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Predictors of Therapist Adherence and Emotional Bond in Multisystemic Therapy: Testing Ethnicity as a Moderator

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Abstract

This study examined the interaction between problem severity and race/ethnicity as a predictor of therapist adherence and family-therapist emotional bond. Data for this study came from a longitudinal evaluation of Multisystemic Therapy (MST) provided by licensed MST provider organizations in community settings. Outcome variables included mid-treatment levels of caregiver report of therapist adherence, changes in caregiver report of therapist adherence over the course of treatment, and overall levels of caregiver-therapist and youth-therapist emotional bond. Hypothesized predictors included race/ethnicity and levels of poly-substance use, externalizing behavior, and youth self-report of delinquency early in treatment as well as pre-treatment number of arrests. Participants were 185 adolescents (M age = 15.35, SD = 1.29) and their caregivers. Of the participating youth, 48 % self-identified as Caucasian, 20 % as African-American, 28 % as Hispanic/Latino, and 4 % as “other.” Two-level Hierarchical Linear Modeling analyses revealed that for Caucasian youth, lower rates of self-reported delinquency were associated with greater increases in caregiver report of therapist adherence over the course of MST. For Hispanic/Latino caregivers, higher externalizing behavior and poly-substance use were associated with reports of lower therapist adherence at mid-treatment and poorer overall levels of emotional bonding with therapists. In contrast, for African-American participants, higher levels of youth externalizing

behavior and poly-substance use were associated with higher overall levels of caregiver and youth report of emotional bonding with therapists, respectively. Results provide evidence that race\ethnicity interacts with problem severity in predicting therapist adherence and family-therapist emotional bond within real-world practice settings and suggest possible therapeutic process differences across race.

Keywords

Multisystemic therapy; Treatment; Ethnic difference; Externalizing behavior; Therapist adherence; Minority

Introduction

Leading academics and meta-analytic reviews have documented the efficacy and effectiveness of family-based interventions for youth with serious externalizing problems, including delinquency and substance use (e.g., Curtis et al. 2004; Waldron and Turner 2008). Despite the initial successes, however, effect sizes often decrease when evidence-based treatments (EBTs) are transported to real-world practice settings (Eyberg et al. 2008; Waldron and Turner 2008). These dampened effects underscore the need for research focused on identifying factors that support or impede successful implementation of EBTs (Henggeler 2011; Hogue et al. 2008; Sexton and Turner 2010). Real-world practice settings serve more diverse clientele with more complex difficulties than controlled university-based settings (Baker-Ericzen et al. 2010). Thus, one possible explanation for these dampened effects is that client cultural background and/or hard-to-treat problems have negative impacts on therapist adherence to evidence-based protocols. For example, therapists might change the way they deliver EBTs based on the race\ethnic group of the client. In addition, severity of problems may make it difficult for therapists to deliver particular components of EBTs. Although some research has examined the impact of problem severity on therapist adherence (e.g., Schoenwald et al. 2005), research has yet to examine the possible interactive relationship between problem severity and race\ethnic status as a predictor of therapist adherence. The primary aim of the present study was to examine how youth problem severity and race\ethnicity interact to predict therapist adherence and family-therapist emotional bond over the course of Multisystemic Therapy (MST; Henggeler et al. 2009).

MST is an evidence-based, comprehensive, family- and community-based treatment for adolescents presenting with serious clinical problems. MST draws upon social-ecological and family systems theories that view problem behavior as the result of the adolescent's interactions within and between systems (e.g., the individual, his or her family, peers, school, community and cultural institutions). MST uses a comprehensive set of empirically supported methods (e.g., cognitive behavioral therapy, parent management training, and pragmatic family therapies), to change these systems to support pro-social behavior. A primary goal of MST is to engage families in treatment and provide them with skills and competencies to manage current and future youth behavior. Consistent with other family-based EBTs, a major predictor of MST's success is therapist adherence to the treatment

protocol (Henggeler et al. 1997, 1999; Hogue et al. 2008; Huey et al. 2000; Robbins et al. 2011; Schoenwald et al. 2000, 2009; Weisz et al. 1995).

When considered as an independent predictor, research has consistently shown that youth problem severity is negatively associated with therapist adherence to MST principles. For example, in a transportability study, Schoenwald et al. (2003a, b) found that caregivers' average ratings of therapist adherence were significantly lower for youth referred for substance use and criminal behavior, compared to caregiver ratings for youth referred for substance use only. Schoenwald et al. (2003a, b) also found therapist adherence was negatively associated with number of arrests and school suspensions. In a second transportability study, Schoenwald et al. (2005a, b) found youth behavior problems were negatively related to therapist adherence. Similarly, Henggeler et al. (1997) found a negative relationship between therapist adherence and youth scores on the Brief Symptom Inventory and youth self-reported delinquency.

Research examining the impact of race/ethnicity on therapist adherence to EBTs is just beginning to emerge. For example, Schoenwald et al. (2003a, b) found that caregivers who identified as white reported higher levels of therapist adherence. Because therapist adherence is associated with outcome, one clear implication of these findings is that race/ethnicity could be related to differential effectiveness when EBTs are transported to real-world practice settings. Indeed, a well-established literature indicates ethnic disparities in service utilization (Atkinson and Gim 1989; Garland et al. 2005), treatment completion (Armbruster and Fallon 1994; Miller et al. 2008), session attendance (Bui and Takeuchi 1992), and clinical benefit (Weersing and Weisz 2002). Session attendance and clinical benefit have been related to therapist adherence in previous studies of family-based treatments (Breitenstein et al. 2010; Henggeler et al. 1997, 1999; Hogue et al. 2008). Furthermore, research has demonstrated that problem severity is related to rates of service utilization, treatment completion, session attendance, and clinical benefit (Mojtabai et al. 2011). Taken together, it is possible that race/ethnicity and severity of problems may negatively impact therapist adherence and the quality of the therapist-client relationship, thus reducing the likelihood that families will stay in and benefit from EBTs. Problem severity may particularly undermine treatment processes when it is coupled with minority race/ethnicity because therapists must respond to client difficulties in ways that are culturally competent, adding more complexity to clinical demands. An aim of the present study was to contribute to the growing literature on therapist adherence by examining the interaction between problem severity and race/ethnicity in the prediction of therapist adherence. In particular, we predicted that greater youth problem severity early in treatment (i.e., substance use, caregiver report of externalizing behavior, youth self-reported delinquency, and number of arrests) would be associated with worse adherence and poorer therapeutic emotional bonding for African-American and Hispanic/Latino families than for Caucasian families, and that these effects would be evident at mid-treatment and would accumulate over time. Given results of intervention studies suggesting there may be therapeutic process differences between Hispanic/Latino families and African-American families in establishing therapeutic alliance and family-therapist emotional bonding (Muir et al. 2004), we also examined differences between Hispanic/Latino ethnicity and African-American race.

The current longitudinal study examined the interaction between cross-informant measures of youth problem behaviors early in treatment and race/ethnicity as predictors of caregiver report of therapist adherence and caregiver and youth report of emotional bond with their therapist over the course of MST delivered within community settings. There are several advantages to examining our research questions within the context of this MST effectiveness study. First, MST's general effectiveness with adolescents exhibiting serious clinical problems (e.g., chronic juvenile delinquency, substance abuse) in community settings is well-documented (Henggeler 2011). Second, although no treatments have been identified as being "well-established" for treating ethnic minority youth, MST has been identified as "probably efficacious and possibly efficacious" (Huey and Polo 2008). Third, the importance of treatment fidelity in achieving favorable clinical outcomes has been supported by multiple efficacy and effectiveness studies of MST (for a review see Henggeler 2011). Fourth, previous MST studies have included predominantly African-American and Caucasian families. Currently, there is a gap in our understanding of whether client level factors differ by race within more diverse samples to predict therapist adherence and other therapeutic processes such as emotional bonding.

Method

Participants

Youth and Caregiver—Participants for this study included 185 adolescents (65.4 % male) and their caregivers who received MST from four agencies licensed to provide MST. At time one (T1), adolescent participants ranged in age from 12 to 18 years ($M = 15.35$, $SD = 1.29$). Forty-eight percent of youth self-identified as Caucasian, 20 % as African-American, 28 % as Hispanic/Latino, and 4 % as "other" (e.g., multi-racial). Fifty-three percent of caregivers self-identified as Caucasian, 18 % as African-American, 26 % as Hispanic/Latino, and 3 % as "other" (e.g., multi-racial). The majority of youth lived with their mother (75 %) at the T1 assessment, 9 % lived with their father, 10 % lived with a grandparent, and 6 % lived with another family member or a non-related adult. The primary caregivers' mean age was 43.62 years ($SD = 9.58$) and average educational attainment was 13 years. Forty-two percent of families received financial assistance and average SES was 30 ($SD = 11.27$) on the Hollingshead 9-step scale, which represents the following types of occupations: child care worker, assistant manager at a fast food restaurant, and bus driver. Inclusion criteria were: (a) youth between the ages of 12 and 18 years, (b) youth referred for MST services from social service agencies or juvenile justice courts for crimes against another person, property offenses, substance abuse, or other externalizing behavior problems; (c) youth living in the caregiver's home for at least a month prior to treatment onset, with no immediate plans for placement elsewhere; and (d) caregiver willing to participate in MST.

Therapists—Across the four MST provider organizations, a total of 76 therapists agreed to participate. Of these, 52 therapists ($M_{age} = 31.0$, $SD = 7.27$) had families who enrolled in the study. Most therapists were women (71 %) who self-identified as Caucasian (86 %). Eighty-five percent of participating therapists reported master's degrees: 50 % Social Work, 19 % Counseling, 15 % Psychology, 12 % Marital and Family Therapy, and 4 % as another field.

Therapists received their highest degree on average 2.62 ($SD = 2.96$) years prior to enrolling in this study, and spent, on average, 9.51 ($SD = 17.35$) months using MST. Therapists who had families in the study did not differ on age, gender, ethnicity, or months using MST from therapists who enrolled but had no participating families.

Procedures

Assessments were conducted in the families' homes and questionnaires were completed on laptop computers. Youth and caregivers completed measures soon after referral (T1; with a mean of 3.02 [$SD = 1.65$] weeks after intake), twice during mid-treatment (T2 and T3; 1.10 [$SD = 0.41$] and 2.56 [$SD = 0.62$] months after the T1 assessment), and at end-of-treatment (T4; 3.90 [$SD = 1.85$] months after T1 assessments). Caregivers provided written consent, and youth provided assents. The Human Subjects Institutional Review Board at all of the participating research sites approved this study.

Multisystemic Therapy—A detailed description of MST is provided elsewhere (Henggeler et al. 1998). Briefly, MST is a home-based treatment approach designed to address the known correlates of antisocial behavior, including characteristics of the individual (e.g., positive attitudes toward delinquency and drug use), his/her family (e.g., poor monitoring, inconsistent or lax discipline), peers (e.g., deviant peers), school (e.g., poor discipline and structure, poor family-school communication), and community (e.g., availability of weapons and drugs, high instability, psychosocial stress). To address these correlates, MST draws upon empirically supported interventions (e.g., Behavior Therapy, Cognitive Behavior Therapy, and Parent Management) and pragmatic family therapies (e.g., structural family therapy) and views problem behavior as the result of the adolescent's interactions within and between systems. These empirically supported interventions are individualized to target relevant systemic factors that maintain or exacerbate the adolescent's problems. MST is further characterized by therapist availability for clinical emergencies (24 h a day, 7 days a week), low therapist caseload (4–6 families), and rigorous quality assurance to support treatment adherence and clinical outcomes (i.e., extensive training in the model with regular booster training sessions, weekly clinical supervision, and weekly consultation with a MST expert). To ensure treatment adherence, the role of supervision and expert consultation is woven into the fabric of Multisystemic Therapy (for a review see Henggeler 2011; Henggeler et al. 1998), and agencies must follow well-specified protocols outlining quality-control service delivery and supervisory practices, as well as treatment principles in order to be licensed providers.

Therapist Training—In addition to meeting their agency's requirements for hiring and training, therapists received standard MST training and ongoing quality assurance (Henggeler et al. 2002). The MST quality assurance and improvement system includes an initial 5-day orientation, weekly group supervision with an onsite MST supervisor (Henggeler et al. 1998), weekly 60-min case consultation with an MST expert, 1.5-day quarterly booster trainings, and a web-based implementation tracking and feedback system provided by the MST Institute (www.mstinstitute.org).

Measures of Adolescent Problem Severity

Each measure of problem severity (i.e., poly-substance use, externalizing behavior, self-report delinquency, and number of arrests) was administered at T1 and assessed behavior during the 30 days prior to the assessment. Criminal charge data were obtained approximately 6 months after treatment was terminated through the Judicial Branch's Integrated Colorado Online Network database, a database used by the Colorado Department of Youth Corrections.

Poly-substance Use—A measure based on the Personal Experience Inventory (PEI; Henly and Winters 1989) was used to assess adolescent self-report of substance use and involvement. The original measure consists of problem severity scales, psychosocial scales, and information related to drug use, including frequency, duration, and age of onset. For the present study, substance use items were adapted by altering street slang terminology to reflect current usage and by adding items that assess alcohol use. Youth answered 19 questions on a 4-point scale (ranging from 0–3: 0—“never” and 3—“often”) pertaining to how often they used alcohol and illegal substances. The sum total of youth responses served as a continuous measure. Higher scores represent higher levels of substance use. The PEI possess adequate psychometric properties, including strong test–retest reliability at one month intervals ($r = 0.84$) (Johnston et al. 1985). Our adapted scale showed moderate internal consistency, $r = 0.80$.

Child Behavior Checklist—Ages 6–18 (CBCL; Achenbach 1991)—The CBCL was administered to primary caregivers and the sum total for the Externalizing subscale was used as a continuous measure of externalizing behavior in the current study. This subscale is comprised of 33 items on a 3-point scale (ranging from 0–2: 0—“not true” and 2—“very true or often true”). Higher scores indicate more externalizing behaviors. The CBCL is one of the most well-validated measures of child and adolescent behavioral functioning (Achenbach 1991; Achenbach and Rescorla 2001). Coefficient alpha for this subscale in the current study was 0.94.

Self-reported Delinquency (SRD; Elliott 1994)—The SRD is a well-validated measure of self-reported delinquency (Henggeler 1989). The SRD assesses covert and overt antisocial behavior and includes subscales that pertain to violent offending, general delinquency, status offenses, and substance use. For purposes of the current study, items related to substance use were excluded given our measure of poly-substance use. This provided 40 items for which youth reported the number of times one of the aforementioned acts were committed. Scores were derived by calculating the total number of youth problem behaviors reported. High scores indicated more involvement in delinquency. Researchers have found test–retest reliability for this measure to range from 0.85 to 0.99, using intervals from less than 1 h to over 2 months (Hindelang et al. 1981; Patterson and Loeber 1982). In this study, the general delinquency scale had a coefficient alpha of 0.89.

Pre-treatment Arrests—Number of pre-treatment arrests was obtained through the Judicial Branch's Integrated Colorado Online Network database, a database used by the

Colorado Department of Youth Corrections. Number of pre-treatment arrests ranged from 0 to 16.

Outcome Measures

Therapist Adherence Measure—The MST Therapist Adherence Measure-Revised (TAM-R; Henggeler et al. 2006) is a 28-item scale that assesses therapist adherence to the nine MST principles (Henggeler et al. 1998). TAM-R items are rated on a 5-point Likert scale, with response options ranging from 1 (not at all) to 5 (very much). Total scores were calculated after dichotomizing each item (5 = adherent, 1–4 = non-adherent, based on Rasch-derived scoring procedures; Rausch et al. 2003), with higher scores indicating greater therapist adherence. The TAM-R is a validated measure (Schoenwald et al. 2003, 2005), with caregiver report shown to significantly predict MST outcome in several studies (Henggeler et al. 1997, 1999; Schoenwald et al. 2000). Caregivers completed the TAM-R at T2, T3, and T4, reporting on therapist adherence in the past week. In the current study, the alpha coefficient for this measure was 0.94 at T2, 0.95 at T3, and 0.96 at T4.

Emotional Bond—The Emotional Bonding subscale of The Working Alliance Inventory (WAI; Horvath and Greenberg 1989) was administered to caregivers and youth to assess emotional connection between the caregiver or youth and the therapist. This subscale consists of 12 items rated on a 7-point scale (ranging from 1–7: 1—“never” and 7—“always”). At T2, caregivers and youth provided a report based on when treatment started; and at T3 and T4, they provided a report based on the past 30 days or since the last assessment (whichever was shorter). Caregivers and youth completed this measure at T2, T3, and T4. The Emotional Bonding subscale is a reliable and valid measure of therapeutic alliance (Fenton et al. 2001; Horvath and Greenberg 1989). In the current study, internal consistency for caregiver report was 0.80 at T2, 0.84 at T3, and 0.88 at T4; and youth report was 0.87 at T2, 0.87 at T3, and 0.86 at T4.

Results

Data Analytic Approach

Analyses were conducted using growth curve modeling techniques (GCM; Raudenbush and Byrk 2001) and the HLM 6 computer software (Raudenbush et al. 2004). Data analyses using these techniques has several advantages over other approaches to examine longitudinal data. First, these techniques allow for the retention of the entire sample, despite missing data across repeated measures. Second, similar to repeated measures ANOVA, HLM provides information as to whether there is significant change over time, on average, and the direction of that change. In addition to this, HLM allows for the examination of individual changes over time and between-subject differences in these changes. Third, HLM accounts for variation in time between data points across subjects which results in a more precise estimation of change.

Intra-class correlation analyses (ICCs) were examined to determine whether 3-level HLM models would be appropriate for analyses such that families are nested within therapists (Sampson and Bartusch 1998). Results showed no significant correlation of observations

within the same therapist for the outcome variables: therapist adherence ($r_{ICC} = 0.00$), caregiver report of emotional bond ($r_{ICC} = 0.00$), and youth report of emotional bond ($r_{ICC} = 0.02$). Thus, HLM models included two-levels with time nested within subjects ($N = 185$ youth). Three models were tested for each of the three outcomes under investigation, including repeated measurement (i.e., T2, T3, T4) of (a) therapist adherence (i.e., caregiver report), (b) caregiver report of emotional bond, and (c) youth report of emotional bond.

Linear change over time was modeled for each of the outcomes. Time was computed as months from Time 2 and was entered uncentered so that the Level 1 Intercept would represent the first mid-treatment (T2) assessment for all analyses. All error terms were free to vary. At Level 2, dichotomous variables were entered uncentered and continuous variables were entered grand-mean centered. Results were evaluated by examining final estimation of fixed effects with robust standard errors. Examination of parameter estimates with robust standard errors increases accuracy of significance tests under conditions of non-normality and in the presence of outliers (Raudenbush and Bryk 2002). For moderation analyses, interaction terms were created by calculating the product of mean-centered scores of the predictor (problem severity) and moderator (race/ethnicity) variables. Significant interactions were interpreted using analytic methods suggested by Preacher et al. (2003) and Curran et al. (2006). Simple slopes representing the effects of the predictors (i.e., poly-substance use, externalizing behavior, self-report delinquency, pre-treatment arrest) on the outcomes at two levels of the moderator variable (racial/ethnic group of delinquency and interest = 1 and “other” families in the study = 0) were computed.

Missing Data and Participant Participation

HLM allows for missing data at Level 1 (repeated outcome measures). However, HLM does not allow for missing data at Level 2 which, in this study, included adolescent level predictors (i.e., levels of T1 poly-substance use, externalizing behavior, and self-report delinquency and pre-treatment arrest). Two adolescents provided poly-substance use data that revealed a distribution of scores that suggested these youth may have provided inaccurate responses. Thus, their data was deemed unusable for calculating poly-substance use involvement. As suggested by Schafer and Graham (2002), missing data such as these can be addressed by estimating the values via multiple imputation. For purposes of this study, the missing data for this predictor variable was estimated with the use of the NORM software developed by Schafer (1999). Five imputations were deemed appropriate given that only 1.8–13.3 % of data was missing.

Seven youth switched primary caregivers during the study; and after T2 assessment, nine youth switched therapists during the study. Analyses were performed with and without controlling for whether participants switched caregivers (yes/no) and or therapist (yes/no). Results did not change in a significant way, thus neither term was included as a control in the results below. Approximately half of families (caregivers = 51.9 %; youth = 51.9 %) completed assessments at all three time points (T2, T3, and T4), 24.9 % of the caregivers and 28.2 % of youth completed assessments at two of the time points only, and 17.7 % of the caregivers and 14.9 % of youth completed assessments at one time point only. Caregivers and youth who completed one or two of the three assessments during which

therapist adherence and emotional bond were assessed (T2, T3, or T 4), were not significantly different from those who completed all assessments on demographic variables (i.e., SES and receiving financial assistance) or on the dependent variables used in this study.

Demographic and Control Variables

At T1, youth and their caregiver completed a family demographics form. Caregivers and youth reported their race\ethnic status. Caregivers also reported youth age and gender and their level of education, occupation (which was converted to a score for SES using the Hollingshead index; Hollingshead 1975), and whether the family was receiving financial assistance. Three dichotomized race\ethnic terms were calculated for caregivers and youth and served as moderator variables: African-American race (1) versus other families in the sample (i.e., 0 = Caucasian, Hispanic\Latino, and “other”), Hispanic\Latino ethnicity (1) versus “other” (0), and Caucasian race (1) versus “other” (0). Correlation analyses between predictors, outcome, and these demographic variables (gender, SES, receipt of financial assistance, youth age) were examined to identify potential statistical controls. As discussed below, correlation analyses revealed that SES and receipt of financial assistance (economic disadvantage) were significantly related to race, thus they were included as statistical controls. In addition, given the mixed literature on the role of family-therapist ethnic-match as a predictor of therapeutic processes, therapeutic alliance (Foster et al. 2009; Halliday-Boykins et al. 2005) and treatment outcome (Cabral and Smith 2011), results were analyzed with and without controlling for whether families were matched with their therapist on race. Results did not change in any meaningful way. Thus this control was not included in the results presented below.

Descriptive Analyses

Table 1 presents means and standard deviations for the variables used in the analyses. Table 2 presents the correlations between the variables used in the analyses. The race\ethnicity variables represent youth race\ethnicity. The same pattern of results was shown for caregiver race\ethnicity. As shown, Hispanic\Latino families were of lower SES relative to other families in the sample, while Caucasian families were of higher SES. Although SES was not related to African-American race, economic disadvantage was positively associated. African-American families were significantly more likely to receive financial assistance than other families, while Caucasian families were significantly less likely to receive financial assistance. In addition, African-American race was significantly related to less poly-substance use, while Caucasian race was associated with more poly-substance use and externalizing behavior at the outset of treatment. Overall, caregiver report of therapist adherence, caregiver report of emotional bond, and youth report of emotional bond were positively associated with each other at each time point.

Given the pattern of relationships between SES, economic disadvantage and the race \ethnicity variables, SES was controlled in analyses of Hispanic\Latino ethnicity and Caucasian race and economic disadvantage was controlled in analyses of African-American race. Correlation analyses showed nonsignificant relationships between youth gender, age, and the independent and dependent variables. Thus, youth gender and age were not included

in the analyses as control variables. For brevity, these variables were not included in the correlations table. Correlation results are available upon request.

Therapist Adherence

Baseline Models—On average, results did not indicate significant linear change in caregiver report of therapist adherence scores across time, $t(150) = 1.53, p = 0.13$. However, there was significant between-subject variability in the time parameter, $\chi^2(143) = 197.21, p < 0.01$, which provides support for examining predictors of this parameter.

Testing for Main Effects and Moderation—The following equation was specified to examine the effects of the race/ethnicity variables as a moderator of each T1 predictor variable (i.e., poly-substance use, externalizing behavior, self-report delinquency, arrest) on (a) mid-treatment levels of caregiver report of therapist adherence (Intercept π_{0j}) and (b) changes in caregiver report of therapist adherence over time (Time π_{1j}) for a total of five separate models:

$$Y_{ij}(\text{adherence}) = \pi_{0j}(\text{Intercept}) + \pi_{1j}(\text{Time}) + e_{ij} \quad (\text{Level 1}):$$

$$\begin{aligned} \pi_{0j}(\text{mid-treatment level of adherence}) &= \beta_{00} + \beta_{01}(\text{control variable}_j) + \beta_{02}(\text{predictor variable}_j) + \beta_{03}(\text{dummy coded race}_j) \\ \pi_{1j}(\text{Time}) &= \beta_{10} + \beta_{11}(\text{control variable}_j) + \beta_{12}(\text{predictor variable}_j) + \beta_{13}(\text{dummy coded race}_j) + \beta_{14}(\text{interaction term}_j) \end{aligned}$$

The significance of the coefficients for the interaction terms β_{04} and β_{14} were examined. If an interaction was significant, simple slope effects were calculated. Notably, across all analyses, there were no significant effects of control variables on outcomes.

Race and Poly-substance Use—Across all analyses, there were no significant main effects of the race/ethnicity variables or T1 poly-substance use on mid-treatment levels of therapist adherence (Level 1 Intercept π_{0j}). There were also no significant interaction effects between the race/ethnicity variables and T1 poly-substance use as predictors of mid-treatment levels of therapist adherence: Caucasian race (vs. other race), $t(146) = 0.81, p = 0.42$, Hispanic/Latino ethnicity (vs. other race), $t(146) = -0.71, p = 0.48$, and African-American race (vs. other race), $t(146) = -0.35, p = 0.73$. With regard to linear change in therapist adherence over time (Level 1 Time π_{1j}) as the outcome of interest, there were no significant main effects of the race/ethnicity variables or T1 poly-substance use on changes in caregiver report of therapist adherence over the course of treatment. In addition, there were no significant interactions between the race/ethnicity variables and poly-substance use as predictors of changes in caregiver report of therapist adherence over the course of MST: Caucasian race (vs. other race), $t(146) = -0.56, p = 0.56$, Hispanic/Latino ethnicity (vs. other race), $t(146) = -1.43, p = 0.16$, and African-American race (vs. other race), $t(146) = 1.86, p = 0.07$.

Race and Externalizing Behavior—Across all analyses, there were no significant main effects of the race/ethnicity variables or T1 externalizing behavior on mid-treatment levels of therapist adherence (Level 1 Intercept π_{0j}). In addition, there were no significant

interaction effects for Caucasian race (vs. other race), $t(146) = 1.92, p = 0.06$, or for African-American race (vs. other race), $t(146) = -0.53, p = 0.60$, as predictors of mid-treatment levels of adherence. Results were significant, however, for the interaction between Hispanic\Latino ethnicity (vs. other race) and T1 externalizing behavior as a predictor of mid-treatment levels of therapist adherence, $t(146) = -2.38, p < 0.05$. Post hoc analyses revealed that for Hispanic\Latino ethnicity, as T1 levels of externalizing behavior increased, mid-treatment levels of caregiver report of therapist adherence decreased, $b = -3.19, p < 0.05$. Among other families in the study, simple slope analyses did not show level of T1 externalizing behavior to significantly predict mid-treatment levels of caregiver report of therapist adherence, $b = 0.04, p = 0.47$.

With regard to linear change in therapist adherence over time (Level 1 Time π_{1j}) as the outcome of interest, there were no significant main effects of the race\ethnicity variables or T1 externalizing behavior. There were also no significant interaction effects between the race\ethnicity variables and T1 externalizing behavior as predictors of changes in caregiver report of therapist adherence: Caucasian race (vs. other race), $t(146) = -0.94, p = 0.35$, Hispanic\Latino ethnicity (vs. other race), $t(146) = 0.35, p = 0.74$, and African-American race (vs. other race), $t(146) = 1.12, p = 0.27$.

Race and Self-Report Delinquency—There was a significant main effect of T1 youth self-report of delinquency on mid-treatment levels of therapist adherence (Level 1 Intercept π_{0j}) when Caucasian race (vs. other race), $t(147) = -2.03, p < 0.05$, Hispanic\Latino ethnicity (vs. other race), $t(147) = -2.01, p < 0.05$, and African-American race (vs. other race), $t(147) = -2.03, p < 0.05$, were examined. Results suggest that when accounting for race\ethnicity, the more delinquency a youth self-reports early in treatment (T1), the lower caregiver report of therapist adherence at mid-treatment. Results showed no significant results for the interaction between the race\ethnicity variables and T1 youth self-report of delinquency as predictors of mid-treatment levels of therapist adherence: Caucasian race (vs. other race), $t(146) = 1.01, p = 0.31$, Hispanic\Latino ethnicity (vs. other race), $t(146) = -0.98, p = 0.33$, and African-American race (vs. other race), $t(146) = 0.73, p = 0.45$. With regard to linear changes in therapist adherence over time (Level 1 Time π_{1j}) as the outcome of interest, again, there were no significant main effects. In addition, the interaction between African-American race (vs. other race) and T1 youth self-report of delinquency did not significantly predict changes in caregiver report of therapist adherence over the course of MST, $t(146) = -0.75, p = 0.45$. Results were significant, however, for Caucasian race (vs. other race), $t(146) = -2.43, p < 0.05$, as well as for Hispanic\Latino ethnicity (vs. other race), $t(146) = 3.85, p < 0.001$.

Post hoc analyses showed that for Caucasian race, as youth self-report of delinquency at T1 decreased, there were greater increases (improvements) in caregiver report of therapist adherence, $b = -0.71, p < 0.05$. Among other families in the study, simple slope analyses showed that as T1 youth self-report of delinquency increased, there were greater increases (improvements) in therapist adherence over the course of MST, $b = 0.09, p < 0.05$. This was likely due to the Hispanic\Latino families in the non-Caucasian group. For Hispanic\Latino ethnicity, higher levels of T1 youth self-report of delinquency at T1 was associated with greater increases (improvements) in caregiver report of therapist adherence over the course

of MST, $b = 0.92, p < 0.001$. Among non-Hispanic/Latino families in this study, simple slope analyses did not show levels of T1 youth self-report of delinquency as a significant predictor of changes in caregiver report of therapist adherence, $b = -0.03, p = 0.4$.

Race and Pre-treatment Arrest—Across all analyses, there were no significant main effects of the race/ethnicity variables or number of pre-treatment arrests on mid-treatment levels of therapist adherence (Level 1 Intercept π_{0j}). There were also no significant interactions between the race/ethnicity variables and number of pre-treatment arrests: Caucasian race (vs. other race), $t(146) = 0.87, p = 0.39$, Hispanic/Latino ethnicity (vs. other race), $t(146) = -0.20, p = 0.84$, and African-American race (vs. other race), $t(146) = -0.56, p = 0.58$. With regards to linear changes in caregiver report of therapist adherence over time (Level 1 Time π_{1j}) as the outcome of interest, there were no significant main effects of the race/ethnicity variables or number of pre-treatment arrest. In addition, results showed no significant interactions between the race/ethnicity variables and number of pre-treatment arrests as predictors of changes in caregiver report of therapist adherence: Caucasian race (vs. other race), $t(146) = 0.68, p = 0.50$, Hispanic/Latino ethnicity (vs. other race), $t(146) = -0.99, p = 0.32$, and African-American race (vs. other race), $t(146) = -0.15, p = 0.88$.

Emotional Bond, Youth Report

Baseline Models—On average, results indicated no significant systematic change in youth report of emotional bond, $t(150) = 1.85, p = 0.07$. Results also showed no significant between-subject variability in the time parameter for youth report of emotional bond, $\chi^2(143) = 154.42, p = 0.24$. There was, however, significant variability for the intercepts across youth report of emotional bond, $\chi^2(143) = 417.57, p < 0.001$. Together, these results suggest that youth reported different overall levels of emotional bond with their therapist, but the overall level of emotional bond did not change significantly across time. As such, the time parameter was removed and predictors were modeled for the intercepts – specifying a mean and variance (intercept only) model.

Testing for Main Effects and Moderation—The following equation was specified to examine the effects of the race/ethnicity variables as a moderator of each T1 predictor variable (i.e., poly-substance use, externalizing behavior, self-report delinquency, number of pre-treatment arrest) on overall levels of youth report of emotional bond (Intercept π_{0j}):

$$Y_{ij}(\text{emotional bond}) = \pi_{0j}(\text{Intercept}_j) + e_{ij} \quad (\text{Level 1}):$$

$$\begin{aligned} \pi_{0j}(\text{overall level of emotional bond}) = & \beta_{00} + \beta_{01}(\text{control variable}_j) \\ & + \beta_{02}(\text{predictor variable}_j) \\ & + \beta_{03}(\text{dummy coded race:moderator}_j) \\ & + \beta_{04}(\text{interaction}_j) + r_{0j} \end{aligned} \quad (\text{Level 2}):$$

The significance of the coefficient for the interaction term β_{04} was of interest. Across all analyses results showed no significant effects for the control variables as predictors of the outcome.

Race and Poly-substance Use—Across all analyses, results showed no significant main effects of the race\ethnicity variables or T1 poly-substance use as predictors of overall levels of youth report of emotional bond. In addition, results showed no significant interactions between the race\ethnicity variables and T1 poly-substance use as predictors of youth report of overall levels of emotional bond: : Caucasian race (vs. other race), $t(171) = 1.04$, $p = 0.30$, Hispanic\Latino ethnicity (vs. other race), $t(171) = -0.74$, $p = 0.46$, and African-American race (vs. other race), $t(171) = -0.92$, $p = 0.36$.

Race and Externalizing Behavior—Across all analyses, results showed no significant main effects of the race\ethnicity variables or T1 externalizing behavior as predictors of youth report of overall levels of emotional bond. In addition, results showed no significant interactions between Caucasian race (vs. other race) and T1 externalizing behavior, $t(171) = -0.39$, $p = 0.70$, and between Hispanic\Latino ethnicity (vs. other race) and T1 externalizing behavior, $t(171) = -1.15$, $p = 0.25$. Results were significant, however, for the interaction between African-American race (vs. other race) and T1 externalizing behavior, $t(171) = 3.44$, $p < 0.01$, as predictors of youth report of overall levels of emotional bond. Post hoc analyses revealed that for African-American families, youth with higher rates of externalizing behavior at T1 also reported greater overall levels of emotional bond, $b = 5.35$, $p < 0.001$. For other families in the study, level of T1 externalizing behavior did not significantly predict overall levels of youth report of emotional bond, $b = -0.14$, $p = 0.07$.

Race and Self-reported Delinquency—Across all analyses, results showed no significant main effects of the race\ethnicity variables or T1 youth self-report of delinquency as predictors of youth report of overall levels of emotional bond. Results also showed no significant interactions between the race\ethnicity variables and T1 youth self-report of delinquency as predictors of youth report of overall levels of emotional bond: Caucasian race (vs. other race), $t(171) = -1.11$, $p = 0.27$, Hispanic\Latino ethnicity (vs. other race), $t(171) = 1.04$, $p = 0.30$, and African-American race (vs. other race), $t(171) = 0.08$, $p = 0.93$.

Race and Pre-treatment Arrest—Across all analyses, results showed no significant main effect of the race\ethnicity variables or number of pre-treatment arrests as predictors of youth report of overall levels of emotional bond. Results also showed no significant interactions between the race\ethnicity variables and number of pre-treatment arrests as predictors of youth report of overall levels of emotional bond: Caucasian race (vs. other race), $t(171) = 1.73$, $p = 0.09$, Hispanic\Latino ethnicity (vs. other race), $t(171) = -1.91$, $p = 0.06$, and African American race (vs. other race), $t(171) = -0.22$, $p = 0.83$.

Emotion Bond, Caregiver Report

Baseline Models—On average, results indicated no significant systematic change in caregiver report of emotional bond, $t(150) = 0.36$, $p = 0.72$. Results also showed no significant between-subject variability in the time parameter for caregiver report of emotional bond, $\chi^2(143) = 136.07$, $p = 0.50$. There was, however, significant variability for the intercepts, $\chi^2(143) = 310.01$, $p < 0.001$. As such, the *time* parameter was removed and predictors were modeled for the intercepts—specifying a mean and variance (intercept only) model.

Testing for Main Effects and Moderation—The following equation was specified to examine the effects of the race\ethnicity variables as a moderator of each T1 predictor variable (i.e., poly-substance use, externalizing behavior, self-report delinquency, arrest) on overall levels of caregiver report of emotional bond (Intercept π_{0j}):

$$Y_{ij}(\text{emotional bond}) = \pi_{0j}(\text{Intercept}_{ij}) + e_{ij} \quad (\text{Level 1}):$$

$$\begin{aligned} \pi_{0j}(\text{overall level of emotional bond}) = & \beta_{00} + \beta_{01}(\text{control variable}_{ij}) \\ & + \beta_{02}(\text{predictor variable}_{ij}) \\ & + \beta_{03}(\text{dummy coded race:moderator}_{ij}) \\ & + \beta_{04}(\text{interaction}_{ij}) + r_{0j} \end{aligned} \quad (\text{Level 2}):$$

The significance of the coefficient for the interaction term β_{04} was of interest. Across all analyses results showed no significant effects for the control variables as predictors of the outcome.

Race and Poly-substance Use—Across all analyses, results showed no significant main effects of the race\ethnicity variables or T1 poly-substance use as predictors of caregiver report of overall levels of emotional bond. In addition, results were not significant for the interaction between Caucasian race (vs. other race) and levels of T1 poly-substance use, $t(175) = -0.12, p = 0.91$, as predictors of caregiver report of overall levels of emotional bond. Results were significant, however, for the interaction between Hispanic\Latino ethnicity (vs. other race) and T1 poly-substance use, $t(175) = -2.11, p < 0.05$, and for African-American race (vs. other race) and T1 poly-substance use, $t(175) = 1.95, p = 0.05$, as predictors of caregiver report of overall levels of emotional bond. Post hoc analyses revealed that for Hispanic\Latino ethnicity, youth with higher reported poly-substance use at T1, caregiver report of overall levels of emotional bond was lower, $b = -2.31, p < 0.05$. Among other families in the study, simple slope analyses did not show level of T1 poly-substance use to significantly predict caregiver report of emotional bond, $b = -0.03, p = 0.69$. For African-American families, results were reversed. Youth with higher reported T1 poly-substance use at T1, had caregivers who reported greater overall levels of emotional bond, $b = 3.65, p = 0.05$. Among other families in the study, simple slope analyses did not show level of T1 poly-substance use to significantly predict caregiver report of overall levels of emotional bond, $b = -0.11, p = 0.11$.

Race and Externalizing Behavior—Across all analyses, results showed no significant main effects for the race\ethnicity variables or T1 externalizing behavior as predictors of caregiver report of emotional bond. In addition, the interaction between Caucasian race (vs. other race) and T1 externalizing behavior, $t(175) = 0.62, p = 0.53$, and African-American race (vs. other race) and T1 externalizing behavior, $t(175) = 0.41, p = 0.68$, were not significant predictors of overall levels of caregiver report of emotional bond. Results were significant, however, for the interaction between Hispanic\Latino ethnicity (vs. other race) and T1 externalizing behavior, $t(175) = -2.25, p < 0.05$. Post hoc analyses showed that for Hispanic\Latino ethnicity, as T1 externalizing behavior increased, overall levels of caregiver

report of emotional bond decreased, $b = -2.85$, $p < 0.05$. For other families in the study, level of T1 externalizing behavior did not significantly predict overall levels of caregiver report of emotional bond, $b = 0.01$, $p = 0.85$.

Race and Self-reported Delinquency—Across all analyses, results showed no significant main effects of the race/ethnicity variables or T1 youth self-report of delinquency as predictors of overall levels of caregiver report of emotional bond. Results also showed no significant interactions between the race/ethnicity variables and T1 youth self-report of delinquency as predictors of overall levels of caregiver report of emotional bond: Caucasian race (vs. other race), $t(175) = -0.04$, $p = 0.97$, Hispanic/Latino ethnicity (vs. other race), $t(175) = -0.68$, $p = 0.50$, and African-American race (vs. other race), $t(175) = 1.65$, $p = 0.10$.

Race and Pre-treatment Arrest—Across all analyses, results showed no significant main effect of the race/ethnicity variables or number of pre-treatment arrests as predictors of overall levels of caregiver report of emotional bond. In addition, results showed no significant interactions between the race/ethnicity variables and number of pre-treatment arrests as a predictor of caregiver report of overall levels of emotional bond: Caucasian race (vs. other race), $t(175) = 0.94$, $p = 0.35$, Hispanic/Latino ethnicity (vs. other race), $t(175) = -0.46$, $p = 0.65$, and African American race (vs. other race), $t(175) = -0.66$, $p = 0.51$.

Discussion

In real-world practice settings, therapist adherence to EBTs is critical for producing treatment outcomes similar to those achieved in controlled settings (Henggeler et al. 1997, 1999; Robbins et al. 2011). Perhaps as a result, the field has begun to focus on predictors of therapist adherence (e.g., Chapman and Schoenwald 2011; Ellis et al. 2010; Schoenwald et al. 2003). Empirical work in this area has paved the way for an important research direction; that is, understanding the interaction between indicators of problem severity and race/ethnicity as predictors of therapist adherence and therapist-client emotional bond. Results of the current study provide preliminary evidence that there may be therapeutic process differences across race/ethnic groups when youth exhibit high and low problem severity at treatment outset.

Specifically, for Hispanic/Latino, and to some extent Caucasian caregivers, levels of youth problem behavior early in treatment were associated with disruptions in the therapeutic process. Specifically, for Caucasian race, caregivers reported less linear increases in therapist adherence over the course of MST for youth with higher rates of self-reported delinquency at the outset of treatment. For Hispanic/Latino ethnicity, as externalizing behavior increased, caregiver report of mid-treatment levels of therapist adherence and overall levels of caregiver report of emotional bond decreased. Similarly, as youth poly-substance use among Hispanic/Latino youth increased, overall levels of emotional bond decreased. However, caregiver report of therapist adherence showed the greatest improvements over the course of MST for Hispanic/Latino youth with higher levels of self-reported delinquency at Time 1. In contrast, for African-American race, caregivers report of overall levels of emotional bond were highest among families in which youth had higher levels of externalizing behavior and poly substance use at the outset of treatment.

Our results for Caucasian families are consistent with previous MST studies. For example, in a sample of predominantly Caucasian participants, Schoenwald et al. (2003a, b) found that therapists of adolescents exhibiting more severe problem behaviors were rated less adherent to MST principles. The current investigation found similar reports and extends Schoenwald et al. (2003a, b) by including therapists with more experience implementing the MST model. Taken together, results suggest that therapists are most likely to become increasingly adherent over time with Caucasian families when the youth has less severe problem behaviors, irrespective of experience level. This result, however, only emerged for self-reported delinquency and did not replicate for other difficulties. Schoenwald et al. (2003a, b) also found that family-therapist race-match was significantly related to adherence, such that those matched on race reported higher levels of therapist adherence. Results of the current study did not find significant race-match effects in this severity-adherence relationship. This finding should be considered in light of the fact that most of the therapists in the current study were Caucasian. Nonetheless, these findings add to the mixed literature on the role of race-match in predicting therapeutic processes (Foster et al. 2009; Halliday-Boykins et al. 2005).

The interpretation of results for Hispanic\Latino and African-American families are best understood in conjunction. For Hispanic\Latino families, findings generally suggested that more troubled youth are at risk for therapeutic rifts—less adherence and poorer therapist-client overall levels of emotional bonding—although there was also evidence that therapists with youth who report more delinquent behavior recovered in adherence (showed greater increases over time than other race\ethnicity groups) over time. In contrast, therapists formed greater overall levels of emotional bonds (according to caregiver and youth report) with African-American families who started treatment with more youth difficulties. These results suggest that at higher problem severity, Hispanic\Latino families may need more initial support—possibly in the form of implementing joining interventions. Previous research has developed specific joining interventions for treating families of Hispanic\Latino backgrounds and focus heavily on techniques for engaging family members early in treatment (Muir et al. 2004). Joining has been defined as a process of establishing therapeutic alliance with each family member and with the family as a whole by first supporting the pre-treatment family structure (Muir et al. 2004). Brief Strategic Family Therapy is one intervention designed to treat Hispanic families that includes joining interventions, and has shown to significantly increase engagement, retention, and outcome (Muir et al. 2004). While engaging clients is prominent over the course of MST, techniques do not specifically include joining interventions. Instead, MST therapists work to engage families by conceptualizing and intervening on factors thought to be related to engagement difficulties. It is possible that at higher levels of problem severity, culturally-syntonic joining interventions may be a necessary process for developing therapeutic alliance and emotional bonding for Hispanic\Latino families. Our findings support the notion that MST may benefit from more specific attention to strategies for engaging families of more troubled Hispanic\Latino youth in treatment.

Despite the above findings, results also showed that higher levels of youth self-report of delinquency was related to greater increases in therapist adherence over the course of MST among Hispanic\Latino families. In line with the above interpretation, it is possible that

Hispanic/Latino adolescents who report more delinquent behavior early in treatment may be more likely to acknowledge their own role in their difficulties and to participate more fully in the therapeutic process, facilitating adherence. As noted above, a key component of previous interventions designed to treat Hispanic/Latino families is to establish a connection with each family member individually and as a whole (Muir et al. 2004). Perhaps when adolescents are more forthcoming with their delinquent behavior, a level of engagement that more closely resembles processes shown to be effective in previous studies of Hispanic/Latino families materializes. Alternatively, MST therapists receive regular supervision that often focuses on family engagement as described above. Perhaps this allows therapists and their supervisors to detect and correct adherence problems in mid-treatment with Hispanic/Latino families with youth who have more severe self-reported behavior problems at the outset of treatment.

In contrast to results for Hispanic/Latino families, for African-American families, higher levels of externalizing behavior and poly-substance use were related to higher overall levels of emotional bonding between therapist and family members. These results suggest that the prominent process of engagement in MST may be sufficient for African-American families with high problem severity; that is, for African-American families, at higher levels of problem behavior, therapists may be particularly effective at using skills that have been shown to be key features of successful interventions within community-based settings (Huey and Henggeler 2001). This is not surprising given that MST was initially developed with samples that consisted predominantly of African-American and Caucasian families (Borduin et al. 1995; Henggeler et al. 1992; Scherer et al. 1994). Clinical implementation procedures may have been developed based on day-to-day therapy experiences with these two race/ethnic groups. Our combined results suggest that a process that is effective for African-American families in MST therapy may be missing for Hispanic/Latino participants with high problem severity. This is supported by a review showing that interventions rich with joining components designed for Hispanic/Latino families do not produce similar effects for African-American families (Muir et al. 2004).

Of note, results showed that at lower levels of problem severity, MST therapists working with African-American families experienced some difficulty establishing an emotional bond. One interpretation of these findings is that even at relatively lower levels of problem severity, MST therapists treating African-American families may also require specific training for how to adjust their skills to match the needs of families with relatively low problem severity. Results suggest that it may be difficult for therapists to form an alliance with African-American youth and/or caregivers who do not “perceive” the need for an intensive and comprehensive treatment designed for youth with serious behavior problems such as MST. Thus, one suggestion is that training focus on sensitivity to larger societal implications for how some African-American families find themselves in the juvenile justice system. For African-American families reporting low problem behaviors, joining with the family early in treatment around the possibility that the adolescent’s behavior problems may not warrant intense interventions and that these families may feel negatively about the juvenile justice system, which they may perceive as biased and/or prejudiced could be an avenue worth exploring (Boyd-Franklin 2003; Boyd-Franklin et al. 2000).

Limitations of this study should be considered while interpreting these findings. First, although the current sample is more diverse than previous MST studies, a larger sample of different ethnic minorities would have provided the opportunity to examine several of our interpretations. Second, we only used one measure of therapist adherence. The choice to rely on caregiver report of therapist adherence was guided by research demonstrating caregiver report of adherence is the best predictor of treatment outcome (Henggeler et al. 1997, 1999) among MST studies. Nonetheless, results from this study could have been enhanced with additional measures of therapist adherence, observational measures in particular. Third, sample sizes within each ethnic group were relatively small. The interactions found in this study should be replicated. Fourth, our sample of therapists was mostly Caucasian, so results may not fully generalize to therapists from other ethnic groups. In addition, whether findings generalize to other EBTs used to treat youth who engage in delinquent behavior and substances use is an important question for future studies. Despite these limitations, this study has several notable strengths. First, this study used multiple informants of problem severity and emotional bond. Second, the MST provider organizations were experienced clinics in delivering MST, as were the supervisors of the therapists. Third, because data came from a dissemination study conducted in real-world settings, it has strong external validity.

The implementation of MST is guided by specific protocols that map directly on to the nine guiding principles of MST and are used by MST therapists, supervisors, and consultants. Still, despite an empirically-supported quality assurance protocol to ensure that MST is delivered with fidelity, results of this study demonstrate that race\ethnicity and adolescent problem severity not only predicted therapist adherence, but also contributed to a component of the working alliance that has been shown to be related to treatment retention and engagement among ethnic minority clients (Coatsworth et al. 2001), family-therapist emotional bonding reported by caregiver and youth. Results of this study suggest that problem severity predicts lower levels of adherence and emotional bond for Hispanic\Latino families, providing evidence that MST may experience some effectiveness challenges as dissemination efforts continue to focus on diversifying clinical populations with which MST is employed. In addition, results support the importance of examining both process and outcome of evidence-based treatment with an explicit focus on the role of race\ethnicity in therapy implementation. Future studies of dissemination to real-world practice settings might examine adaptive treatment designs whereby process differences are examined across race\ethnicity and problem severity.

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Table 1

Cross-sectional descriptive statistics for the variables used in analyses

Variable	Time 2		Time 3		Time 4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
N (%) economic disadvantage ^a	77 (41.6 %)					
Socioeconomic status	30.29	11.22				
T1 poly-substance use	6.55	8.59				
T1 CBCL externalizing	22.54	13.63				
T1 self-reported delinquency	3.96	5.00				
Pre-treatment arrests	2.16	5.65				
Therapist adherence, caregiver report	13.85	8.32	13.10	8.88	13.55	9.70
Emotional bond, caregiver report	72.43	9.46	70.65	10.13	71.11	11.45
Emotional bond, youth report	61.95	13.86	61.36	14.32	61.94	14.05

T time, *CBCL* child behavior checklist 6-18 (Achenbach 1991)

^aRepresents the number (percentage) of caregivers who reported “yes” they were receiving assistance from the state

Table 2

Correlations between study variables

	1	2	3	4	5	6	7	8	9
1. African-American ^d	–								
2. Hispanic/Latino ^b	–0.28**	–							
3. Caucasian ^c	–0.50**	–0.63**	–						
4. Socioeconomic status	–0.07	–0.33**	0.34**	–					
5. Economic disadvantage ^d	0.17*	0.13	–0.19**	–0.28**	–				
6. T1 poly-substance use	–0.16*	–0.07	0.20**	0.06	0.05	–			
7. T1 self-reported delinquency	–0.10	0.02	0.04	–0.02	0.10	0.45**	–		
8. T1 CBCL externalizing	–0.06	–0.15*	0.22**	0.18*	0.07	0.26**	0.20**	–	
9. Pre-treatment arrests	0.06	0.04	–0.08	–0.05	–0.04	0.03	–0.07	–0.15*	–
10. T2 therapist adherence	0.09	0.01	–0.04	0.01	0.02	–0.01	–0.14	0.01	–0.01
11. T3 therapist adherence	0.13	–0.03	–0.04	0.01	0.02	–0.06	–0.03	0.04	–0.18
12. T4 therapist adherence	0.05	–0.02	0.00	–0.04	0.06	–0.02	0.00	–0.02	–0.03
13. T2 emotional bond, CG	0.03	0.02	–0.01	0.09	–0.03	–0.08	–0.21**	–0.03	–0.01
14. T3 emotional bond, CG	0.14	–0.01	–0.04	0.00	–0.05	–0.04	–0.01	–0.07	–0.05
15. T4 emotional bond, CG	0.06	–0.10	0.06	0.09	–0.08	–0.05	–0.06	0.01	0.01
16. T2 emotional bond, youth	0.14	–0.04	–0.04	0.00	0.03	0.00	–0.06	–0.10	0.02
17. T3 emotional bond, youth	0.05	0.19	–0.16	–0.19*	0.16	–0.09	–0.02	0.05	–0.06
18. T4 emotional bond, youth	0.12	–0.08	–0.01	–0.03	0.02	–0.13	–0.15	–0.08	–0.09

1. African-American^d2. Hispanic/Latino^b3. Caucasian^c

4. Socioeconomic status

5. Economic disadvantage^d

6. T1 poly-substance use

	10	11	12	13	14	15	16	17	18
7. T1 self-reported delinquency									
8. T1 CBCL externalizing									
9. Pre-treatment arrests									
10. T2 therapist adherence	–								
11. T3 therapist adherence	0.69	–							
12. T4 therapist adherence	0.57	0.82**	–						
13. T2 emotional bond, CG	0.63**	0.52**	0.42**	–					
14. T3 emotional bond, CG	0.39**	0.50**	0.46**	0.55**	–				
15. T4 emotional bond, CG	0.42**	0.61**	0.62**	0.58**	0.57**	–			
16. T2 emotional bond, youth	0.31**	0.17	0.15	0.17*	0.11	0.15	–		
17. T3 emotional bond, youth	0.32**	0.26**	0.28**	0.12	0.26**	0.24*	0.57**	–	
18. T4 emotional bond, youth	0.22**	0.30**	0.24**	0.10	0.23*	0.35**	0.56**	0.72**	–

T time, *CG* caregivers

*
 $p < 0.05$,

**
 $p < 0.01$

^a African-American race coded (1 = yes; 0 = no)

^b Hispanic/Latino ethnicity coded (1 = yes; 0 = no)

^c Caucasian race coded (1 = yes; 0 = no)

^d Economic disadvantage (1 = yes; 0 = no)