)	.43** (.13)	.11 (.16)
	Time X Centered BDI	β_{40}		.0002 (.0006)		.003** (.001)
Variance Components						
Level 1	Within-person	σ^2_i	12.94 (3.60)	12.96 (3.60)	18.94 (4.35)	13.67 (3.70)
Level 2	In initial status	σ^2_0	42.48† (6.52)	42.47† (6.52)	28.14† (5.30)	30.80† (5.55)
	In rate of change	σ^2_1	.0002 (.01)	.0002 (.01)	.002† (.05)	.003† (.06)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_ε			.31		-	.57
R^2_0			.02			.46
R^2_1			.93			.75
Deviance			914.36	914.27	984.49	977.49





Graph 3-8. Patterns of Change in Parenting Stress Related to Difficult Child by Changes in Maternal Depression during PCIT. A) Effect of changes in minimal maternal depressive symptoms. B) Effect of changes in mild maternal depressive symptoms. C) Effect of moderate maternal depressive symptoms. D) Effect of severe maternal depressive symptoms.





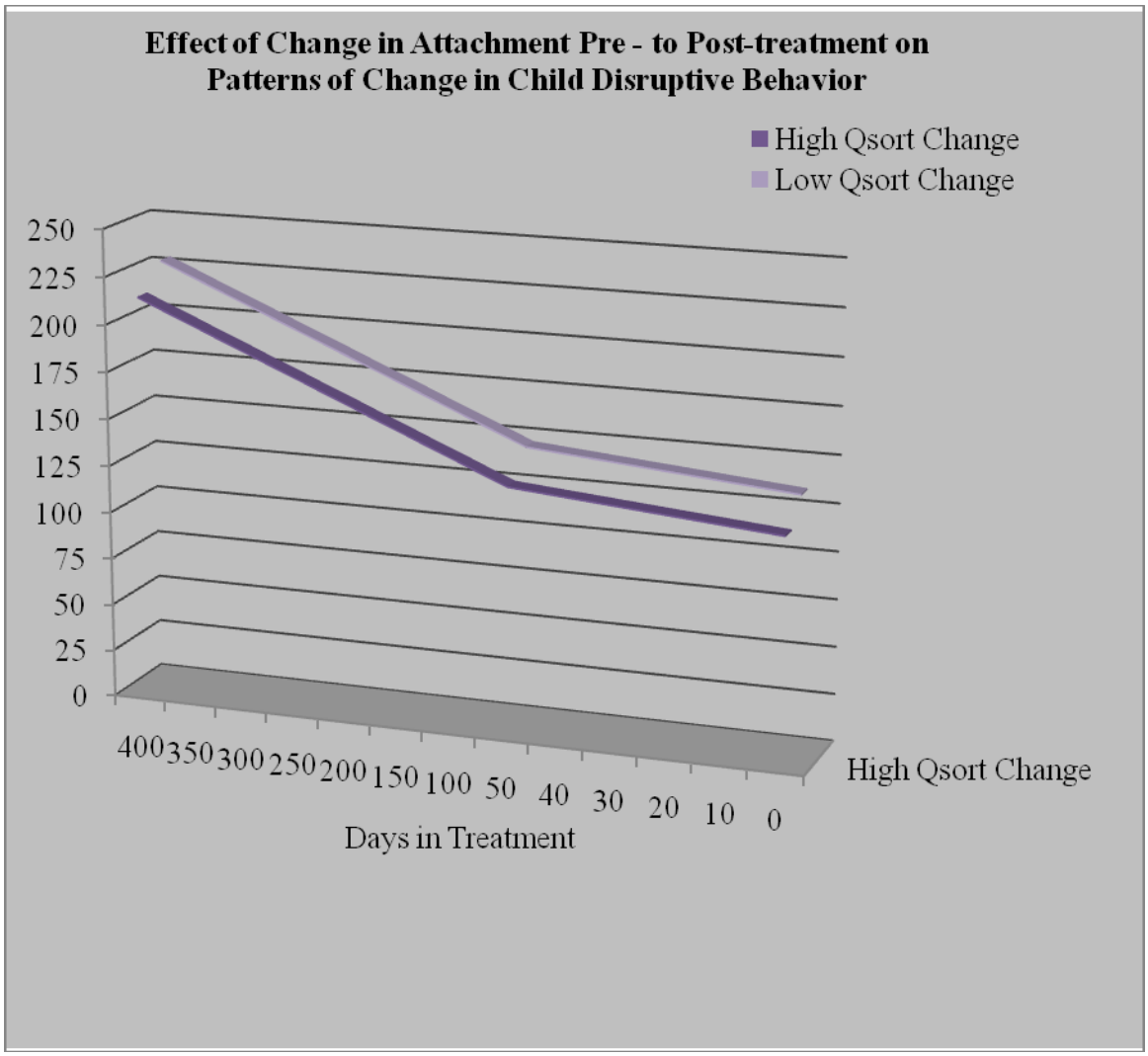
Graph 3-8 Continued.

Table 3-16. Unconditional Growth Models with Reverse Time Code						
	Parameter	Unconditional Growth Means (SE.)				
		ECBI	PSI Total	PD subscale	PCDI subscale	DC subscale
Fixed Effects						
Final Status, π_{0i}	Intercept β_{00}	121.10** (5.07)	88.71** (3.00)	27.13** (1.31)	24.66** (.97)	36.69** (1.29)
Rate of Change, π_{2i}	Intercept β_{10}	.34** (.05)	.13** (.02)	.04** (.01)	.03** (.008)	.07** (.01)
Variance Components						
Level 1	Within-person σ^2_i	212.29 (14.57)	44.52 (6.67)	12.01 (3.47)	6.15 (2.48)	9.78 (3.13)
Level 2	In final status σ^2_0	1251.35† (35.37)	448.24† (21.17)	84.86† (9.21)	46.40† (6.81)	82.85† (9.10)
	In rate of change σ^2_1	.12† (.34)	.03† (.16)	.004† (.06)	.003† (.05)	.006† (.08)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_{ε}		.62	.64	.38	.58	.65
Deviance		6,143.81	5,039.59	4,083.99	3,629.39	3,952.95

Table 3-17. Effect of Change in Qsort on Patterns of Change in Parent Child Dysfunctional Interaction

	Parameter		Change Estimates (S.E.)
			PCDI
Fixed Effects			
Final Status, π_{0i}	Intercept	β_{00}	25.27** (1.66)
	Qsort Change	β_{01}	1.51 (3.83)
Rate of Change, π_{2i}	Slope	β_{10}	.02** (.007)
	Qsort Change	β_{11}	.02 (.02)
	Tx Phase	β_{20}	.06 (.46)
	Tx Phase by Qsort Change	β_{21}	-2.05 [a] (1.09)
Variance Components			
Level 1	Within-person	σ^2_i	6.12 (2.47)
Level 2	In initial status	σ^2_0	45.24† (6.72)
	In rate of change	σ^2_1	.002† (.05)
Pseudo R^2 statistics and Goodness-of-fit			
$R^2_{Y, \hat{Y}}$			
R^2_{ε}			.58
R^2_0			.03
R^2_1			.13
Deviance			3621.15

[a] Slope estimate *p* value of .059 (t = -1.88). **Estimates significant at the *p* .01 level.

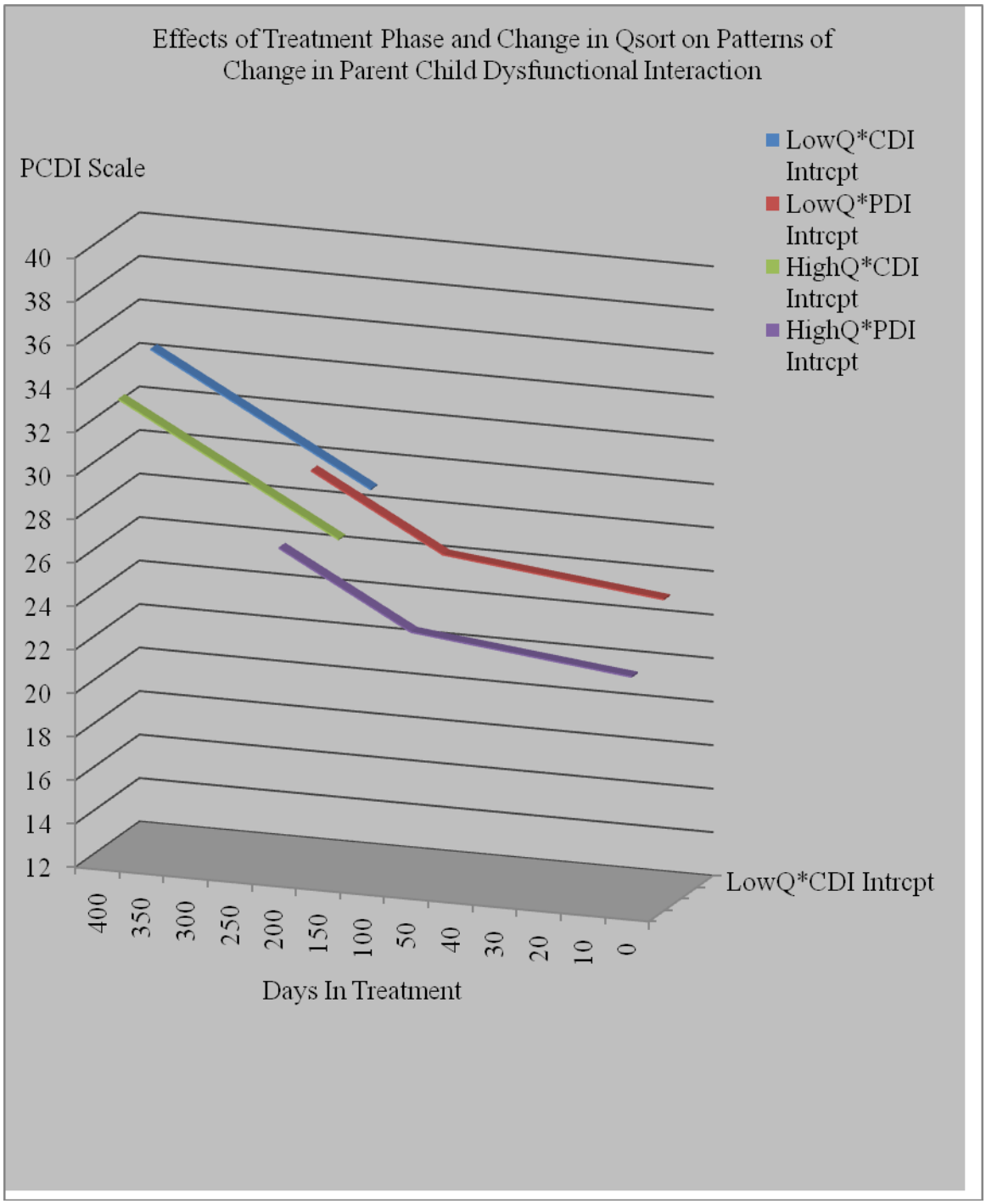


Graph 3-9. Effect of Change in Attachment Security from Pre- to Post-treatment on Patterns of Change in Child Disruptive Behavior during PCIT

Table 3-18. Relation between Patterns of Change in Child Disruptive Behavior and Change in Attachment Security from Pre- to Post-treatment

	Parameter		Change Estimates (S.E.)
			ECBI
Fixed Effects			
Final Status, π_{0i}	Intercept	β_{00}	132.35** (9.25)
	Qsort Change	β_{01}	-22.58 (13.31)
Rate of Change, π_{2i}	Slope	β_{10}	.24** (.07)
	Qsort Change	β_{11}	.29 [a] (.16)
	Tx Phase	B_{20}	-3.00 (2.93)
Variance Components			
Level 1	Within-person	σ^2_i	199.46 (14.12)
Level 2	In initial status	σ^2_0	1731.24† (41.61)
	In rate of change	σ^2_1	.11† (.34)
	In Rate of change by tx phase	σ^2_2	200.61 (14.16)
Pseudo R^2 statistics and Goodness-of-fit			
R^2_ε			.62
R^2_0			.02
R^2_1			.05
R^2_2			.02
Deviance			6,125.01

[a] Slope estimate *p* value of ..074 (t = 1.82). **Estimates significant at $p \leq .01$.



Graph 3-10. Effect of Treatment Phase and Change in Attachment Security from Pre- to Post-treatment on Patterns of Change in Parent Child Dysfunctional Interaction

Table 3-19. Predicting Change in Child Disruptive Behavior from Change in Attachment					
	Change in Qsort				
	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	S.E.	β	*t*	Significance (*p*)
ECBI CDI Change	.004	.002	.34	2.29	.03
ECBI PDI Change	.001	.001	.16	1.05	.30
PCDI CDI Change	-.01	.01	-.14	-.92	.36
PCDI PDI Change	.01	.01	.15	1.01	.32

Table 3-20. Predicting Change in Parent Child Dysfunctional Interaction from Change in Child Disruptive Behavior					
	Change in CBCL				
	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	S.E.	β	*t*	Significance (*p*)
PCDI CDI Change	.84	.32	.36	2.67	.01
PCDI PDI Change	-.79	.32	-.33	-2.43	.02
DC CDI Change	.40	.35	.18	1.16	.25
DC PDI Change	-.01	.21	-.01	-.03	.98

Table 3-21. Predicting Change in Maternal Perceived Social Support from Change in Parent Distress					
	Change in MSPSS				
	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	S.E.	β	*t*	Significance (*p*)
PD CDI Change	.12	.15	.12	.77	.45
PD PDI Change	.34	.35	.15	.95	.35

Table 3-22. Logistic Regression Model Predicting Early vs. Late Dropout from Change in Child Disruptive Behavior and Parenting Stress in CDI and PDI						
Predictor	β	S.E.	Wald	df	*p*	Exp (β)
ECBI CDI Change	-.02	.02	.89	1	.35	.99
ECBI PDI Change	-.001	.01	.01	1	.91	1.0
DC CDI Change	-.01	.07	.09	1	.86	.98
DC PDI Change	-.06	.04	2.0	1	.15	.94
PCDI CDI Change	.06	..06	.96	1	.33	1.06
PCDI PDI Change	-.07	.08	.74	1	.39	.93

CHAPTER 4
DISCUSSION

The aims of this study were to examine predictors of different patterns of change in child disruptive behavior and parenting during PCIT and to examine different patterns of change as predictors of outcomes on specific parent and child variables. Multilevel modeling was used to examine the patterns of change in child disruptive behavior and parenting stress across PCIT and between each phase of PCIT (Child Directed Interaction and Parent Directed Interaction). Predictors of the established patterns of change in child disruptive behavior and parenting stress across the two phases of treatment, CDI and PDI, were then examined.

Patterns of change examining the effect of time (conceptualized as days in treatment) demonstrated significant patterns of changes in individual child disruptive behavior and parenting stress related to involvement in PCIT. Unconditional multilevel models which examined patterns of change across PCIT as a whole demonstrated that children experienced improvements in child disruptive behavior and parents experienced declines in levels of parenting stress. Variances around slopes, however, indicated significant inter-individual differences in the patterns of change in child disruptive behaviors and parenting stress across PCIT. Therefore, specific child, parent, family, and treatment predictors were examined and found to predict different patterns of change in child disruptive behavior and parenting stress during PCIT.

Predictors of Patterns of Change

Treatment phase was found to predict differences in the patterns of change in children's disruptive behaviors and in parenting stress, as was anticipated. Children demonstrated faster behavior change during CDI than PDI and mothers' ratings of having difficulty managing their child's behavior demonstrated faster change during CDI than PDI. Length of time (number of

days spent) in CDI may explain differences in patterns of change between phases. Recall that families progressed at different speeds through each phase of treatment. Therefore, families differed in the number of CDI sessions completed and number of PDI sessions completed. Families who were in CDI at a particular day in treatment were found to be changing at a faster rate than families who had already proceeded to PDI on that particular day. Families who proceed quickly from CDI to PDI appear to "slow down" possibly because that is where the parenting problems lies for that family – predictability, consistency, and follow-through in disciplining problem behaviors. Meanwhile, families who take more time in CDI are moving faster in terms of behavior change.

These findings lend support to the aim of CDI, which is to decrease child disruptive behaviors by improving the warmth and security in the parent-child relationship, and they highlight the power a repaired parent-child relationship has on the change in child disruptive behaviors. Poor attachment and poor parenting practices have been consistently linked to the severity of disruptive behaviors (Patterson, 1982; Loeber and Schmaling, 1985); therefore CDI is the first phase of treatment in PCIT. During the CDI Teach session, which orients parents to the structure of format and goals of CDI, parents are informed that use of the PRIDE skills taught in CDI throughout their day, in interactions with their children, will help increase their children's good behavior and improve the quality of the parent-child relationship. It appears that as child disruptive behavior improves in response to the PRIDE skills, mothers' perceptions of their children also shift in a positive direction, with mothers perceiving their children as less problematic as they progress through CDI and becoming more competent in their use of the PRIDE skills.

Interestingly, pre-treatment attachment security ratings did not predict different patterns of change between CDI and PDI, as was hypothesized. The range of Q sort ratings for this sample (.24 to -.18), which represent the strength of the association of the individual dyad's attachment security to the ideal secure attachment profile, suggests little similarity between mothers and children in our sample to the ideal, securely attached mother-child dyad. Hence, all families had room for improvement in the quality of the parent child relationship. It is important to note that PRIDE skills remain an integral component in PDI. The PRIDE skills are utilized to establish a warm, positive interaction between mothers and children prior to implementing a demand on the child to comply with a direct command and are conceptualized to re-establish warmth in the parent-child interaction following a time-out session, which places strain on the parent-child relationship. Hence, the quality of the parent-child relationship continues to be shaped after families have proceeded to PDI, and in this sample, all families were in need of improving the quality of the attachment to be more secure and warm.

Maternal Depression

Changes in maternal depression from pre- to mid- to post-treatment were found to predict different patterns of change in child disruptive behavior and parenting stress. Children of mothers whose ratings of depression remained consistently high during PCIT demonstrated less behavior change in children during PCIT. Likewise, children of mothers whose ratings of depression decreased during PCIT demonstrated faster change in child disruptive behavior during PCIT.

Studies examining the effect of maternal depression on treatment outcome have demonstrated that high levels of maternal depression at start of treatment predicts less change in child disruptive behaviors (Kazdin, 1995; Kazdin & Wassel, 1999; Webster-Stratton and Hammond, 1990). The one study found in the literature that examined maternal depression as

predictor of *patterns of change* in child disruptive did not find that pre-treatment levels of maternal depression predicted different patterns of change in their sample (Hartmanet al., 2003). The authors postulated that no effect was found in their study due to the small percentage of their sample reporting moderate to severe levels of depression. Findings from this study contradict the finding from the Hartman et al (2003) study, implicating changes in maternal depression as a significant predictor of patterns of change in child disruptive behavior and parenting stress, and lending support for the inclusion of enhancements in treatment protocols to attenuate the adverse impact parent factors may have on progress in treatment.

Findings from this study illustrate the tandem effect between maternal depression and child disruptive behavior discussed in the developmental literature (Munson et al., 2001), but in the context of intervention. Changes in maternal depression predicted *average* differences in patterns of change in child disruptive behavior. Children whose mothers' maintained high levels of maternal depression or experienced an increase in depression during PCIT exhibited slower rates of change in child disruptive behavior, whereas children of mothers who reported minimal symptoms or experienced a decrease in depression during PCIT exhibited faster rates of change in child disruptive behavior.

The relationship between changes in maternal depression and patterns of change in mothers' ratings of having difficulty managing their child varied over time, such that an increase or a decrease in mother's ratings of depression from one time point to another was associated with an increase or decrease in parenting stress as it relates to difficulties managing child behaviors. For a mother who started treatment reporting minimal depressive symptoms and experienced an 18 point increase in depressive symptoms from mid-treatment to post-treatment, also experienced a significant increase in parenting stress. For mothers who started treatment

reporting moderate to severe depressive symptoms and experienced a significant decrease in symptoms to minimal levels from pre- to mid- to post-treatment experienced a tandem decrease in parenting stress during PCIT. If change in maternal depression was variable from pre- to mid- to post-treatment, patterns of change in mothers' ratings of having a difficult child were also found to vary in the same direction.

This link between changes in maternal depression and patterns of change in parenting stress is important given that levels of parenting stress have been found to influence disciplinary practices that promote and escalate aggressive and oppositional child behavior (Patterson, Reid, and Dishion, 1992). If mothers' levels of depression maintain higher levels of parenting stress, or vice versa, children's behavior appears less likely to change during treatment, as two of the main predictors in the development and maintenance of disruptive behaviors remain essentially untreated or unaffected during treatment. Mothers who are stressed and depressed are likely to use more punitive, harsh, and critical forms of discipline (Downey and Coyne, 1990) and may increase their risk for abusing their child

Recent advances in the child therapy literature have focused on developing and implementing enhancement components to child interventions in an attempt to remedy or attenuate the adverse impact parent risk factors have on therapeutic change and treatment completion (e.g., Kazdin and Whitley, 2003; McKay and Bannon, 2004; Nock and Ferriter, 2005; Sanders and McFarland, 2000). Findings from this study provide further support for the inclusion of enhanced components in child therapy to address parent factors that adversely affect success in treatment. Other studies have demonstrated positive outcomes in treatments that included enhancements to address maternal depression (Sanders and McFarland, 2000) and parenting stress (Kazdin and Whitley, 2003). In both of the cited studies, the enhancements were

structured intervention components that directly treated maternal depression and parenting stress. The PCIT protocol in this study included a supportive component in each session in which therapists were encouraged to provide support and problem-solve with parents any significant stressors that were perceived as affecting participation in treatment. Though this study did not directly examine therapist supportive behaviors as predictors of patterns of change, some mothers showed exhibited significant declines in depressive symptoms and hence, significant declines in parenting stress. Inclusion of this supportive component may have assisted in attenuating the adverse impact of maternal depression, leading to positive outcomes for both mother and child and lending weight to the import to include components in any intervention that reduces the negative impact of parent risk factors on treatment progress.

Family Predictors

Post-treatment ratings of perceived barriers to participation in treatment were examined as a predictor of patterns of change in child disruptive behavior and parenting stress for families who completed treatment. Families who reported greater number of perceived barriers to participation in treatment were found to have patterns of slower change in child disruptive behavior and parenting stress across PCIT as a whole. Families who reported fewer perceived barriers to participation in treatment demonstrated patterns of faster change in child behavior and parenting stress. These findings emphasize the important of assisting families in treatment to reduce these barriers that impede their success in treatment. The treatment protocol used in this study included components to address and assist in removing or alleviating barriers to participation in treatment. This included providing families with a voucher to cover the expense of parking to arranging payment of bus or cab fare for families who relied on public transportation to attend treatment sessions. Therapists occasionally even provided therapy in families' homes.

It is important to keep in mind that these findings are limited to the treatment completers in the sample. Graduation from treatment required meeting termination criteria, which included final ratings of child disruptive behavior ½ standard deviations below the normative mean on the ECBI, and children who graduated from treatment reached non-clinical levels of disruptive behaviors. Treatment completers who reported a greater number of perceived barriers finished treatment close to termination criteria (average final ECBI status of 119), with treatment completers who reported fewer barriers well below termination criteria (final ECBI status of 108 for average group and 97 for lowest group). Hence, families who reported greater number of barriers to participation in treatment still experienced improvements in child disruptive behavior during PCIT, only at slower rates than families who reported fewer barriers. This finding supports other studies in the child therapy literature that suggest that some treatment is better than no treatment at all (Nock and Ferriter, 2005).

A great concern for families who perceive greater number of barriers to participation is their ability to attend treatment consistently in order to receive the most benefit. In an earlier study, Kazdin and Wassell (1998) found that families who reported greater number of barriers also had poor treatment attendance (Kazdin and Wassell, 1998), and families who dropped out of treatment in the same study had poor treatment attendance as measured by higher cancellation and no-show rates. In a recent review of the literature, Nock and Ferriter (2005) note that premature termination from treatment does not necessarily mean that families do not improve. In fact, they cite Kazdin and Wassell (1998) who found that 34% of the dropouts in their study improved significantly prior to leaving treatment. Nock and Ferriter (2005) note that families with poor treatment attendance may still demonstrate change if they remain adherent to the treatment in between attended treatment sessions. PCIT is a skills-based approach and families

are expected to complete a homework assignment on a daily basis during the week between sessions. Families are expected to practice the CDI and PDI skills by incorporating a special play time at home, during which they actively practice the PRIDE skills and time out procedures. Hence, families who may not be able to attend treatment consistently, as a result of experiencing a greater number of barriers impeding participation, may still reap benefits if they are adhering to treatment outside of the treatment session. Further investigation is necessary to confirm this relation between treatment adherence, barriers to participation, and patterns of change in PCIT; however, findings in this study suggest that treatment completers experience improvements in child disruptive behavior and parenting stress, even if they experience high numbers of barriers to participation in treatment.

Gender

Gender was the final child predictor entered into the model, and it was examined to determine whether gender predicted different patterns of change in child disruptive behavior and parenting stress during PCIT. Boy and girls in this sample were found to have similar patterns of change in child disruptive behavior during PCIT, as well as similar levels of disruptive behavior at start of treatment. Gender was also not predictive of differences in patterns of change for parenting stress. Mothers of boys and girls in this sample had similar patterns of change in their stress levels related to parenting, despite significant differences in overall parenting stress and stress related to the parenting role at start of treatment. (Mothers of girls in this sample reported higher levels of overall parenting stress and stress related to the parenting role, at the start of treatment.)

The role of gender has not been well studied in the treatment outcome literature or the developmental literature. One reason often cited is the low prevalence of disruptive behaviors in preschool girls; hence the there are fewer girls in study samples compared to boys, making it

difficult to look at gender differences. Webster-Stratton (1996) examined the effect of gender on treatment outcome in a study of 64 girls and 158 boys, ages 4 to 7 years, and did not find an effect between gender and time. Boys and girls were found to improve similarly over time, even with mothers perceiving boys as having more disruptive behaviors at pre-treatment. Findings from this study were similar, in that gender did not predict different patterns of change in disruptive for boys and girls. Boys and girls were actually found to have similar levels of disruptive behavior at start of treatment in this sample.

The lack of significant findings for gender differences is not disappointing. It suggests that PCIT works as well for boy as it does for girls. Any differences that do exist in patterns of change appear related to other child, parent, and family predictors.

Predicting Treatment Outcomes from Patterns of Change in Child Disruptive Behavior and Parenting Stress

Patterns of change in child disruptive behavior and parenting stress were hypothesized to predict specific parent and child outcomes. A regression analysis using individual patterns of change as predictors of change in attachment security, child disruptive behavior, daily parenting stress, and perceived social support from pre- to post-treatment was originally proposed; however, some cases failed to meet necessary assumptions for the regression analysis to run, calling into question the appropriateness of using predicted values from the patterns of change as data for another analysis.

The researcher conducted alternative analyses in an attempt to address the questions proposed in the hypotheses, which included a redefined multilevel model analysis and traditional linear and logistic regression models. The redefined multilevel model examined change in parent and child outcome variables as predictors and placed emphasis on the level of disruptive

behavior and parenting stress at the end of treatment by reversing the coding for time (days in treatment). Two of the five models examined returned significant and promising results.

Families who exhibited faster change in CDI in child disruptive behavior were predicted to exhibit greater change in attachment security from pre- to post-treatment. Results from the multilevel mode did not support differences in patterns of change between CDI and PDI. Change in attachment security, however, did predict different patterns of change in child disruptive behavior across PCIT as a whole. Families who showed greater improvement in attachment security from pre- to post-treatment demonstrated faster behavior change, where as families who demonstrated less change in attachment security exhibited slower behavior change. Results from the traditional regression model analysis, which examined change in ECBI in CDI and PDI as predictors of change in attachment security from pre- to post-treatment, supported the hypothesis that greater change in child disruptive in CDI predicted greater change in attachment security.

Families who exhibited faster change in parent child dysfunctional interaction in CDI were predicted to exhibit greater change in attachment security from pre- to post-treatment. Results from the multilevel model returned a trend for the interaction between change in attachment security and treatment phase, however, not in the predicted direction. The results from the multilevel model suggest an association between changes in attachment security and patterns of change in PDI, with greater change in attachment security predicting faster change in parent child dysfunctional interaction during PDI. The results from the traditional linear regression analysis, examining change in parent child dysfunctional interaction in CDI and PDI as predictors of change in attachment security, returned non-significant findings, suggesting that

change within each phase of treatment was not predictive of treatment outcome for attachment security.

Results from the traditional linear regression model predicting change in child disruptive behavior from change in parent child dysfunctional interaction in CDI and PDI were significant. Both change in CDI and change in PDI in parent child dysfunctional interaction predicted change in attachment security. The overall lack of change in parent child dysfunctional interaction during CDI resulted in less change in child disruptive behavior from pre to post-treatment. In contrast, improvement in parent child dysfunctional interaction during PDI resulted in improvement in child disruptive behavior from pre to post-treatment.

The findings that patterns of change in PDI, as predicted by change in attachment security, predicted greater change in parent child dysfunctional interaction and that change in PDI in parent child dysfunctional interaction predicted improvements in child disruptive behavior were initially surprising. Upon further consideration, however, these findings make sense in light of the structure of PCIT. The CDI phase addresses only one component of the parent child relationship. The PDI phase completes transformation in parent child interaction by shaping parenting style to include warmth as well as limits and consistent follow through with consequences and discipline. Indeed families did not demonstrate much change in parent child dysfunctional interaction during CDI, suggesting that PDI was a necessary component to assist families in developing fully functional parent-child interactions.

It is recognized that both alternative analyses failed to address the questions posed in the hypotheses adequately. It was hoped that patterns of change could predict to outcome in specific parent and child variables; however, statistical limitations rendered analysis of this kind unfeasible. Findings from the alternative analyses provide preliminary support for relation

between therapeutic change and change in specific child and parent treatment outcomes. Findings from the multilevel models suggest an association between changes in outcomes and patterns of change, while results from the traditional regression models indicate that change in a particular phase of treatment is predictive of change in specific outcomes. Further investigation is warranted to establish the relation between patterns of change in PCIT and change in specific outcomes.

Examination of patterns of change in between dropouts and treatment completers did not yield significant findings, indicating that treatment status did not predict differences in patterns of change in child disruptive across PCIT. Dropout status also did not predict different patterns of change in child disruptive behavior among dropouts; hence, families who dropped from treatment in CDI did not exhibit a unique pattern of change from families who dropped from treatment in PDI. Patterns of change in child disruptive behavior in CDI and PDI were able to be examined as predictors of dropout status and were not predictive of early versus late dropout in PCIT. These findings are disappointing given evidence in the literature indicating that early dropouts are differentiated by unique set of predictors than families who drop late in treatment. It was anticipated that families who dropped in CDI would have exhibited patterns of change indicating minimal change in child disruptive behavior; however, in light of perceived barriers to participation in treatment findings, families who dropped early from treatment may be better differentiated based on number of barriers to participation rather than on treatment status alone.

Limitations and Challenges of the Current Study

There were many challenges present in this study that required forethought in determining the appropriate statistical approach and creativeness in application of both traditional and state-of-the-art statistical approaches. The unbalanced nature of the data set required the use of a statistical approach that could accommodate the lack of balance resulting from three sources: (1)

unequal spacing of occasions; (2) unequal number of occasions per participant; (3) missing data. Multilevel modeling was chosen specifically for its ability to accommodate unbalanced data sets and utilize all data points available to return estimates considered more valid and reliable compared to estimates derived from a selected data set (one that excludes participants due to missing data; Zaidman-Zait and Zumbo, 2005).

Significant findings reported in this study are limited to the current sample for a few reasons. First, the geographic location and racial/ethnic make-up of the sample limit generalizability of significant findings to largely White samples from suburban and rural locations. The small sample of other races and ethnicities included in the study precluded examination of patterns of change by race/ethnicity. It is also plausible that families from other geographical locations (urban versus suburban versus rural) may have different patterns of change. Again, such examination was precluded given the nature of this sample, which included families from the suburban area of Gainesville and the outlying rural towns. Patterns of change may also differ according to location of service delivery of treatment. Families were participants in a research study, in which monitoring for the integrity of treatment delivery was on-going, with state-of-the art equipment and set-up. Families receiving PCIT in community settings may demonstrate different patterns of change predicted from a different set of predictors.

Methodological issues also limit findings from this study. Most concerning are the number of significance tests run during the course of the study, which raises concern over inflation of Type I error in the current findings. The researcher ran sixty-six models during the course of analyzing the data, equaling 217 significance tests (397 parameters total including variance components). Under the assumption of independent measures and observations, the experiment-wise error rate for the current study equals 1, calling into question the validity of the significant

findings reported in the study. Under the assumption of dependence among observations, the experiment-wise error rate of 1 is less than the product of the number of comparisons and per comparison probability (.05), which lends some reassurance that findings in the study are not solely a result of artifact due to sheer number of tests run; however, the researcher remains cautious in interpretation of current findings and encourages readers to consider the significance of findings, the size of the effect for significant findings, and the large number of tests run.

For example, treatment phase was a significant predictor of different patterns of change in child disruptive behavior and parenting stress related to having a difficult child to manage at the $p \leq .05$ level; however, treatment phase only explains 1% of the within person variance after linear time, which explains 62% in child disruptive behavior and 57% in stress related to having a difficult child to manage. This small percentage in accounted within-person variance does not lend much weight to the effect of the significant finding and certainly raises caution regarding the validity of the finding given the number of significance tests run in the study.

Closer inspection of the significant finding for barriers to participation in treatment as a significant predictor of different patterns of change in child disruptive behavior and parenting stress reveals small to moderate effect sizes. Retrospective ratings of barriers to participation explained 16% of the between-participants variance in rate of change in child disruptive behavior during PCIT, a small effect size, whereas retrospective BPTS ratings explained 32% of the variance in rate of change in parent child dysfunctional interaction during PCIT, a medium effect size. Alongside the .001 level of significance of these findings, these findings can be cautiously interpreted as promising and deserving of further examination alongside other important predictors not investigated in this study.

A cumulative model approach, which examines the effects of multiple predictors on rates of change in a specific outcome, would assist in reducing the number of models and significance tests run, thereby reducing inflation of Type I error. Future investigations of predictors of change in therapy should approach model building with a priori predictions driven by theory. Hence, only predictors linked meaningfully to the specific outcome are examined. Such an approach lends itself to a model comparison approach, which is considered to provide meaningful results beyond significance testing (Judd, McClelland, and Culane, 1995). The current study did not test a cumulative model nor did it compare competing models of predictors of patterns of change. Future investigations should attempt to examine predictors cumulatively and with an eye toward testing models for explanatory power in modeling change in therapy.

A limited number of predictors were chosen for examination in this study. The researcher attempted to include meaningful predictors based on findings in the current literature; however, results from the current study clearly indicate the need to examine additional predictors. At least for this sample, gender, diagnosis of ADHD, and socioeconomic status were not predictive of different patterns of change in child disruptive behavior and parenting stress and the predictors that were found to significantly predict differences can only boast small to medium effect sizes at best, suggesting that important predictors were excluded from the models tested here. Differences in patterns of change in this current study may have been more strongly predicted by therapist qualities and characteristics or other treatment factors, such as treatment attendance and adherence. The inclusion of these factors in a cumulative model of change in disruptive behavior and parenting stress may result in a more robust model of change. Other factors to consider include family structure and other family characteristics, such as family cohesion or conflict,

other measures of environmental disadvantage, such poverty level, and neighborhood characteristics such as crime and violence.

It is important to note that this study modeled change solely using maternal ratings for measures of both outcomes and predictors. Though parents are considered the best resource for information regarding their child compared to other informants, such as teachers (Loeber, Green, and Lahey, 1991), independent measures, such as behavioral observations, provide additional information that may converge or diverge from information gleaned from parent report alone. It is possible that patterns of change would differ based on informant (mother, father, and therapist) and sources of data used (parent and therapist report or observational data). The findings here reflect patterns of change based on maternal ratings of child disruptive behavior and parenting stress and all predictors examined in the study.

Lack of a control sample makes it difficult to speculate on the effect of PCIT on patterns of change in child disruptive behavior and parenting stress. Regression to the mean is often cited by researchers, as a confounding variable to findings demonstrating change in response to intervention (Cunningham, 2006). Regression to the mean is thought to represent a phenomenon in which a person who presents with significant levels on a particular measure at time 1 will move towards the population mean at subsequent measurements. Certain factors increase the risk for regression artifacts in a study. First is a nonrandom sample, selected based on performance on a pre-test that differs from the population. Another factor is imperfect correlation between measurements, with measures with little to no correlation more likely to regress toward the mean on consecutive measurements (Rogosa, 1988). Measures in this study tended to correlate with one another; however, inclusion of a control group in future studies

would assist in determining artifact from true change in child disruptive behavior and parenting stress during PCIT.

Future Directions

Preliminary findings from this study support different patterns of change in child disruptive behavior. Patterns of change in child disruptive behavior differed between treatment phase, with families appearing to change at a faster rate in CDI than PDI. This significant finding is confounded by order, as CDI typically precedes PDI in the PCIT protocol. Future studies may want to examine whether the difference in patterns of change is present regardless of order of treatment phase, and whether faster change is present in CDI regardless of order.

Changes in maternal depression during PCIT also predicted different patterns of change in child disruptive behavior and parenting stress. While this finding lends credence to the transactional relationship between maternal depression and child disruptive behavior, further investigation is needed to determine whether changes in maternal depression led to changes in child disruptive behavior and parenting stress or vice versa.

Retrospective maternal ratings of perceived barriers to participation in treatment predicted different patterns of change in child disruptive behavior and parenting stress, with families who experienced greater number of barriers experiencing slower rates of change during PCIT. Despite slower rates of change, families who experienced greater number of barriers successfully completed treatment, with children's levels of disruptive behavior returning to normative levels. This finding suggests that measures taken to minimize impact of barriers to participation were successful; however, further investigation is merited, particularly to examine the role of treatment attendance and adherence in patterns of change in child disruptive behavior during PCIT.

Examination of other child, parent, family, environmental, and treatment-related variables as predictors is merited, in order to reach a better understanding of predictors of change in PCIT, and child therapy as whole. As noted in the limitations, the predictors examined in this study were limited and most of the predictors examined were not found to affect patterns of change in child disruptive behavior or parenting stress. Of those that were significant, effect sizes ranged from small to medium, indicating that a significant portion of the variance remains unaccounted for, providing further support for the need for further investigation with other predictors of interest.

In a similar vein, cumulative models that examine the effects of multiple predictors simultaneously on patterns of change are needed. The results in this study are limited by the large number of models run, which inflated Type I error and raises concern that significant findings in this study were a result of chance. Future studies should include meaningful cumulative models supported by theory and conceptual frameworks that posit how specific child, parent, and family factors affect change in therapy.

The results of this study are limited to changes in maternal ratings of child behavior and parenting stress. Future studies should include measurements of direct behavior observation to provide convergence between parent reports of change and observed change. Would patterns of change in child disruptive behavior differ according to informant and measure? A future study would include data provided by fathers to allow comparison of patterns of change based on ratings provided by mothers and fathers. Examination of observational data would provide patterns of change in observed behavior and provide convergent validity to patterns of change based on parent ratings of behavior.

Finally, inclusion of a control group in a future study would help elucidate whether patterns of change in child disruptive behavior result from intervention or time alone. Child, parent, and family predictors can be examined to determine which combination of variables predict a pattern of change in which child disruptive behavior persists and the pattern of change in which disruptive behaviors desist and return to normative levels. Findings from such a study would address the role of regression to the mean and its true effect on patterns of change across time and across treatment.

APPENDIX A
TABLES OF NON-SIGNIFICANT FINDINGS

Table A-1. Patterns of Change in Child Disruptive Behavior and Parenting Stress by Treatment Phase

	Parameter	Change Estimates				
		ECBI	PSI Total	PD subscale	PCDI subscale	DC subscale
Fixed Effects						
Final Status, π_{0i}	Intercept β_{00}	125.97** (7.23)	89.41** (3.30)	26.08** (1.57)	26.12** (1.30)	36.42** (1.51)
	Tx Phase β_{01}					
Rate of Change, π_{2i}	Days in Treatment β_{10}	.31** (.06)	.12** (.06)	.04* (.01)	.02* (.006)	.06** (.01)
	Tx Phase β_{11}	-2.86 (.2.94)	-.32 (1.18)	.55 (.52)	-.77 (.48)	.12 (.53)
Variance Components (S.D)						
Level 1	Within-person σ^2_i	199.49 (14.12)	43.08 (6.56)	11.79 (3.43)	5.81 (2.41)	9.51 (3.08)
Level 2	In initial status σ^2_0	1738.72† (41.70)	368.23† (19.19)	75.34† (8.68)	61.81† (7.86)	75.61† (8.69)
	In rate of change σ^2_1	.12† (.34)	.02† (.13)	.005† (.07)	.001† (.04)	.005† (.06)
Pseudo R^2 statistics and Goodness-of-fit						
R^2_ε		.62	.64	.38	.58	.65
R^2_0		--	--	--	--	--
R^2_1		--	--	--	--	--
Deviance		6128.59	5029.72	4079.61	3,606.25	3945.17

** Estimates significant at the $p \leq .001$

Table A-2. Relation between Patterns of Change in Child Disruptive Behavior and Change in Parenting Stress (PDH) from Pre- to Post-Treatment

	Parameter	Change Estimates
		ECBI
Fixed Effects		
Final Status,	Intercept β_{00}	123.63**
π_{0i}		(7.13)
	PDH β_{01}	.23
		(.43)
Rate of Change,	Days in Treatment	.28**
π_{2i}	β_{10}	(.07)
	PDH β_{11}	-.005
		(.005)
Variance Components (S.D)		
Level 1	Within-person σ^2_i	212.56
		(14.58)
Level 2	In initial status σ^2_0	1242.83†
		(35.25)
	In rate of change σ^2_1	.11†
		(.33)
Pseudo R^2 statistics and Goodness-of-fit		
R^2_{ε}		.62
R^2_0		--
R^2_1		--
Deviance		6141.99

** Estimates significant at $p \leq .001$; † Variance component significant at the $p \leq .001$

Table A-3. Relation between Patterns of Change in Parent-Child Dysfunctional Interaction and Change in Attachment Security from Pre- to Post-treatment

	Parameter	Change Estimates
		PCDI
Fixed Effects		
Final Status,	Intercept β_{00}	25.45**
π_{0i}		(1.45)
	Qsort β_{01}	-2.88[a]
		(3.49)
Rate of Change,	Days in Treatment	.02**
π_{2i}	β_{10}	(.007)
	Qsort β_{11}	.04[b]
		(.02)
Variance Components (S.D)		
Level 1	Within-person σ^2_i	6.15
		(2.48)
Level 2	In initial status σ^2_0	45.76[†]
		(6.76)
	In rate of change σ^2_1	.002[†]
		(.05)
Pseudo R^2 statistics and Goodness-of-fit		
R^2_ε		.58
R^2_0		--
R^2_1		--
Deviance		3627.17

** Estimates significant at $p \leq .001$; [†] Variance component significant at the $p \leq .001$; [a] Estimate p value = .413; [b] Estimate p value = .123

Table A-4. Relation between Patterns of Change in Parenting Stress and Change in Child Disruptive Behavior from Pre- to Post-treatment

	Parameter	Change Estimates	
		PCDI subscale	DC subscale
Fixed Effects			
Final Status,	Intercept β_{00}	33.35**	34.66**
π_{0i}		(2.19)	(2.62)
	CBCL β_{01}	-.14 [a]	-.12 [c]
		(.13)	(.14)
Rate of Change,	Days in Treatment	.03*	.06**
π_{2i}	β_{10}	(.02)	(.02)
	CBCL β_{11}	-.0002 [b]	-.0004 [d]
		(.0008)	(.001)
Variance Components (S.D)			
Level 1	Within-person σ^2_i	6.15	9.78
		(2.48)	(3.13)
Level 2	In initial status σ^2_0	44.84†	81.57†
		(6.69)	(9.03)
	In rate of change σ^2_1	.002†	.006†
		(6.69)	(.08)
Pseudo R^2 statistics and Goodness-of-fit			
R^2_ε		.58	.65
R^2_0		--	--
R^2_1		--	--
Deviance		3626.48	3950.55

** Estimates significant at the $p \leq .001$; Estimate p value = .062; † Variance component significant at $p \leq .001$; [a] Estimate p value = .300; [b] Estimate p value = .804; [c] Estimate p value = .346; [d] Estimate p value = .769

Table A-5. Relation between Pattern of Change in Difficult Child and Change in Perceived Social Support from Pre- to Posts-treatment

	Parameter	Change Estimates
		DC
Fixed Effects		
Final Status,	Intercept β_{00}	36.99**
π_{0i}		(1.21)
	MSPSS β_{01}	.14[a]
		(.09)
Rate of Change,	Days in Treatment	.06**
π_{2i}	β_{10}	(.01)
	MSPSS β_{11}	-.002[b]
		(.001)
Variance Components (S.D)		
Level 1	Within-person σ^2_i	9.78
		(3.13)
Level 2	In initial status σ^2_0	80.76[†]
		(8.98)
	In rate of change σ^2_1	.006[†]
		(.08)
Pseudo R^2 statistics and Goodness-of-fit		
R^2_ε		.65
R^2_0		--
R^2_1		--
Deviance		3951.32

** Estimates significant at the $p \leq .001$; [†] Variance component significant at $p \leq .001$; [a] Estimate p value = .141; [b] Estimate p value = .143

Table A-6. Patterns of Change in Child Disruptive Behavior and Parenting Stress by Treatment Phase

	Parameter	Change Estimates			
		PSI Total	PD subscale	PCDI subscale	DC subscale
Fixed Effects					
Final Status, π_{0i}	Intercept β_{00}	108.36**	34.01**	29.45**	43.80**
		(5.45)	(2.56)	(1.96)	(2.44)
	SES β_{01}	-.14	-.06	-.05	-.0005
		(.13)	(.06)	(.05)	(.06)
Rate of Change, π_{2i}	Days in Treatment β_{10}	-.23 **	-.05*	-.04*	-.11**
		(.06)	(.02)	(.02)	(.03)
	SES β_{11}	.002	.002	.0004	.001
		(.001)	(.001)	(.0004)	(.001)
Variance Components (S.D)					
Level 1	Within-person σ^2_i	54.45	10.94	10.01	11.92
		(7.38)	(3.31)	(3.16)	(3.45)
Level 2	In initial status σ^2_0	317.53†	80.54†	41.16†	51.82†
		(17.82)	(8.97)	(6.42)	(7.20)
	In rate of change σ^2_1	.03†	.005†	.003†	.007†
		(.18)	(.07)	(.05)	(.09)
Pseudo R^2 statistics and Goodness-of-fit					
R^2_{ε}		.56	.44	.31	.57
R^2_0		--	--	--	--
R^2_1		--	--	--	--
Deviance		9670.06	7536.12	7338.18	7614.14

** Estimates significant at $p \leq .001$; *Estimates significant at $p \leq .01$.

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BIOGRAPHICAL SKETCH

Jaimee is a native Floridian. She received her Bachelor of Arts degree in psychology from Florida Atlantic University in 1998. She began her graduate training at the University of Florida and received a Master of Science degree in clinical and health Psychology in 2001. Jaimee entered doctoral candidacy in summer 2004 and completed her internship in psychology at the Columbia University Medical Center/New York Presbyterian Hospital from 2005 to 2006. She took a hiatus from graduate school to give birth to her daughter, Sophia, and returned to complete her degree summer 2008. Jaimee resides in Lantana, Florida and plans to remain with the Treasure Coast Early Steps Program, where she has been working with infants and toddlers with developmental delays and disabilities.