Predicting Outcome in Parent-Child Interaction Therapy: Success and Attrition

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Success and Attrition

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This study explored predictors of treatment response and attrition in Parent-Child Interaction Therapy (PCIT). Participants were 99 families of 3- to 6-year-old children with disruptive behavior disorders. Multiple logistic regression was used to identify those pretreatment child, family, and accessibility factors that were predictive of success or attrition. For all study participants, waitlist group assignment and maternal age were the significant predictors of outcome. For treatment participants (study participants excluding those who dropped out after the initial evaluation but before treatment began), only maternal ratings of parenting stress and maternal inappropriate behavior during parent-child interactions were significant predictors of treatment outcome. These results suggest that for treatment studies of disruptive preschoolers, the benefits of using a waitlist control group may be outweighed by the disproportionate number of dropouts from this group. Once families begin PCIT, however, parent-related variables become salient in predicting treatment outcome.

Keywords: *treatment outcome; responsiveness; success; attrition; dropout; parent-child interaction therapy; parent training; preschool; child; family; disruptive behavior*

Disruptive behavior disorders represent a major public health concern in the United States, estimated to be the most costly of all mental health problems (Kazdin, 1995). Children with disruptive behavior

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constitute the most frequent referrals to child mental health clinics (Reid, 1993) and experience a broad range of impairment that is generally more severe and chronic than that experienced by other clinic-referred children (Lambert, Wahler, Andrade, & Bickman, 2001). Studies indicate that disruptive behavior evident in early childhood persists across stages of development (Moffitt, 1993; Patterson, 1993) and is a powerful predictor of subsequent delinquency and criminal behavior (Loeber, Green, Keenan, & Lahey, 1995) as well as a host of personal and social difficulties in adulthood (Robins, 1981).

Parent training is considered the most promising approach for the treatment of early disruptive behavior (Dumas, 1989; Eyberg, 1992), and positive outcomes of parenting skills training programs are well documented (Brestan & Eyberg, 1998; Nock, 2003; Kumpfer & Alvarado, 2003). Follow-up studies suggest that young children whose parents successfully complete parenting skills training will continue to fare well in the future (Funderburk et al., 1998; Hood & Eyberg, 2003). For children whose parents drop out of treatment, although, the picture is bleaker. Boggs et al. (2004) found that 1 to 3 years after families of preschoolers with disruptive behavior disorders began parent-child interaction therapy (PCIT), the families who successfully completed treatment maintained their gains, but families who dropped out showed no changes from pretreatment levels in either child disruptive behavior or parenting stress.

Attrition from parenting skills training programs has received little study, although attrition from child psychotherapy in general is high, ranging from 40% to 60% (Wierzbicki & Pekarik, 1993). Very little is known about the variables that moderate or mediate either attrition or successful outcome in these programs. A better understanding of the processes affecting treatment outcome may lead to more effective strategies for treatment retention and success.

Early research aimed at understanding the factors associated with attrition from child treatments examined attrition from heterogeneous clinical populations seen in community mental health and child guidance clinics (Armbruster & Fallon, 1994; Gould, Shaffer, & Kaplan, 1985; Pekarik & Stephenson, 1988; Singh, Janes, & Schechtman, 1982; Weisz, Weiss, & Langmeyer, 1987). These studies yielded contradictory findings regarding specific variables that were associated

with treatment dropout. For example, some studies found differences between completers and dropouts on demographic variables such as child age, sex, and socioeconomic status (SES; Singh et al., 1982) whereas other studies found no differences on these demographic variables (Weisz et al., 1987; Pekarik & Stephenson, 1988). Reviewers of this early attrition literature urged investigators to examine specific child populations and child treatments separately because of the likely treatment-specific nature of attrition and its predictors (Armbruster & Kazdin, 1994, Kazdin, 1995).

In treatment studies of children with disruptive behaviors, the most frequently identified predictors of attrition have been indicators of socioeconomic disadvantage (Dumas & Wahler, 1983; Frankel & Simmons, 1992; Kazdin, 1990; Kazdin, Holland, Crowley, & Breton, 1997; Kazdin & Mazurick, 1994; Kazdin, Mazurick, & Bass, 1993; McMahon, Forehand, Griest, & Wells, 1981). Other factors found related to attrition in studies of children with disruptive behavior include single-parent family status (Dumas & Wahler, 1983; Kazdin et al., 1993, 1997; Kazdin & Mazurick, 1994), younger maternal age (Kazdin et al., 1993; Kazdin & Mazurick, 1994), higher parenting stress (Kazdin, 1990; Kazdin et al., 1993; Kazdin & Mazurick, 1994), higher parent depression (McMahon et al., 1981), higher negativity (Frankel & Simmons, 1992), and greater severity of conduct problems (Kazdin, 1990; Kazdin et al., 1993; Kazdin & Mazurick, 1994).

Studies examining predictors of successful outcome in treatments for disruptive behavior have identified predictors similar to those found in studies of attrition (Baekeland & Lundwall, 1975; Kazdin, 1995; Webster-Stratton, 1985, 1996; Webster-Stratton & Hammond, 1990). For example, in her videotape modeling program, Webster-Stratton identified parental depression and negative life stress as predictors of outcome (Webster-Stratton & Hammond, 1990). Parent negativity and the severity of disruptive behavior influenced long-term treatment outcome (Webster-Stratton, 1996).

Even within specific child populations, treatment-specific predictors of attrition and successful completion may exist because of differences in treatment format or content. Barriers to treatment participation, such as the demands of the protocol and the accessibility of the program are thought to influence outcome (Kazdin et al., 1997) and

likely differ among specific treatments. Similarly, minority status may predict outcome for treatments differentially based on the cultural sensitivity of the treatment (Forehand & Kotchick, 1996).

Among the treatments for disruptive behavior disorders, age differences in the children treated are likely an important predictor of outcome and, in turn, are likely contributors to other predictors of treatment attrition and/or successful outcome. For example, Dishion and Patterson (1992) demonstrated age effects in attrition from parent training for disruptive children, with school-age children, approximately aged 7 to 13, significantly more likely to drop out than younger children, aged 3 to 7. Kazdin (1995) found that contact with antisocial peers was a salient predictor of treatment response in his parent management training and problem-solving skills training program for school-age children, but this predictor is probably irrelevant in treatments for preschoolers, who have not yet formed stable peer group relationships.

Finally, methodological decisions may influence the findings of studies examining predictors of treatment outcome (Armbruster & Kazdin, 1994). For example, assessment demands during treatment could increase information about patterns of change but also increase treatment dropout. Conversely, participant payment for attendance could reduce dropout but limit the generalizability of the study. Predictors of treatment outcome may also vary as a function of the definition of outcome used. For example, in group treatments or time-limited treatments, missing the final treatment session could hypothetically define dropout; and the investigators' goals for the treatment will define success in any study of outcome. Thus, an examination of outcome predictors for children with disruptive behavior disorders must (a) consider the influence of research procedures per se on treatment outcome, (b) consider both population- and treatment-specific variables that influence treatment outcome, and (c) develop definitions of outcome that are meaningful for the specific treatment and the study design.

PCIT is an evidence-based treatment for preschool-age children with disruptive behavior that incorporates principles and techniques of play therapy into behavioral parent training. Parents practice relationship enhancement skills and discipline skills with their child in

play situations while being coached by the therapist via a bug-in-ear device from an observation room during treatment. Studies have demonstrated statistically and clinically significant improvements in child behavior problems on completion of PCIT (see Brinkmeyer & Eyberg, 2003, for a review), but dropout is a significant concern. In PCIT, treatment is continued until the child's behavior is brought to within normal limits. Treatment completion is therefore equated with treatment success. Therapists work to prevent dropout. When dropout occurs, it is a unilateral decision by the family, and it is and is classified as a treatment failure. Thus, in PCIT, the variables that affect attrition and success are the same.

The factors associated with successful completion or dropout from PCIT are largely unknown. Only one study to date has examined differences between PCIT dropouts and completers. In a psychometric study of the therapy attitude inventory, Brestan, Jacobs, Rayfield, and Eyberg (1999) demonstrated the discriminative validity of this posttreatment consumer satisfaction measure by showing its ability to differentiate dropouts from completers. No study has yet examined the pretreatment variables that potentially predict outcome. Identification of pretreatment predictors of PCIT outcome is important so that families at risk for dropping out can be identified and their treatment tailored to address the specific areas that may impede treatment progress.

The purpose of this study was to explore the pretreatment predictors of outcome in PCIT. We reasoned that parent, child, demographic, or some combination of these factors might contribute to the prediction of outcome because they have emerged as predictors in studies of other treatments for children and families. Although less grounded in the literature, we also considered variables affecting the accessibility of treatment as potential predictors of outcome, including assignment to a waitlist (WL) group and travel required to attend treatment (parent estimated distance in miles). Finally, we examined behavior management skills as predictors of outcome because these skills are the proximal target of change in PCIT. The identification of predictors from this exploratory study was expected to provide useful hypotheses for treatment tailoring and important direction for planning prospective studies of outcome prediction in PCIT.

METHOD

PARTICIPANTS

Participants were 99 mother-child dyads who had been referred for treatment and screened for inclusion in an outcome study of 3- to 6-year-old children with disruptive behavior (Eyberg, Boggs, & Algina, 1995). To participate in the study, children had to meet diagnostic criteria for oppositional defiant disorder (ODD) according to the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition–Revised* Structured Interview for disruptive behavior disorders (*DSM-III-R Structured Interview* (American Psychiatric Association, 1987; McNeil, Eyberg, Eisenstadt, Newcomb, & Funderburk, 1991). In addition, children and parents had to achieve standard score equivalents of > 70 on the Peabody Picture Vocabulary Test–Revised (PPVT-R; Dunn & Dunn, 1981) and parents the Wonderlic personnel test (Dodrill, 1981), respectively. Children with a history of severe physical or mental impairments (e.g., deafness, blindness, autism) were not included.

Most of the children (80%) were boys, which is representative of clinic-referred children with disruptive behavior. The mean age of the children was 58.1 months (*SD* = 13). The racial and ethnic composition of the families was 78% White, not of Hispanic Origin; 14% Black, not of Hispanic Origin; and 8% Hispanic, Asian, or biracial. Family SES, as measured by Hollingshead's (1975) four-factor index, was 35 (*SD* = 13), indicating that families were in the lower-middle SES range on average. Of the children, 70% had a comorbid diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), 29% had a diagnosis of Conduct Disorder (CD), and 27% had both ADHD and CD, according to the *DSM-III-R Structured Interview.* Other Axis I diagnoses were not assessed in this study. Participants were asked not to begin psychoactive medication to manage the child's behavior during the study. Children already on medication (n = 22) were not enrolled until the medication and dosage had been unchanged (stabilized) for at least 1 month, and these families were asked not to change medication or dosage during the study. Of the 99 families in this study, 50 were treatment completers, 31 were treatment dropouts, and 18

dropped out after the pretreatment assessment but before treatment began (study dropouts).

DEFINITIONS OF OUTCOME

Treatment success was defined as meeting highly specific treatment completion criteria. Mothers were required to demonstrate criterion levels on the interaction skills taught during treatment (see Herschell, Calzada, Eyberg, & McNeil, 2002) and to report resolution of the child's three primary presenting problems. In addition, the children had to demonstrate > 75% compliance to commands during structured parent-child interactions and fewer than five ODD symptoms according to parent report on the *DSM-III-R Structured Interview*. For purposes of meeting completion criteria, symptom presence was determined by current symptom frequency, and symptom duration was disregarded. Treatment continued until the family met the completion criteria.

We considered two definitions of dropout in developing prediction models of treatment outcome. In the first model, we examined study dropouts versus completers. Study dropouts included all families who dropped out of the study after signing, at their first assessment visit, the informed consent to participate in the study. The study dropouts included families who attended at least one assessment session, but dropped out before treatment actually started (many of whom had been assigned to a WL group). In the second prediction model, we examined the treatment dropouts versus completers. Treatment dropouts were a subset of the study dropouts who attended at least one treatment session before dropping out of the study. Although the first model allowed examination of variables relevant to research design, the second model better informed us of treatment-specific factors affecting outcome. In this study, the study completers were the same families as the treatment completers (all those who met treatment termination criteria for PCIT).[1]

Of the 99 families who were enrolled in the treatment outcome study, 52 had been randomly assigned to an immediate treatment (IT) group, and 47 had been assigned initially to a WL group. No family dropped out of the study between the time they signed the consent

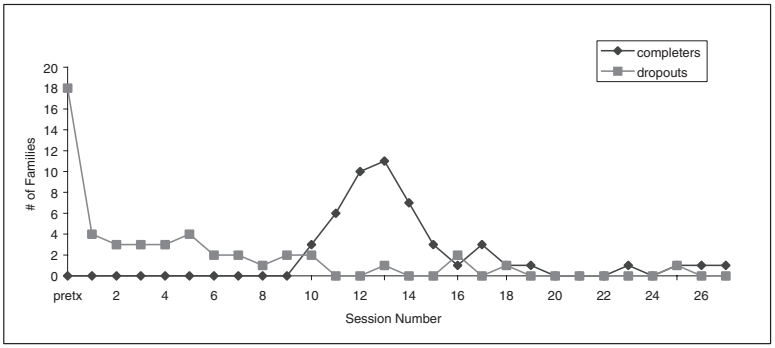

Figure 1. Number of families who drop out or complete treatment following each treatment session.

form (at the first assessment visit) and the time they were randomly assigned to treatment group (at the end of the second assessment visit). In total, 33 (63%) IT families successfully completed treatment, 2 (4%) dropped out before the first treatment session, and 17 (33%) dropped out during treatment. Among those in the WL group, 16 (34%) dropped out before the first treatment session. Of the 31 WL families who began treatment after being on the waitlist, 17 (58%) completed treatment. For the combined IT and WL groups, 50 (51%) completed treatment. The overall treatment dropout rate was 38%, and the study dropout rate was 49%. Figure 1 shows the point during the study after which each family either completed or dropped out.

MEASURES

The *DSM-III-R Structured Interview* (McNeil et al., 1991) was designed to determine whether a child meets the *DSM-III-R* criteria for ODD, CD, and ADHD. Parents describe the frequency and duration of each of the symptoms categorized under these disorders. In this study, diagnoses of ODD and CD were defined as in the *DSM-III-R*. Diagnoses of ADHD were defined using Barkley's criteria for preschoolers (Barkley, 1990). Using these criteria, the children were required to have displayed 10 of the 14 *DSM-III-R* ADHD symptoms for > 1 year to be diagnosed with ADHD. Interrater reliability for the *DSM-III-R Structured Interview* was assessed by comparing the interview data collected by the assessor with the data collected by a trained

undergraduate research assistant who independently observed and coded videotapes of the interviews. High levels of interrater reliability have been demonstrated for this measure (McNeil et al., 1991). In the present study, percentage agreement reliability was .99 for specific symptoms, .99 for duration of symptoms, and 1.0 for the presence versus absence of the disorder.

The PPVT-R (Dunn & Dunn, 1981) is a standardized test designed to measure receptive language in individuals 2.5 years of age and older. Each item consists of four pictures, one of which corresponds to a stimulus word presented orally by the examiner. The respondent is required to indicate the picture that best matches the stimulus word. Split-half reliability coefficients for children range from .67 to .88. Validity studies indicate that the PPVT-R measures vocabulary recognition and visual comprehension and correlates significantly with measures of reading, language, and general academic achievement (Sattler, 1988). Several studies have demonstrated significant correlations between the PPVT-R and the Wechsler intelligence scale for children, third edition (Altepeter, 1989; Carvajal, Hayes, Miller, Wiebe, & Deloise, 1993).

The Wonderlic personnel test (Dodrill, 1981) is a 50-item test designed as a screening scale of adults' intellectual abilities (Dodrill, 1981). The items cover subject matter including vocabulary, visual-spatial tasks, reasoning, abstraction, and calculation problems. The test score is the number of items answered correctly in 12 minutes. In a sample of 120 adults, the Wonderlic estimate of intelligence correlated .93 with the Wechsler adult intelligence scale full scale (WAIS IQ; Wechsler, 1981) and was within 10 points of the WAIS IQ for 90% of the participants (Dodrill, 1981). Differences in age, sex, education, level of intelligence, and emotional adjustment did not significantly affect observed correlations with the WAIS.

The dyadic adjustment scale (DAS; Spanier, 1976) is a 32-item rating scale designed to measure the quality of adjustment between marital or other partners in a dyadic relationship. Respondents indicate the extent to which they agree or disagree with their partner on some items, and they rate how often they engage in various activities with their partner on other items. The DAS yields a total adjustment score, with lower scores indicating poorer relationship quality. The mean score for married couples is 115 (SD = 18). Adequate reliability and

discriminant validity of the DAS have been reported (Budd & Heilman, 1992).

The Eyberg child behavior inventory (ECBI; Eyberg & Pincus, 1999) is a 36-item parent report measure of disruptive behavior that assesses behavior on two scales: the intensity scale and the problem scale. The intensity scale measures the severity of the behavior, and the problem scale measures how problematic the behavior is for the parent. Clinical cutoff scores of 132 and 15, respectively, have been established. Both scales have demonstrated strong internal consistency, stability, and discriminative and predictive validity (Eyberg & Pincus, 1999; Hood & Eyberg, 2003).

The parenting stress index (PSI; Abidin, 1995) is a 101-item self-report instrument consisting of 13 subscales grouped into a child domain scale and a parent domain scale. The child domain measures child behavior problems that lead to frustration in trying to develop a relationship with the child. The parent domain reflects the parents' view of their own functioning in the parenting role. Abidin (1995) has documented the reliability and discriminative validity of the domain scores and their sensitivity to reductions in stress following parent training and has established cutoff scores (Parent Domain, 153; Child Domain, 122).

The parental locus of control scale (PLOC; Campis, Lyman, & Prentice-Dunn, 1986) is a 47-item self-report instrument that measures on a 5-point Likert-type scale the degree to which parents believe they can influence the behavior of their child. Lower scores are associated with greater internal locus of control. Sample items include When something goes wrong between me and my child, there is little I can do to correct it, and I always feel in control when it comes to my child. Roberts, Joe, and Rowe-Hallbert (1992) reported a Cronbach's alpha of .81, 2-week retest stability of .83 and sensitivity of the scale to parent training.

The Beck depression inventory (BDI; Beck & Steer, 1987) is a 21-item self-report scale designed to measure adult depressive symptomatology. Past studies have found adequate reliability and construct validity for this measure (Shaw, Vallis, & McCabe, 1985; Beck, Steer, & Garbin, 1988). The severity of depression can be assessed according to four levels: *not depressed* (0 to 9), *mildly*

depressed (10 to 15), *moderately depressed* (16 to 23), and *severely depressed* (24 to 63; Beck et al., 1988).

The dyadic parent-child interaction coding system II (DPICS-II; Eyberg, Bessmer, Newcomb, Edwards, & Robinson, 1994) is a behavioral observation coding system designed to assess the quality of parent-child social interaction. It provides an observational measure of parent and child behaviors during three 5-min standard situations that vary in the degree of parental control required (5 min of child-directed play, 5 min of parent-directed play, and 5 min of clean-up). Identical categories may be coded for both parent and child. These categories include verbalizations (e.g., command, praise, critical statement), vocalizations (e.g., laugh, yell), and physical behaviors (e.g., destructive behavior, positive touch). The DPICS-II includes several composite variables created by summing scores across related categories or developing ratio scores. The DPICS-II system has been standardized with clinical and nonclinical samples, and normative data are available (Bessmer, Brestan, & Eyberg, 2005; Brestan, Foote, & Eyberg, 2005).

Four graduate student coders were trained to 80% agreement with a 15-min criterion tape prior to coding family interactions Coder training, outlined in the DPICS-II coder training manual (Eyberg, Edwards, Bessmer & Litwins, 1994), involved weekly meetings and 3 hours of weekly homework for approximately 12 weeks. The coders were uninformed as to the group status (dropout versus completer) of the families.

For this study, DPICS-II scores were summed across the three 5-min situations on the 2 days of observation. Four of the composite DPICS-II variables were used to measure parent behavior management skills. *Total commands* is formed by summing direct and indirect commands. *Demandingness* (direct command ratio) is formed by dividing the total direct commands by total commands. *Inappropriate behavior* is formed by summing criticism and smart talk. *Prosocial behavior* is formed by summing acknowledgment, answer, behavioral description, praise, reflection, laugh, and physical positive. These composite variables were selected because they have been shown to discriminate parents of referred from nonreferred children (Brestan et al., 2005).

Three of the composite DPICS-II variables were used to measure child behavior. The *Compliance ratio* is formed by dividing the number of child complies by the number of maternal commands that provide an opportunity to comply. *Inappropriate behavior* is formed by combining whine, yell, criticism, and smart talk. *Prosocial behavior* is formed by combining acknowledgment, answer, behavioral description, praise, laugh, and physical positive. These composite child variables are the ones that have discriminated referred from nonreferred children (Brestan et al., 2005) and were therefore the ones considered the most promising potential predictor variables.

Reliabilities for the DPICS-II categories that formed the composite variables used in this study were examined with the Kappa statistic. According to Fleiss (1981), Kappa values above .75 are considered excellent, values between .60 and .75 are considered good, and values between .40 and .60 are considered fair. Kappa reliabilities for the 10 individual parent categories used in this study, coded for 50% of the observations of each situation ($n = 187$ five-minute segments), ranged from .45 (*smart talk*) to .74 (*unlabeled praise*), with a mean reliability of .63. Kappa reliabilities for the 13 child variables used in this study ranged from .54 (*behavior description*) to 1.0 (*labeled praise*), with a mean reliability of .74. One variable, *maternal laugh*, was not included in its summary variable (*maternal prosocial behavior*) because its reliability estimate was unacceptably low in this study).

PROCEDURE

This study was conducted within the psychology clinic in a large health sciences center. Participants were referred by primary care providers, community mental health clinics, and local Head Start and preschool personnel as well as self-referrals. Information about the treatment program was printed in the local community referral network publication, and information about the research project was presented at Pediatric Grand Rounds.

Referred families were mailed the demographic questionnaire and the ECBI to complete and bring with them to the initial clinical intake interview. Following the clinical interview, the assessor administered

the *DSM-III-R Structured Interview*, PPVT-R, and Wonderlic. Families who did not meet inclusion criteria for the study were scheduled for treatment outside the research program.

For families meeting the inclusion criteria, the study was described in detail, and they signed the informed consent form. Study families then completed the PSI and were videotaped during the three standard parent-child interaction situations of the DPICS-II. The situations were presented in order from least to most parental control required: In the child-directed play situation, the parent was instructed to allow the child to lead the play and to follow along according to the child's rules. In the parent-directed play situation, the parent was instructed to choose an activity and get the child to participate. In the final situation, clean-up, the parent was instructed to get the child to clean up all the toys without assistance. The families returned 1 week later to continue the pretreatment assessment, which included administration of the PLOC, BDI, and DAS, followed by a second videotaped observation of the three DPICS-II situations. Families were paid $50 for completion of the two assessment visits.

Following the second assessment visit, families were randomly assigned to either an IT group or a WL control group. Families assigned to the WL group began treatment approximately 4 months after the first assessment.

FORMAT OF THE TREATMENT

Each family was seen individually by two graduate student therapists during weekly 1-hour sessions. To help ensure treatment fidelity, therapists were extensively trained, received weekly supervision, and adhered to the PCIT treatment manual, which detailed the procedures for each treatment session. Treatment fidelity was assessed by a primary observer who randomly selected and checked 50% of the videotaped sessions. This observer used integrity checklists from each session within the treatment manual to record each session element that was covered. A secondary observer independently checked 50% of those tapes to determine interobserver reliability. Accuracy was 97% with the treatment manual, and the percentage agreement interrater reliability was 96%. The number of treatment sessions in this study

ranged from 10 to 27 for treatment completers ($M = 14.14$, $SD = 3.89$), and from 1 to 25 ($M = 6.81$, $SD = 5.72$) for treatment dropouts (Figure 1).

PCIT sessions were conducted once a week and were approximately 1 hr in length. In the first phase of treatment, parents learned child-directed interaction (CDI) skills, such as labeled praise, behavioral description, and reflection to follow appropriate child behavior, and ignoring to follow negative child behavior. Parents were asked to practice the CDI skills during daily 5-min home sessions with their child. In the second phase, parents learned parent-directed interaction (PDI) skills, such as clear, age-appropriate commands and consistent consequences (praise for compliance and timeout for noncompliance). Parents were asked to continue to practice the CDI skills during daily sessions at home and to introduce the PDI skills at home in gradually expanding situations with the child.

ANALYSES

To identify potential predictor variables for inclusion in the regression analyses, dropouts and completers were compared on 26 pretreatment variables using independent samples *t* tests or chi-square tests. The 26 variables included *demographic characteristics* (SES, child age, maternal age, child minority status, single-parent status, number of children in family), *maternal characteristics* (IQ, depressive symptoms, marital adjustment, parenting stress related to parent characteristics, parenting stress related to child characteristics, total parenting stress, parenting locus of control, tolerance for child misbehavior), *behavior management skills* (total commands, inappropriate behavior, prosocial behavior, direct command ratio), *child characteristics* (comorbid ADHD diagnosis, comorbid CD diagnosis, intensity of disruptive behavior, observed inappropriate behavior, observed compliance ratio, observed prosocial behavior), and *accessibility factors* (distance to clinic, WL group assignment).

Following the method used by Kazdin et al. (1993), we retained any variable as a potential predictor that differed between the dropout and completer groups at $p < .10$. This alpha level is adopted when the outcome is likely to be influenced by multiple factors, each potentially small in its individual contribution (Kazdin et al., 1993). In explor-

atory studies such as this, Type II errors are considered more costly than Type I errors (Hoza et al., 2000).

MLR was used to develop prediction models for both study outcome and treatment outcome. We selected MLR rather than discriminant function analysis because several of the potential predictor variables were categorical. Variables that differed between groups were entered into the prediction equation. In developing each model, a backward stepwise procedure was used, which retains only those variables that make a significant contribution to prediction beyond the other variables in the equation. The log likelihood ratio statistic was used to test change in the predictive fit of each model. Nonsignificance of the log likelihood criterion was used to determine removal from the model.

Similar to methodology used by Frankel and Simmons (1992), classification indices were calculated to determine agreement between the actual outcome and that classified by each regression equation: (a) sensitivity, or the true-positive rate, which refers to the proportion of completers correctly predicted by the regression equation; (b) specificity, which refers to the proportion of observed dropouts correctly predicted by the equation; (c) positive predictive power (PPP), which refers to the proportion of predicted completers who actually completed treatment; and (d) negative predictive power (NPP), which refers to the percentage of predicted dropouts who actually dropped out. The prediction models and the overall classification accuracy of the models were also calculated.

RESULTS

PREDICTORS OF STUDY OUTCOME

Table 1 shows the mean score or percentages for the potential outcome predictors for all families who entered the PCIT outcome study. In the order of their significance, the following variables differentiated the study dropouts from the successful completer families at $p < .05$: WL assignment, DPICS-II direct command ratio, BDI depression scores, DPICS-II parent inappropriate behavior, and maternal age. Variables that differentiated the groups at $p < .10$ were the mothers'

TABLE 1
Differences Between Study Dropouts and Completers

	Dropouts (n = *49*)		*Completers* (n = *50*)		
Variable	M	SD	M	SD	*Effect Size*
Demographic					
% Minority status	24		20		.05
% Single-parent family	37		38		.01
Socioeconomic status (Hollingshead index)	32.73	12.31	36.82	14.77	.30
Child age	4.35	1.01	4.44	1.03	.08
Maternal age	29.79	5.84	32.92**	8.80	.42
Number of children in family	2.31	0.94	2.10	0.86	.23
Maternal characteristics					
Wonderlic (IQ estimate)	100.04	14.33	105.06*[c]	13.25	.36
Beck depression inventory	13.52[a]	9.47	9.70**	8.30	.43
PSI parent domain	150.02	25.06	141.70*	24.79	.33
PSI child domain	149.61	21.47	147.92	17.76	.10
PSI total scale	299.63	41.52	289.62	36.15	.26
ECBI problem scale	23.78	6.19	22.14	6.32	.26
Parent locus of control–short form	72.11[b]	9.96	70.15[c]	8.08	.22
Dyadic adjustment scale	104.81	20.87	110.31	17.22	.29
Behavior management skills					
DPICS-II parent inappropriate behavior	33.29	23.82	25.28**	13.01	.42
DPICS-II parent direct command ratio	0.69	0.13	0.63**	0.14	.44
DPICS-II parent prosocial behavior	83.04	37.91	80.58	32.89	.07
DPICS-II parent total commands	126.84	62.84	120.18	39.09	.13
Child characteristics					
ECBI intensity scale	178.80	26.13	173.04	23.04	.23
% ADHD (Barkley criterion)	78		62*		.17
% Conduct disorder diagnosis	37		22		.16
DPICS-II child compliance ratio	0.25	0.14	0.23	0.13	.09
DPICS-II child inappropriate behavior	58.41[a]	66.82	54.48	49.47	.07
DPICS-II child prosocial behavior	56.86[a]	26.04	59.31	22.65	.10
Accessibility					
Distance to clinic (miles)	37.31[a]	33.87	34.41[c]	44.20	.07
% Waitlist group	61		34***		.27

NOTE: ECBI = Eyberg child behavior inventory; PSI = parenting stress index; ADHD = attention deficit hyperactivity disorder DPICS-11.
a. $n = 48$.
b. $n = 47$.
c. $n = 49$.
d. $n = 36$.
e. $n = 31$.
*$p < .10$. **$p < .05$. ***$p < .01$.

TABLE 2
Pearson Correlations Among Variables in Study Prediction Equation

	1	*2*	*3*	*4*	*5*	*6*	*7*
1. Waitlist group		.13	.18	.14	.02	–.30**	.01
2. Parent direct command ratio			.33**	.42**	–.32**	–.29**	.23*
3. Beck depression inventory				.07	–.20*	–.29**	.23*
4. Parent inappropriate behavior					–.17	–.26**	.02
5. Maternal age						.23*	–.15
6. Maternal IQ							–.19
7. Child ADHD diagnosis							

NOTE: ADHD = attention deficit hyperactivity disorder.
*$p < .05$. **$p < .01$.

Wonderlic IQ estimates and child comorbid ADHD. Table 2 shows the bivariate correlations among these variables. When these variables were entered into the prediction equation, the results indicated that WL assignment best predicted study outcome. Maternal age significantly increased the prediction of completing the study beyond WL assignment alone. The chi-square test of the overall prediction equation was significant, χ^2 (2, $N = 97$) = 12.78, $p = .002$.[2]

The sensitivity index of the obtained prediction equation of study outcome was .71, indicating that 71% of completers were correctly predicted. The specificity of the equation was .56, indicating that 56% of dropouts were correctly predicted. The PPP indicated that 63% of predicted completers actually completed the study, which is higher than the 50% base rate for study completion in this sample. The NPP indicated that 66% of predicted dropouts actually dropped out of the study, which is also higher than the 49% base rate for study dropout in this sample. The overall classification accuracy rate of 64% is larger than what would be predicted by chance (49%).

PREDICTORS OF TREATMENT OUTCOME

Table 3 shows the mean score or percentages for the potential treatment outcome predictors for the families who attended at least one session of PCIT. As shown, the DPICS-II direct command ratio was the only variable that differentiated the treatment dropout from com-

TABLE 3
Differences Between Treatment Dropouts and Completers

	Dropouts (n = 31)		*Completers (n = 50)*		
Variable	M	SD	M	SD	*Effect Size*
Demographic					
% Minority status	16		20		.05
% Single parent	39		38		.00
Socioeconomic status (Hollingshead index)	34.48	12.89	36.82	14.77	.17
Child age	4.35	1.05	4.44	1.03	.15
Maternal age	30.77	6.21	32.92	8.80	.25
Number of children	2.32	1.01	2.10	0.86	.24
Maternal adjustment					
Wonderlic test (IQ estimate)	103.23	14.23	105.06[a]	13.25	.13
Beck depression scale	13.42	9.83	9.72*	8.30	.42
PSI parent domain scale	152.42	25.50	141.70*	24.79	.43
PSI child domain scale	150.81	21.20	147.92	17.76	.15
PSI total scale	303.23	43.86	289.62	36.15	.35
ECBI problem scale	23.74	6.65	22.14	6.32	.25
Parent locus of control scale–short form	72.57[e]	10.31	70.14[a]	8.08	.27
Dyadic adjustment scale	109.53[c]	18.93	110.31[b]	17.22	.04
Behavior management skills					
DPICS parent inappropriate behavior	31.94	19.83	25.28*	13.01	.42
DPICS parent direct command ratio	0.70	0.13	0.63**	0.14	.52
DPICS parent prosocial behavior	85.03	35.87	80.58	32.89	.13
DPICS parent total commands	128.42	59.41	120.18	39.09	.16
Child adjustment					
% ADHD diagnosis	74		62		.13
% Conduct disorder diagnosis	42		22*		.21
ECBI intensity scale	179.84	25.14	173.04	23.04	.28
DPICS child compliance ratio	0.23	0.12	0.23	0.13	.00
DPICS child inappropriate behavior	59.19	70.23	54.48[b]	49.47	.08
DPICS child prosocial behavior	54.87	24.46	59.31[b]	22.65	.19
Accessibility					
% Waitlist group assignment	45		34		.11
Distance to clinic (miles)	34.70[e]	37.52	34.41[a]	44.20	.01

NOTE: ECBI = Eyberg child behavior inventory; PSI = parenting stress index; DPICS = dyadic parent-child interaction coding system; ADHD = attention deficit hyperactivity disorder.
a. $n = 49$.
b. $n = 48$.
c. $n = 36$.
d. $n = 31$.
e. $n = 30$.
*$p < .10$. **$p < .05$. ***$p < .01$.

TABLE 4
Pearson Correlations Among Variables in Treatment Prediction Equation

	1	*2*	*3*	*4*	*5*	*6*
1. DPICS parent direct command ratio		.17	.27*	.33**	.41**	.34**
2. Child CD diagnosis			.21	.15	.13	.20
3. PSI parent domain scale				.56**	–.09	.88**
4. Beck depression inventory					.10	.88**
5. DPICS parent inappropriate behavior						.02
6. Maternal distress composite[a]						

NOTE: PSI = parenting stress index. DPICS = dyadic parent-child interaction coding system. CD = conduct disorder.
a. Maternal distress composite is composed of scores on the PSI parent domain scale and the Beck depression inventory.
*$p < .05$. **$p < .01$.

pleter families at $p < .05$. The diagnosis of CD according to the *DSM-III-R Structured Interview*, the parenting stress index (PSI) parent domain score, the BDI score, and the DPICS-II parent inappropriate behavior score differentiated dropouts from completers at $p < .10$. The bivariate correlations among these five potential predictor variables are shown in Table 4. When the five variables were entered into a prediction equation, the model including the PSI parent domain score and the parent inappropriate behavior score, $\chi^2(2, N = 81) = 7.92$, $p = .02$, best predicted treatment outcome.

The sensitivity index of the obtained prediction equation of treatment outcome was .84, indicating that 84% of the treatment completers were correctly predicted by this equation. The specificity of the equation was .38, indicating that 38% of dropouts were correctly predicted. The PPP indicated that 69% of predicted completers actually completed treatment, which is higher than the 62% base rate for treatment completion in this sample. The NPP indicated that 60% of predicted dropouts actually dropped out of treatment, which is higher than the 38% base rate of dropout in this sample. The overall classification accuracy rate of 66% was greater than what would be predicted by chance (57%).

Post hoc analyses were performed to test the predictive value of a pretreatment maternal distress variable created by standardizing and combining two moderately correlated ($r = .58$) and conceptually

related variables that both showed moderate effect sizes for differentiating the groups, the PSI parent domain and the BDI depression scores. The composite maternal distress variable differentiated dropouts from completers at $p < .05$. When this variable was entered into the prediction equation for treatment completion rather than considering the PSI parent domain and BDI scores separately, the model including the maternal distress composite and total maternal inappropriate behavior, $\chi^2(2, N = 81) = 7.82$, $p = .02$, best predicted treatment outcome.

The sensitivity index of this equation was .82, indicating that 82% of completers were correctly predicted. The specificity of the equation was .35, indicating that 35% of dropouts were correctly predicted. The PPP indicated that 67% of predicted completers actually completed treatment, which is higher than the 63% base rate for completion in this sample. The NPP indicated that 55% of predicted dropouts actually dropped out of treatment, which is higher than the 38% base rate of dropout in this sample. The overall classification accuracy rate of 64% was larger than that because of chance (57%), yet smaller than the model that included the PSI parent domain and maternal inappropriate behavior alone.

DISCUSSION

This is the first study to examine pretreatment predictors of success and attrition in PCIT. We explored a wide array of potential child, family, and accessibility predictors of outcome but found that only parent and accessibility variables significantly predicted PCIT outcome. Our results suggested that for treatment outcome studies of disruptive preschoolers, the benefits of using a WL control group may be outweighed by the disproportionate number of dropouts from this group. Once families began treatment, however, parent variables, specifically maternal parenting stress and inappropriate parenting, became the salient predictors of outcome.

Looking first at the total group of families who enrolled in the treatment study, WL assignment emerged as the strongest predictor of study outcome. The vast majority of families who failed to begin treatment after consenting to the study and completing the initial assess-

ment (16 of the 18 families) were those who had been assigned to the 4-month WL group. These early dropouts were families with enough motivation to seek treatment initially and, therefore, represent a group of high-risk families who have a better chance of being helped than similar families who do not make that first step. None of the families who were invited to take part in this study declined to participate; all families signed the informed consent form at the initial visit, indicating their willingness to participate in random assignment to either experimental group. Thus, there were no study or treatment refusers (Garfield, 1986). Assignment to the WL group, rather than anything related to the families' initial willingness to participate in the study, appeared to influence dropout in this study.

Although we had insufficient power to examine the predictors of WL dropout separately, the high number of families who withdrew from the study before treatment started indicates that their initial engagement was insufficient to maintain their commitment. The clinicians who conducted the initial assessments were not the same individuals who would become a family's therapist when treatment started, and therefore an opportunity to establish a therapeutic relationship that might have served as a tie to the project was missed. It is possible that when waiting for treatment is necessary, an already established relationship with the therapist may help decrease study dropout for the highly stressed families of children with disruptive behavior.

Another factor in dropout from the WL for these families may have been the difficulty of waiting for treatment in this program when other options were available. The normal WL time for services at our psychology clinic and the county mental health centers in our area exceeded 4 months, which limited other psychosocial options for families without private insurance coverage. However, Medicaid coverage for medical treatments was available to most of the families who enrolled in our study. In a follow-up to this study, Boggs et al. (2004) found that 44% of families who dropped out reported obtaining medication to manage their child's behavior, and 13% obtained individual play therapy. None of the families obtained parent training, although one mother attended a parenting workshop. Our results suggest that mental health clinics that maintain long waiting lists for treatment are potentially losing some families who might subsequently not seek

help for their children or might seek short-term solutions that do not last over time (Boggs et al., 2004).

In addition to assignment to the WL group, maternal age emerged as a predictor of study completion. As in other treatment studies (Kazdin et al., 1993; Kazdin & Mazurick, 1994), our results showed that older mothers were more likely than younger mothers to remain in the study. The age difference between the mothers who dropped out (mean age = 30) versus completed this study (mean age = 33) was small, however. To understand this finding, we examined individual data and found there were two grandmothers who completed treatment and none who dropped out. When we excluded the two grandmothers from analyses, maternal age was no longer a significant predictor of outcome. In view of the growing number of children living in households maintained by grandparents (U.S. Census Bureau, 1999), it may be useful to consider type of parenthood in future child treatment prediction studies.

In contrast to predictors of study outcome, we found that once families began treatment, parent domain stress and inappropriate parenting behavior (criticism and sarcasm observed during mother-child interactions) were the significant predictors of treatment outcome. These results are similar to findings from a series of studies by Webster-Stratton in which negative life stress (Webster-Stratton & Hammond, 1990) and observed parent negativity (Webster-Stratton, 1996) predicted outcome from another parent-training program for young disruptive children. Prinz and Miller (1996) found that treatment dropout in families of school-aged children was significantly reduced by discussing parents' personal stressors and feelings about treatment as a component of each parent training session. Together, these findings suggest that if we identify mothers at pretreatment who show high parent-domain stress, we may be able to reduce the likelihood that they will drop out of PCIT by providing support and attention to their personal concerns as well as child-related concerns.

In addition to parent-domain stress, we found that inappropriate parenting behavior during parent-child interactions before treatment predicted treatment dropout. Mothers with disapproving parenting styles may hold parenting beliefs so antithetical to the parenting principles in PCIT that new cognitive strategies will be required help them see their child from a different perspective. As initial steps, it may be

useful to examine the personality variables associated with this parenting style, and we may need to examine therapy process variables that differentiate dropouts from completers with this parenting style as well to understand how to succeed with these families.

Unlike some other treatment studies examining variables predictive of outcome for disruptive children (McMahon et al., 1981; Kazdin, 1990; 1995), demographic and child variables demonstrated little predictive value for PCIT outcome. Unique characteristics of this treatment, such as the young age of the children who are treated, probably account for some of these differences. In most families, preschoolers have little voice in decisions about whether families will continue or drop out of treatment. The restricted age range in PCIT may also limit the predictive ability of other child characteristics, such as the severity of child disruptive behavior.

Dropouts and completers showed little difference in disruptive behavior severity, and although children with CD or comorbid ADHD are sometimes considered more difficult to treat, the presence of these disorders did not contribute to the prediction of outcome for PCIT. Future research must continue to examine the influence of comorbid disorders on PCIT outcome, however, including the internalizing disorders. Although anxiety disorders during the preschool years are a significant concern in their own right (Pincus, Choate, Eyberg, & Barlow, in press), the comorbidity of anxiety disorders with disruptive behavior disorders may lower the risk or seriousness of later conduct problems (Loeber & Keenan, 1994). In school-age children with ADHD, March and colleagues (2000) found that comorbid anxiety disorder predicted a better response to treatment than ADHD alone.

In this study, distance of the clinic from the families' home, as estimated in miles by the mothers, did not predict outcome. Although many families lived in towns other than the one in which the clinic was located, distance is just one of many barriers to treatment participation faced by families in this study. It is possible that maternal stress moderates many of the barriers to treatment participation identified by Kazdin et al. (1997) and, for this reason, may emerge as a predictor of outcome in PCIT.

The generally low specificity of prediction in this study suggests that key predictors of treatment outcome for PCIT remain unknown. Although prediction equations were significant, the classification

indices suggest that identified variables increase predictions only slightly over base rates, and better predict completers than dropouts. Other than WL assignment (for study participants), all significant predictors of outcome identified in this study were parent variables. Thus, our results suggest that a more comprehensive array of potential parent variables, including parenting styles, cognitive processes, personality characteristics, and social support, is a promising direction for further study. One of the limitations of this study was our exclusive focus on mothers. Examination of potential predictors among fathers' behavioral, emotional, and personality characteristics will be important in future studies as well.

Finally, much greater attention to process variables in PCIT is indicated. Variables such as treatment expectations, treatment acceptability, the demands of treatment, and the therapist-parent relationship must all be examined as potential predictors of outcome. Parent expectancies for child treatment outcome have been found to predict perceived barriers to treatment participation, treatment attendance, and premature termination from treatment among children ages 2 through 15 referred for oppositional, aggressive, and antisocial behavior (Nock & Kazdin, 2001). The initial engagement of the family is another key process variable that may be critical not only for preventing immediate dropout after intake but also for predicting dropout later in treatment. Aside from the large number of families who dropped out while on the WL, there appeared to be no temporal pattern to the dropout in this study that might suggest particular phases of treatment that might be revised to decrease attrition.

Another process of particular interest in PCIT is the therapist-parent interaction during the coaching of treatment skills. Therapists must be highly active and directive during coaching to achieve changes in child behavior, yet the transfer of control (Silverman & Carmichael, 1999) process that occurs during the course of coaching sessions must be carefully monitored and shaped by the therapist. If salient process variables in coaching can be reliably measured, they hold promise as additional predictors of treatment success in PCIT.

One important limitation of this study warrants further comment. The study was conducted retrospectively and was, therefore, limited to variables selected originally for other purposes. Future research

examining predictors of PCIT outcome must be designed prospectively to enable inclusion of all potential predictors of treatment responsiveness and attrition that are deemed important to investigate. Prediction models are essential for improving current treatments and furthering understanding of treatment process. These models can help us improve both our research designs and our treatment protocols, which will ultimately contribute to more families being treated successfully.

NOTE

1. In follow-up studies, a family who completed treatment but did not participate in the follow-up evaluation would be a treatment completer but not a study completer.

2. Two completer families were excluded from the analyses because of incomplete data. When the two missing data points were replaced with means, the results of the prediction model did not change.

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