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Indirect Effects of Fidelity to the Family Check-Up on Changes in Parenting and Early Childhood Problem Behaviors

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Abstract

Objective—This study examines observations of client in-session engagement and fidelity of implementation to the Family Check-Up (FCU) as they relate to improvements in caregivers' positive behavior support (PBS) and children's problem behavior in the context of a randomized prevention trial. The psychometric properties of fidelity scores obtained with a new rating system are also explored.

Method—The FCU feedback sessions of 79 families with children with elevated problem behavior scores at age 2 were coded by trained raters of fidelity, who used an observational coding system developed specifically for this intervention model.

Results—Path analysis indicated that fidelity to the FCU results in greater caregiver engagement in the feedback session, which directly predicts improvements in caregivers' PBS 1 year later ($\beta = 0.06$, 95% CI [.007, .129]). Similarly, engagement and PBS directly predict reductions in children's problem behavior measured 2 years later ($\beta = -0.24$, 95% CI [-.664, -.019]).

Conclusions—These results suggest fidelity within the context of this randomized intervention trial. Ratings of fidelity to the FCU covary with observed improvements in parenting and children's problem behavior in early childhood. Overall reliability of the fidelity scores was found to be acceptable, but some single-item reliability estimates were low, suggesting revisions to the rating system might be needed. Accurately assessing fidelity and understanding its relationship to change during intervention studies is an underdeveloped area of research and has revealed some inconsistent findings. Our results shed light on the mixed conclusions of previous studies, suggesting that future research ought to assess the role of intervening variable effects, such as observed engagement.

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Keywords

fidelity; positive behavior support; Family Check-Up; problem behavior; engagement

Central to assessing the effectiveness of an intervention is ensuring that implementation of the intervention adheres to its intended process and content. A breakdown in treatment fidelity threatens the experimental validity of a study and the ability to draw valid inferences regarding a treatment effect (e.g., Kazdin, 2003; Perepletchikova & Kazdin, 2005). Without adequate evaluation of fidelity to the intervention's content and processes, one cannot explain whether failure to produce or replicate a treatment effect has resulted from a problem with the intervention program or with its application. These concerns are valid when researchers are conducting a randomized controlled trial (RCT) and when they are attempting to translate effective mental health interventions into real-world settings (Brownson, Colditz, & Proctor, 2012; Perepletchikova & Kazdin, 2005). The ongoing monitoring of fidelity in clinical practice reduces the potential to drift from an evidence-supported intervention protocol, which affects the benefits clients are likely to experience as a result of receiving the intervention. Despite the methodological and practical importance of treatment fidelity, a recent review by Perepletchikova, Treat, and Kazdin (2007) revealed that less than 4% of the evaluated RCTs published in six influential psychology and psychiatry journals had adequately implemented them, which casts some doubt on the validity of the studies' conclusions.

Treatment fidelity comprises two primary elements: adherence and competence. Waltz, Addis, Koerner, and Jacobson (1993) defined *adherence* as "the extent to which a therapist used interventions and approaches prescribed by the treatment manual and avoided the use of intervention procedures proscribed by the manual" (p. 620). They defined *competence* as "the level of skill shown by the therapist in delivering the treatment" (p. 620). These definitions are widely accepted in the psychological intervention and implementation science literatures. It is scientifically reasonable to expect that implementation fidelity will result in significant effects on the outcomes specifically targeted by theoretically based and well-designed interventions. The literature generally substantiates this expectation across a variety of psychological interventions and client populations (e.g., Barber et al., 2006; Barber, Sharpless, Klostermann, & McCarthy, 2007; Forgatch, Patterson, & DeGarmo, 2005; Henggeler, Melton, Brondino, Scherer, & Hanley, 1997). However, competence and adherence have been shown to independently predict outcomes. For example, Barber, Crits-Christoph, and Luborsky (1996) found that adherence and competence each contributed to the outcomes of brief dynamic therapy for depression, whereas competence was the better predictor of outcomes of a cognitive behavioral intervention for depression (Shaw et al., 1999).

Recent reviews on this topic have noted mixed results in the link between the components of fidelity to intervention outcomes (e.g., Barber et al., 2007; Leichsenring et al., 2011). Some studies have failed to find direct effects between fidelity and treatment outcomes. For example, Elkin (1988) found that adherence to a cognitive behavioral therapy (CBT) protocol added little to the prediction of outcome. Similarly, Svartberg and Stiles (1994) found that competence did not predict change in dysfunctional attitudes in a study of short-term anxiety-provoking psychotherapy, yet was predictive of reductions in general symptomatic distress. In a study of adherence and competence in the Individual Drug Counseling arm of the National Institute on Drug Abuse Collaborative Cocaine Treatment Study, Barber et al. (2006) found no association between competence and outcome. However, Barber and colleagues (2006) found support for a curvilinear relationship between adherence and outcome, indicating that both very high levels of adherence, perhaps

signifying inflexibility, and very low levels, suggesting poor intervention implementation, impede positive outcomes. Hogue et al. (2008) found a similar relationship when examining CBT and family therapy interventions for adolescent problem behaviors.

In the context of family-based interventions for child and adolescent problem behaviors, the relationship between treatment fidelity and outcome appears to be more consistent. Huey, Henggeler, Brondino, and Pickrel (2000) found that greater adherence to multisystemic therapy principles resulted in improved parenting practices. Hogue et al. (2008) demonstrated a relationship between fidelity to multidimensional family therapy concepts and reductions in adolescent problem behavior. Forgatch and colleagues (Forgatch & DeGarmo, 2011; Forgatch, DeGarmo, & Beldavs, 2005; Forgatch, Patterson, & DeGarmo, 2005) found that fidelity to a parent management training intervention was predictive of long-term improvements in the quality of observed parenting practices. These published studies suggest that fidelity to skills-based parenting interventions predicts changes in both parenting practices and youth outcomes. Despite the inconsistencies in the broader literature, the evidence is promising that fidelity to family-based interventions improves outcomes.

One potential explanation for inconsistent findings in the broader literature is the assessment and measurement of the components of fidelity. The assessment of competence in the context of empirically supported treatments is most often measured as the delivery of a specific intervention protocol or treatment modality. Further muddying the waters is the difficulty of measuring adherence and competence, which are conceptually unique but undoubtedly interrelated. As Perepletchikova and Kazdin (2005) pointed out, treatment adherence and therapist competence are inextricably linked, such that it is impossible to competently deliver a specified treatment sans adherence to that treatment. Reviews of this topic provided by Barber and colleagues (2006, 2007), Leichsenring et al. (2011), and Perepletchikova and Kazdin (2005) describe conceptualization and measurement issues in significant detail. The conclusion seems to be that measurement of fidelity ought to encompass both adherence and competence in a meaningful manner.

A second explanation for the inconsistent findings regarding direct effects of fidelity on outcome is the possible relationship between fidelity and other therapeutic processes. Pertinent to our study is the process of engaging clients in intervention sessions and the therapeutic alliance. The Vanderbilt psychotherapy process-outcomes study revealed that in-session observable client engagement accounted for approximately 20% of the variance in treatment outcome (O'Malley, Suh, & Strupp, 1983). Client engagement is a particularly important clinical process in motivational interviewing (MI), in which the therapist's style of collaboration, egalitarianism, and empathy are hypothesized to increase observable in-session engagement (Miller & Rollnick, 2002) and is supported by the MI literature (Hettema, Steele, & Miller, 2005). Specifically, therapists' use of prescribed MI behaviors is associated with greater observable in-session client engagement (Boardman, Catley, Grobe, Little, & Ahluwalia, 2006). Engaging caregivers, particularly those with high-risk youth, is a primary goal of family-based prevention programs (e.g., Dishion, Kavanagh, Schneiger, Nelson, & Kaufman, 2002; Spoth & Redmond, 2000).

Establishing an alliance with caregivers and the youth is also a second, closely related, process variable that has been found in meta-analysis to account for an average of 4% of the variance in child outcomes (Shirk & Karver, 2003). Hawley and Weisz (2005) found that parent-therapist alliance was instrumental to engagement in treatment but did not predict child outcome, whereas child-therapist alliance predicted symptom improvement but not engagement in treatment. A stronger parent-therapist alliance in family therapy was found to predict improvements in adolescent drug use and externalizing symptoms, but this relationship was not found in individual CBT (Hogue, Dauber, Stambaugh, Cecero, &

Liddle, 2006). These findings suggest that therapists who are effective at fostering significant clinical change in their clients exhibit skills that increase the therapeutic alliance and client engagement in sessions, which perhaps paves the way for enhanced parental skill acquisition and subsequent behavior change.

Evaluating Collaborative Assessment Feedback Processes

Collaborative assessment-driven family intervention models, including the Family Check-Up (FCU; Dishion & Stormshak, 2007), are being used with increasing frequency (see Finn, Fischer, & Handler, 2012), and a number of studies support their effectiveness in reducing children's behavior problems (e.g., Dishion et al., 2008; Smith, Handler, & Nash, 2010). Finn et al. (2012) stress that the effectiveness of these models hinges upon delivering feedback in a collaborative manner to increase client engagement in the intervention (Tharinger et al., 2008). FCU feedback sessions provide therapists with the opportunity to share the results of the ecological assessment, which is conducted as part of the FCU and is discussed further in the Method section, in a manner that increases families' motivation to change parenting practices and implement the necessary parenting skills to reduce youth behavior problems. This is accomplished by using collaborative, MI-based feedback procedures, which are addressed in a number of the COACH dimensions. Moreover, a strong collaborative set between the therapist and client during parent management training reduces resistance to change in the context of treatment (e.g., Patterson & Forgatch, 1985). Therefore, assessing fidelity via observations of therapist's behaviors during the FCU feedback session is most likely to be related to intervention outcomes. Furthermore, FCU techniques during this session are intended to increase client in-session engagement and motivation to participate in subsequent services, if indicated.

This Study

In this study, we examined the fidelity of implementation of the FCU, a brief, assessment-driven family intervention that has been shown to be an effective treatment for early childhood problem behaviors (e.g., Dishion et al., 2008; Gardner, Shaw, Dishion, Burton, & Supplee, 2007). We introduce the COACH rating system, a newly developed measure for assessing fidelity to the FCU (Dishion, Knutson, Brauer, Gill, & Risso, 2010). The goals of this study were twofold: (a) evaluate therapist fidelity to the FCU with a subsample of families with children exhibiting clinically elevated problem behavior from a larger parent project called Early Steps and (b) demonstrate reliability and validity of scores obtained using the COACH rating system by linking fidelity scores to primary parent- and child-level outcomes of the intervention model. We examined the role of observed caregiver engagement as a potential intervening variable between fidelity and later outcomes. We first present the conceptual underpinnings of the FCU intervention and then a description of the COACH.

The FCU

The FCU is an ecological approach to family intervention and treatment designed to improve children's adjustment across settings (home, school, neighborhood) by motivating positive behavior support (PBS) and other family management practices (e.g., effective limit setting, parental monitoring) in those settings. Family-based intervention programs with a parent management training focus have been found to reduce child behavior problems (e.g., Dishion, Patterson, & Kavanagh, 1992). Two key features of the intervention are that it is assessment driven and individually tailored to the needs of youth and families. An ecological assessment is accomplished through a brief, three-session intervention that is assessment driven, based on MI, and modeled on the Drinker's Check-Up (Miller & Rollnick, 2002). Typically, the three meetings include an initial contact session, a home-

based multi-informant ecological observational assessment session, and a feedback session (Dishion & Stormshak, 2007). Feedback emphasizes parenting and family strengths, yet draws attention to possible areas of change. One goal of the FCU feedback session is to collaboratively help caregivers better understand the ecological factors influencing the child's problem behaviors and to enhance the family's motivation to change using collaborative, MI-based therapeutic techniques, such as promoting change talk, highlighting discrepancies, and fostering motivation to address key problems in parenting either on their own or with professional support. Research has indicated that participation in the FCU leads to reductions in problem behaviors during the preschool years (e.g., Dishion et al., 2008; Gardner et al., 2007). Of particular importance to our study, Dishion et al. (2008) found that the FCU's effect on child problem behaviors is mediated by improvements in caregivers' observed PBS, which is a prevalent and effective educational behavior management principle that emphasizes the use of nonaversive, reinforcing caregiver-child interactions to promote development (e.g., Horner & Carr, 1997).

In previous studies of the FCU with parents of children and adolescents with behavior problems, Dishion and colleagues (Connell, Dishion, Yasui, & Kavanagh, 2007; Dishion et al., 2013; Dishion & Connell, 2008) found that families at greater risk were more likely to engage in the treatment. In contrast to these previous FCU studies, which operationalized engagement as participation versus nonparticipation and retention over time, our study observationally assessed caregivers' engagement in feedback sessions. The individually tailored and adaptive nature of the FCU; collaborative, client-driven decision making regarding intervention foci; and motivation-enhancing processes were designed to increase client engagement in sessions and promote continued participation. These therapeutic processes are reflected in each of the dimensions of the COACH.

The COACH Rating System

The COACH is an observational system designed to quantify the extent to which an interventionist exhibits fidelity to the core components of the FCU. The system assesses five dimensions of observable therapist skill prescribed to the FCU intervention, as well as client engagement in the session. The engagement items of the system are described in the Measures section. The five COACH categories are rated separately on a 9-point scale: *needs work* (1–3), *acceptable work* (4–6), *good work* (7–9). Scores in the “needs work” range indicate minimal knowledge and skill implementing the FCU. Score in the “acceptable work” range indicate an acceptable level of process skill and conceptual understanding of the model as evidenced by a demonstration of key basic skills. Scores in the “good work” category indicate clear understanding of the principles and mastery of the process skills of the model: Execution is relatively fluid, barriers to change are tactfully addressed, feedback is effective and realistic, motivation enhancement techniques are skillfully applied, and the therapist capitalizes on opportunities to proactively enhance behavior change and motivation to change. A score of 5 is considered “sufficient” fidelity to the model, which is based on the treatment developer's descriptions of therapist skill in this range. This benchmark was used as a reference to describe therapist skill at the upper and lower anchors.

Following are descriptions of the five dimensions. The COACH manual (available by request) provides additional description of each dimension, which is followed by explication of the key process skills. Clinical examples reflecting exemplar (conceptually accurate) and nonexemplar (conceptually inaccurate) execution of each concept are also provided in the manual. Additionally, more specific, operational definitions of the dimensions are provided in Figure 1.

1. **Conceptual accuracy and adherence.** The therapist demonstrates an accurate understanding of the FCU model in terms of its emphasis on family-centered

change, caregiver leadership in the change process, and support of specific skills that define family management. The model is assessment driven and tailored to the specific needs of children and families; this unique aspect of the model shapes all therapist–caregiver interactions.

2. *Observant and responsive to client needs.* It is essential that the therapist observes the client’s immediate and pressing concerns and contextual factors and responds accordingly while giving feedback or while working with a caregiver on changing a specific behavior. The delivery of feedback is appropriately modified to align with the client’s context and unique cultural and individual needs (e.g., intellectual or mental health factors).
3. *Actively structures sessions.* The therapist actively structures the change process using an assessment-driven case conceptualization as a guide. Aside from listening, being supportive, and being empathetic, the therapist can use actions such as constructing useful questions, conducting role-plays, and redirecting discussions to motivate and empower the caregivers to behave differently in their interactions with children. As an active agent in the therapy process, the therapist encourages caregiver involvement and uses active strategies to teach family management skills, which often require caregiver effort and self-regulation.
4. *Careful and appropriate teaching.* The foundation of the model is to use assessment data to direct the course of the family-centered intervention. Therapists actively provide feedback to caregivers to increase their accurate self-appraisals and motivation to either build on existing strengths or take corrective action in one or more areas. This dimension of the COACH evaluates whether the therapist sensitively provides feedback and guidance to increase caregivers’ motivation to change. Useful therapist skills include reframes that incorporate family strengths, skillful questions that help caregivers reevaluate their motivations, and supportive statements that validate the complexity of the change process.
5. *Hope and motivation are generated.* Specific therapeutic techniques from MI are integrated into the FCU to promote caregivers’ hope, motivation, and change. The motivational approach means (a) providing feedback to the caregiver, (b) acknowledging that the caregiver is responsible for the change process, (c) informing the caregiver about known effective change strategies, (d) providing the caregiver with a menu of change options and not controlling the change process by offering only one option, (e) expressing empathy for the caregiver’s situation, and (f) promoting the caregiver’s self-efficacy. These process skills are used in moment-by-moment interaction with caregivers to help the caregiver become an agent of positive family change and enhance motivation to work toward that end.

The COACH was developed on the basis of the Fidelity of Implementation Rating System (FIMP; Knutson, Forgatch, & Rains, 2003) because of similar conceptual and theoretical underpinnings, mainly the role of coercive family processes and family management training in the escalation and treatment, respectively, of child problem behaviors. As such, COACH fidelity terminology is consistent with the definition provided by Forgatch, Patterson, and DeGarmo (2005): The term *fidelity* refers to the incorporation of two concepts: “*adherence* to the intervention’s core content components and *competent* execution using accomplished clinical and teaching practices” (p. 3). Adherence refers to therapists’ following FCU-specific procedures while covering specific content or topic areas consistent with the intervention model. *Competent adherence*, as defined by Forgatch, Patterson, and DeGarmo (2005), “requires that the procedures be carried out with sophisticated clinical and teaching skills that promote behavior change” (p. 4).

As is the parenting intervention for which the FIMP was designed, the FCU is theory based, meaning that rigid adherence to treatment manuals is neither necessary nor desired in most cases, as long as the core interventional components of the model are implemented in a manner that promotes positive parenting change. Thus, evaluation of fidelity to the FCU requires assessment of both content delivery and process. Competent adherence reflects a combination of constructs that have been found in other studies to be distinct components of the superordinate construct of treatment fidelity. FIMP scores of competent adherence have been found to have reliable kappa coefficients (.67–.74) and intraclass correlation coefficients (.76–.82) and were found to be predictive of improved child and family outcomes (Forgatch & DeGarmo, 2011; Forgatch, DeGarmo, & Beldavs, 2005; Forgatch, Patterson, & DeGarmo, 2005). Evaluating adherence to the content of the FCU can be accomplished using a checklist, which is provided to coders on the COACH rating form (Version 1; see Figure 1). Coders are instructed to first determine whether or not the key content of the FCU was delivered, using the checkboxes, and then evaluate the therapist's clinical and teaching skill level in delivering those interventions in a manner consistent with the model and in the service of promoting behavior change.

Method

Participants

A subsample of the original 731 mother–child dyads (49% female) recruited from the Women, Infants, and Children Nutrition Program (WIC) was examined in this study in three geographically and culturally diverse U.S. regions near Charlottesville, VA (188 dyads), Eugene, OR (271), and Pittsburgh, PA (272), for an RCT of the FCU. WIC families with children between age 2 years 0 months and 2 years 11 months whose screening indicated socioeconomic, family, or child risk factors for future child behavior problems were invited to participate in the study. Comprehensive information regarding the recruitment and randomization protocol can be found in Dishion et al. (2008). Inclusion in this study was determined by either the primary or alternate caregiver reporting clinical or borderline range scores on the Externalizing scale of the Child Behavior Checklist (CBCL) 1.5/5 (Achenbach & Rescorla, 2001) at the age 2 assessment. Seventy-nine families (VA, 23; OR, 28; PA, 28) met inclusion criteria, and their FCU feedback sessions were rated using the COACH. Of this subsample, 64 (81%) of the families elected to receive the FCU again at age 3. The children in this subsample of 79 families were 48% female, had a mean age of 29.9 months ($SD = 3.2$) at the time of the age 2 assessment, and were reported by caregivers to be European American (51%), African American (30%), Hispanic/Latino (7%), Native American/American Indian (1%), or biracial (12%).

Procedure

Home observation assessment protocol—Caregivers (i.e., predominantly mothers and, if available, alternative caregivers, such as fathers or grandmothers) and children who agreed to participate in the study were scheduled for a 2.5-hr home visit. Each assessment began by introducing the child to an assortment of age-appropriate toys and having them play for 15 min while the mother completed questionnaires. Following this free-play period, the primary caregiver and child participated in a cleanup task (5 min) followed by a delay-of-gratification task (5 min), four teaching tasks (3 min each), a second free play (4 min), a second cleanup task (4 min), the presentation of two inhibition-inducing toys (2 min each), and a meal preparation and lunch task (20 min). Exactly the same home visit and observation protocol were repeated at age 3. During this home assessment, assessment staff completed ratings of caregiver involvement with and supervision of their child (described in the Measures section). In addition, in-home interaction tasks were videotaped for later

coding. The average time between age 2 and age 3 assessments and age 3 and age 4 assessments was 11.86 months ($SD = 1.21$) and 12.02 months ($SD = 1.38$), respectively.

Intervention—For the purposes of the randomized research protocol and the internal validity of the study, the home-based assessment was the first contact and occurred prior to randomization. Those families randomized to the intervention condition (following the assessment) were then offered the FCU, which comprises the initial interview and feedback session. All the families in this study sample elected to participate in the FCU and completed the feedback session. In the overall Early Steps study, 77.9% (286) of the 367 families assigned to the intervention group participated in the FCU at child age 2.

Measures

Fidelity—Therapist adherence and competence in the FCU feedback session were jointly assessed using the COACH. Coders were an advanced undergraduate student, a graduate student, and a professional family interventionist who had received approximately 20 hr of training in the COACH. The reliability criterion at the conclusion of training requires scoring three sessions in a row with 85% agreement and a kappa greater than .65. A reliable code during the initial training period in the COACH system is one in which two raters are within one rating point on each dimension. Raters attended weekly meetings to maintain reliability and minimize rater drift. Raters viewed the entire FCU assessment feedback session. We randomly selected 20% of the sessions to be independently coded by two different members of the coding team in order to calculate interrater reliability. Thus, a one-way random-effects model intraclass correlation coefficient (ICC [1,1]; Shrout & Fleiss, 1979) was used. According to previous interpretative guidelines (Cicchetti, 1994), COACH ICC single-item values were in the “fair” to “excellent” range ($C = .59$; $O = .72$; $A = .70$; $C = .57$; $H = .76$). The overall ICC of the COACH composite score used in the final analysis was in the “good” range at .74.

Client engagement—Assessment of the client’s level of engagement with the therapist was accomplished at the same time and by the same coders who had used the COACH and consisted of the same training and reliability procedures. High Engagement scores (7–9) indicate a client’s active participation in the session as exemplified by engaging in conversation with the therapist and staying on topic; giving complete, thoughtful responses to open-ended questions; using change talk; being willing to discuss personal information; asking questions and elaborating on the therapist’s comments; showing initiative; and actively participating in role-plays and other session tasks. Moderate Engagement (4 – 6) scores are exemplified by clients’ modest signs of engagement in similar areas, such as occasional verbal and nonverbal signs of interest and understanding, modest elaboration of therapist comments, short responses to questions, and reluctance to disclose and share personal information and problems. Low Engagement (1–3) indicates that the client appears inattentive or disengaged as exemplified by shutting out the therapist, lacking nonverbal engagement (e.g., eye contact, head nodding), displaying signs of boredom, providing very brief responses to the therapist’s open-ended questions, repeatedly attempting to steer the conversation away from parent management topics, being unwilling to participate in role-plays and other activities, and seeming dishonest or disingenuous. The one-way random-effects model ICC was “excellent” at .87.

PBS—Interactions between the child and his or her primary caregiver were observed in the home at ages 2 and 3. Four observational measures of parenting were used to build the PBS construct, which is represented as a z -score in the analyses because the four measures are on different scales. The home-based assessment protocol, described previously, was recorded for observational coding by a team of trained undergraduate coders. Additional information

regarding the measurement model of PBS and the coder training and reliability procedures can be found in previous research from the parent study from which this subsample was drawn (Dishion et al., 2008; Lunkenheimer et al., 2008).

1. Parent involvement. Home visitors rated parent involvement using the following items from the Home Observation for Measurement of the Environment (Bradley, Corwyn, McAdoo, & Garcia-Coll, 2001): “Parent keeps child in visual range, looks at often”; “Parent talks to child while doing household work”; “Parent structures child’s play periods” (Yes/No).
2. Positive behavior support. This measure is based on videotape coding (durations) of caregivers prompting and reinforcing young children’s positive behavior as captured in the following Relationship Process Code (RPC; Jabson, Dishion, Gardner, & Burton, 2004) scores: positive reinforcement (verbal and physical), prompts and suggestions of positive activities, and positive structure (e.g., providing choices in a request for behavior change). Noldus Observer 5 (Noldus Information Technology, 2003), which was used to process observation data, provided a kappa coefficient of .86 at both ages.
3. Engaged parent–child interactions. RPC codes, such as Talk and Neutral Physical Contact, were used to develop a measure of the average duration of parent–child sequences that involve talking or physical interactions, such as turn taking or playing a game. Kappa coefficients were .86 at both ages.
4. Proactive parenting. Coders rated each parent on his or her tendency to anticipate potential problems and to provide prompts or other changes to avoid young children becoming upset and/or involved in problem behavior on the following six items from the Coder Impressions Inventory (Dishion, Hogansen, Winter, & Jabson, 2004): parent gives child choices for behavior change whenever possible; parent communicates to the child in calm, simple, and clear terms; parent gives understandable, age-appropriate reasons for behavior change; parent adjusts/defines the situation to ensure the child’s interest, success, and comfort; parent redirects the child to more appropriate behavior if the child is off task or misbehaves; parent uses verbal structuring to make the task manageable. Cronbach’s alpha for ages 2 and 3 were .84 and .87, respectively.

Child problem behavior—The CBCL for Ages 1.5–5 (CBCL; Achenbach & Rescorla, 2001) is a 99-item questionnaire used to assess behavioral problems in young children. Caregivers completed the CBCL at the home assessments each year. The Externalizing factor of the CBCL is a broadband scale used to assess problem behavior. Cronbach’s alpha for Externalizing were .74 and .91 at ages 2 and 4, respectively, using the current study sample. Primary and secondary caregiver scores at age 2 were used to determine study inclusion, because at-risk or clinical range scores indicate clinically significant levels of problem behavior. Only primary caregiver reports were available for all children at both the age 2 and age 4 assessments, so these scores were used in the subsequent analyses reported in this article.

Data Analytic Plan and Hypotheses

We first examined correlations between the five dimensions assessed in the COACH system (see Table 1). Pearson’s *r* correlations ranging from .56 to .78 indicated the appropriateness of creating a composite score. This approach was verified using a principal axis factor analysis, which resulted in a one-factor solution with loadings ranging from .54 to .79. The five dimensions were equally weighted when creating the composite variable for further analyses. Our conceptual model (see Figure 2) reflected our two hypotheses: (a) The

composite COACH fidelity score would be related to observed client engagement in the age 2 assessment feedback session, which would act as an intervening variable on PBS at age 3, and (b) COACH fidelity scores would have a significant indirect effect on children's problem behavior at age 4, through engagement and PBS scores at age 3. We examined both the direct effects of COACH fidelity on engagement and PBS and the indirect effect of COACH scores on PBS with observed engagement as a mediator. We then examined the indirect effects of the COACH on caregiver-reported problem behaviors at age 4. The child's enrollment in Head Start and the family's receipt of FCU feedback at age 3 were examined as potential covariates.

The typical requirements for mediation include a significant direct effect of the predictor on the presumed mediator (i.e., Path A; see conceptual model in Figure 2) and on the distal outcome (i.e., Path D), a significant direct effect of the mediator on the outcome (i.e., Path B), and a significant indirect effect of the predictor on the outcome via the mediator (Judd, Kenny, & Mc-Clelland, 2001; MacKinnon & Dwyer, 1993). However, some have argued that this approach is too restrictive (e.g., MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) and have advocated for the consideration of other approaches that focus solely on the joint significance of the paths from the predictor to the proposed mediator and from the mediator to the outcome (i.e., Path A*B). In the absence of a direct effect of the predictor on the outcome, MacKinnon et al. (2002) refer to the purported mediator as an *intervening variable*. Given the inconsistent literature regarding the direct effect of fidelity on outcome, as we previously discussed, we hypothesized engagement to be an intervening variable: a variable that is affected by fidelity to the FCU that, in turn, promotes beneficial improvements in parents' PBS and thus is theoretically and clinically meaningful (Sandler, Schoenfelder, Wolchik, & MacKinnon, 2011). In our model, we controlled for the effect of baseline PBS (i.e., age 2) on PBS 1 year later (i.e., age 3; Path F). Second, consistent with previous findings from the Early Steps study indicating the mediating role of PBS between intervention and child problem behavior outcomes (Dishion et al., 2008), we hypothesized engagement and PBS at age 3 to be intervening variables on caregiver-reported problem behaviors at age 4 (Path A*B*C). Again, we controlled for the effect of baseline problem behavior (i.e., age 2) on age 4 (Path G).

Path modeling was conducted using structural equation modeling with Mplus 6.12 (L. K. Muthén & Muthén, 2012). A Bayesian estimator was used because of its robust performance under conditions of smaller sample sizes compared with maximum likelihood estimation (Lee & Song, 2004). Similar to full information maximum likelihood, the Bayesian estimator uses all available data to estimate parameters (Asparouhov & Muthén, 2010; Little & Rubin, 2002). However, there were no missing data to be estimated when conducting the analyses; thus, the full 79-subject subsample was included. Mplus provides a 95% credibility interval for all estimated effects in structural equation models using Bayesian estimation. When using the Bayes estimator, if the provided confidence interval (CI) of the specified indirect effect using the Model Constraint command does not contain zero, the effect is considered to be statistically significant (Yuan & MacKinnon, 2009).

Results

Correlations among model variables are provided in Table 1, along with means and standard deviations. In terms of the overall treatment fidelity of the sample, the mean scores of the five COACH dimensions were within the "good work" range (5.40–5.81) and were above the minimum level of competency cutoff (5). As previously discussed, there was a high level of intercorrelation between the five COACH dimensions, indicating the appropriateness of using a manifest fidelity variable in subsequent path analyses (i.e., a mean composite score). Similarly, each of the COACH dimensions was modestly correlated with observed client

engagement in the session. Engagement was modestly correlated with PBS 12 months later. PBS was negatively correlated with caregivers' reports of the children's problem behavior such that higher levels of observed PBS were associated with lower levels of reported problem behaviors.

Path analysis began with an examination of the model fit of the model presented in Figure 2. Model fit with models using Bayesian estimation uses the posterior predictive checking (PPC) method. Model fit is determined in two ways using the PPC: (a) Mplus produces a 95% CI in which a negative lower limit is considered to be one indicator of good model fit (B. O. Muthén, 2010), and (b) Mplus also provides a posterior predictive *p* value (PPP) of model fit based on the usual chi-square test of the null hypothesis against the alternative hypothesis. PPP values approaching zero (e.g., .05) indicate poor fit (B. O. Muthén, 2010). Our model provided good fit to the data: PPC (95% CI [-8.666 | 26.191]) and the PPP (0.250). With adequate model fit, we proceeded by examining the results of the path model.

The path coefficients for the model in Figure 2 are provided in Table 2. Fidelity scores as assessed using the COACH were significantly and directly related to observed client engagement in the session (Path A). However, the path between COACH scores and PBS at age 3, controlling for PBS at age 2 (F), was not significant (D). Higher levels of observed client engagement in the feedback session had a significant direct effect on PBS at age 3 (B), controlling for baseline levels. Furthermore, PBS at age 3 was significantly and negatively associated with children's reported problem behavior at age 4 (C), controlling for baseline levels (G). Baseline levels of PBS were not significantly related to the level of observed engagement in the feedback session (E). Correlations between the baseline variables (i.e., age 2 scores on PBS, problem behavior, and COACH) were not significant. *R* squares presented in Table 2 of the three outcome variables in our model were significant and trustworthy, based on the credibility intervals. Enrollment in Head Start and receipt of FCU feedback at age 3 were not related to age 3 PBS or age 4 problem behavior scores and were not included in the final model.

Two intervening variable effects were of interest in this study: (a) COACH scores on observed PBS at age 3, by way of observed client engagement, and (b) COACH scores on caregiver-reported problem behavior at age 4, by way of observed client engagement and observed PBS at age 3. The results of the indirect effect analyses are presented in Table 3. The 95% CIs for the indirect effects tested do not contain zero and are thus considered significant (Yuan & MacKinnon, 2009). In regard to the first indirect effect, observed engagement in feedback acted as a significant intervening variable (MacKinnon et al., 2002) between COACH fidelity scores and PBS at age 3, controlling for prior levels. Results indicate that higher fidelity scores were related to higher levels of engagement and higher levels of observed PBS 12 months later. The second indirect analysis was also significant and contained two intervening variables between COACH scores at the age 2 feedback and problem behavior at age 4: observed engagement and observed PBS at age 3. Results indicate a negative indirect effect between the COACH scores and problem behavior, showing that higher COACH scores are related to decreased problem behavior 2 years later.

Discussion

The goals of this study were to present and evaluate the reliability and validity of the COACH rating system, a measure of fidelity to the FCU intervention model. The reliability of the COACH is within the acceptable range with respect to the overall internal consistency of ratings (overall ICC = .74). However, single-item ICCs of the first and fourth dimensions, Conceptual accuracy and adherence to the model and Careful and appropriate teaching and corrective feedback, were .59 and .57, respectively. One explanation for this finding is the

advanced clinical skill required within these dimensions. An untrained clinician rating sessions for fidelity might not recognize or label these skills. A second consideration is the heterogeneity of the coders trained in the COACH for this study; one had not been trained as a clinician and had not practiced the FCU model firsthand, which might have made deciphering the quality of the therapists' conceptual accuracy to the model and careful and appropriate teaching and feedback more difficult. Reliability is likely to increase when using coders who are clinicians trained in the model. Low reliability could also be an indication of potential misspecification of the underlying constructs, suggesting that revision of the system is needed. We have undertaken a systematic study of the COACH system to address the psychometric concerns identified in this study. The results indicate that raters who are trained clinicians in the FCU, who are also provided with the family's assessment data, produce more reliable scores (Smith, Dishion, & Knoble, 2013). Although the reliability of single-item scores on the COACH were low in this study, the overall score used in the path analysis was good ($ICC = .74$), and we did not intend for the individual items to be used as separate indicators of fidelity to the FCU.

In the context of the larger RCT in which this study was conducted, it is important to note that the therapists associated with the cases selected for this study were found to have sufficient fidelity to the model. That is, average scores on each of the COACH dimensions were above the minimum preestablished threshold of 5, with a mean of 5.62. In comparison, Smith, Stormshak, and Kavanagh (2013) found that therapists with less training and implementation support achieved a mean score of 4.46 on the COACH when delivering the FCU outside of the laboratory environment in community mental health clinics. These findings suggest the sensitivity of scores obtained by the COACH rating system. As Perepletchikova and Kazdin (2005) and others have noted, demonstrating fidelity to the treatment model is critical when drawing valid inferences regarding treatment effects. Additional assessment of fidelity across more diverse families, ages, and session types (i.e., initial sessions) remains an area of focus in the Early Steps study and for research with the FCU model in general.

In terms of the predictive validity of the COACH, our study proposed two hypotheses, both of which were supported by the results of the path analysis. The direction of the two significant indirect effects indicate that therapists who more competently adhere to the content and process of the FCU feedback are better able to engage clients in the session, which is related to the parent using more PBS 1 year later and to reduced child problem behavior the following year. Although this finding is rather intuitive, the intervening effect of client engagement between fidelity, parenting practices, and later child outcomes had not previously been demonstrated in the family intervention literature. Thus far, it appears that researchers have neglected identifying potential intervening variables between fidelity and outcome. Yet, identifying salient intervening variables in intervention and prevention research is valuable in developing more effective and efficient interventions that focus on processes that lead to change over time (Sandler et al., 2011). Engagement could possibly be seen as a prerequisite for future changes: If therapists are unable to engage parents in an intervention, even if they can competently and skillfully use the intervention's techniques, as evidenced by high fidelity, parents might be unlikely to retain skills that result in changes in their parenting practices. The same could likely be said for other prevention programs in which engagement and participation in the intervention is viewed as an outcome in and of itself. Similarly, model-specific components of the FCU could very likely be responsible for increasing caregiver engagement. As such, strategies that foster engagement, and perhaps alliance, may not be generic; rather, specific components of the FCU and fidelity to these components engage caregivers. At least one other study has found support for the distinctive contribution of model-specific components of manualized CBT therapy in cultivating salient process variables (Malik, Beutler, Alimohamed, Gallagher-Thompson, & Thompson, 2003).

This consideration illuminates the mutually dependent nature of fidelity and engagement: It could very well be that better fidelity increases client engagement. Yet, an engaged client arguably enables the therapist greater ease of implementing the model. Our findings support the proposed model of implementation presented by Berkel, Mauricio, Schoenfelder, and Sandler (2011), who identified client engagement as a mediating variable between fidelity of implementation and client outcomes.

Our findings suggest that engagement and other potential intervening variables related to therapeutic process ought to be examined in future studies of treatment fidelity and outcome. Although we did not directly assess this construct in our study, therapeutic alliance might well be an important intervening variable in the relationship between fidelity and outcome. The larger psychotherapy literature has consistently found that therapeutic alliance accounts for a significant amount of the variance in the dependent measures (e.g., Martin, Garske, & Davis, 2000). The family intervention literature has similarly demonstrated a relationship between alliance and outcomes (e.g., Hogue et al., 2006, 2008; Shelef, Diamond, Diamond, & Liddle, 2005; Shirk & Karver, 2003). A study by Boardman et al. (2006), which tested an MI intervention for smokers, revealed not only a strong relationship between therapists' use of MI techniques and increased observable engagement and a stronger therapeutic alliance, but also a very strong relationship between therapeutic alliance and observed engagement ($r = .85$; from Table 3, p. 334). The conceptual linkages between these two constructs suggest that intervention models ought to prescribe therapeutic processes that increase in-session engagement and foster a strong therapeutic relationship.

Limitations

This study requires replication and has some limitations that require acknowledgment. First, the sample size is adequate for the statistical methods used (path analysis with Bayesian estimation; Asparouhov & Muthén, 2010) but is still relatively small, especially when compared with the larger study from which the data were drawn. The focus of the study is also rather narrow in terms of examining only FCU assessment feedback sessions at age 2 and with families in which the target child had elevated problem behavior. Although this study took place in the larger context of a prevention program for early problem behaviors, the results and conclusions might be more applicable to treatment models, given the elevated problem behavior scores of the subsample we examined. Yet, these findings are still applicable with respect to the goal of prevention programs to reach families with the highest degree of need for intervention.

Second, fidelity ratings in this study are relatively high and lack variation. Future studies might consider a research design that could increase the variability in treatment integrity between interventionists or service delivery sites. This issue is significant when translating intervention programs from highly controlled randomized designs, in which therapists receive considerable and ongoing training and supervision, to real-world service delivery sites, in which the training and supervision infrastructure will undoubtedly vary and affect fidelity, resulting in a voltage drop in effectiveness (e.g., Carroll et al., 2007; McHugh & Barlow, 2010).

Last, the COACH system ratings were completed based on full sessions averaging about 60 min in duration. Future studies should examine the reliability and validity of ratings conducted on shorter segments of the feedback session (e.g., 15–20 min), which would make the system more cost-effective and applicable to implementation research in real-world clinical settings. Empirical demonstration that segment and full-session ratings are equivalent is needed as a precursor to altering the current COACH rating procedures.

Conclusions

Clients benefit from well-implemented treatments. This is one of the central assumptions of psychological intervention research, yet empirical support for this assumption is not consistently demonstrated. Our study adds to a growing body of literature demonstrating the importance of fidelity to family-based interventions for problems in childhood and the outcomes of those intervention models. Illumination of the role of engagement in assessment feedback sessions provides a unique contribution to this literature and opens the door for future studies of the relationship between germane therapeutic processes, fidelity, and outcome. This study also presents a reliable and valid tool for assessing fidelity to the FCU. Feasible, psychometrically sound, and valid measures of implementation fidelity are sorely needed to advance the field of implementation science and move evidence-supported treatments into the community settings for which they were designed (e.g., Aarons, Sommerfeld, Hecht, Silovsky, & Chaffin, 2009; Carroll et al., 2007; Forgatch & DeGarmo, 2011; McHugh & Barlow, 2010). Sound assessment of fidelity, empirical demonstration of its relationship to salient clinical outcomes, and use of fidelity measurement and monitoring in the community will help close the chasm between health research and real-world practice identified by the Institute of Medicine (2001). This issue will undoubtedly be one of the primary challenges facing mental health intervention researchers in the 21st century (Institute of Medicine, 2001, 2006; Report of the President's New Freedom Commission on Mental Health, 2004).

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Interventionist ID: Family ID: TC Age: Session Type: Segment Time: Rater ID: Date:		Good work	Acceptable work	Needs work
		9	8	7
		6	5	4
		3	2	1
Conceptual accuracy and adherence to the FCU model				
<input type="checkbox"/> Demonstrates understanding of key family management skills	<input type="checkbox"/> Links session goals to assessment, feedback goals and concerns: 'connects the dots'			
<input type="checkbox"/> Accurate in technical details of FCU, EPC	<input type="checkbox"/> Provides accurate rationales for EPC components and skill areas in ways that are meaningful to client			
<input type="checkbox"/> Prioritizes and frames issues using family management focus	<input type="checkbox"/> Therapist offers further treatment options in a meaningful way that relates back to feedback and collaboratively set goals			
<input type="checkbox"/> Therapist applies EPC teaching strategies/procedures strategically, tailored to client				
Observant and responsive to client needs				
<input type="checkbox"/> Establishes and works from a collaborative set	<input type="checkbox"/> Uses reflective listening and accurate empathy			
<input type="checkbox"/> Sensitive to client learning ability and context	<input type="checkbox"/> Effectively uses open-ended questions to explore client issues, motivation, understanding			
<input type="checkbox"/> Sensitive to client emotional and adjustment status	<input type="checkbox"/> Language and examples used are those of the client and reflect the family storyline			
<input type="checkbox"/> Balances broader goals with immediate concerns of client	<input type="checkbox"/> Uses harm reduction strategies as needed to address imminent danger/abuse/crises			
<input type="checkbox"/> Is culturally sensitive and congruent				
Actively structures sessions to optimize effectiveness				
<input type="checkbox"/> Flexible leadership of sessions – leads without dominating	<input type="checkbox"/> Comes prepared with materials to facilitate in-depth discussion or motivation			
<input type="checkbox"/> Actively and collaboratively sets agenda with family	<input type="checkbox"/> Has a plan in mind; stays on track; keeps family on task			
<input type="checkbox"/> Structures session time to maximize family management work	<input type="checkbox"/> Uses summaries, effective transitions, good pacing, weaves instruction as appropriate			
<input type="checkbox"/> Uses materials appropriately: video, handouts, materials	<input type="checkbox"/> Balances support for all family members present in session			
Careful and appropriate teaching				
<input type="checkbox"/> Uses strengths-based approach	<input type="checkbox"/> Breaks feedback/family profile into understandable units and pinpoints			
<input type="checkbox"/> Feedback emphasizes/builds on client's efforts, insights and successes	<input type="checkbox"/> Provides clear explanations and information			
<input type="checkbox"/> Tailors feedback and EPC, rationales to address parent's situation, strengths and culture	<input type="checkbox"/> Predicts problems and pre-corrects to maximize client success			
<input type="checkbox"/> Provides accurate feedback, does not minimize areas of concern	<input type="checkbox"/> Collaboratively sets realistic goals relevant to family management and child behavior			
Hope and motivation are generated				
<input type="checkbox"/> Uses motivational strategies to address barriers to change: reflection, normalizing, hopeful reframes, humor, validation, decisional balance	<input type="checkbox"/> Validates parent's efforts; motivates parent to try new skill/approach			
<input type="checkbox"/> Collaborative problem solving/troubleshooting to promote change	<input type="checkbox"/> Evokes change talk and client's own solutions to problems			
<input type="checkbox"/> Sets realistic goals that instill hope, maximizing chance of success	<input type="checkbox"/> Highlights discrepancies between values and behavior; explores ambivalence			
<input type="checkbox"/> Manages resistance/ambivalence in service of change	<input type="checkbox"/> Expresses optimism about families capacity for change			
Client engagement				
<input type="checkbox"/> Actively participates; stays on topic and engaged in discussions	<input type="checkbox"/> Articulates problems, goals; wishes to do things differently			
<input type="checkbox"/> Gives thoughtful responses to therapist's questions	<input type="checkbox"/> Demonstrates an understanding of therapist's comments			
<input type="checkbox"/> Is willing to discuss personal information and problems	<input type="checkbox"/> Displays emotion related to topic; shows caring/concern for child/family			
<input type="checkbox"/> Asks questions about or elaborates on therapist's observations	<input type="checkbox"/> Uses change talk; offers solutions to problems			

Figure 1. COACH Rating Form (Version 1). FCU = Family Check-Up; EPC = Everyday Parenting Curriculum.

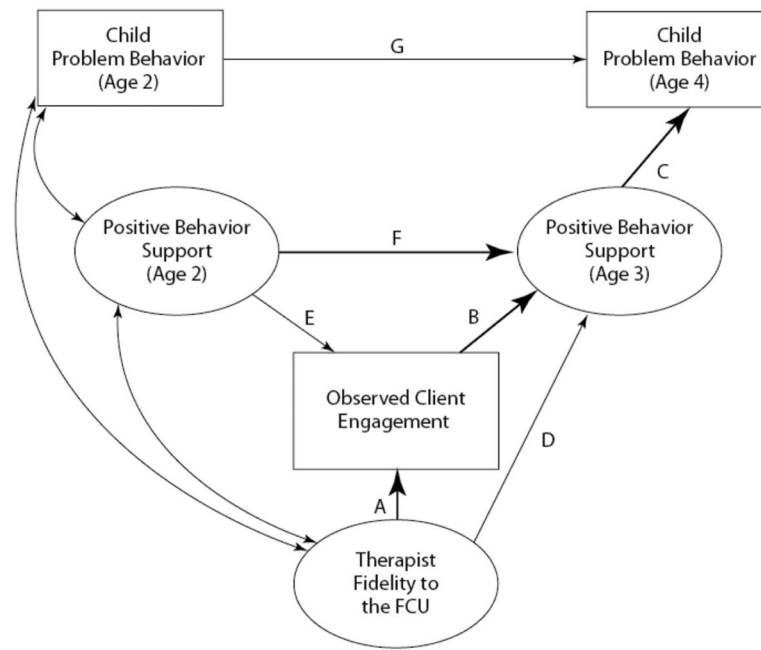


Figure 2. Conceptual model: The relationship between treatment fidelity, observed engagement in the feedback FCU session, improvement in caregivers' positive behavior support 1 year later, and the child's problem behaviors 2 years after intervention. Paths in bold are significant. FCU = Family Check-Up.

Intercorrelations Between COACH Treatment Fidelity Variables, Observed Caregiver Engagement, and Positive Behavior Support

Table 1

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Conceptual accuracy and adherence to the FCU model	—	.57**	.58**	.66**	.61**	.80**	.30**	.06	.06	.19	.05
2. Observant and responsive to client needs		—	.62**	.56**	.68**	.82**	.44**	.02	3.04	.03	.02
3. Accurately structures sessions to optimize effectiveness			—	.66**	.71**	.84**	.37**	.03	.01	.18	.20
4. Careful and appropriate teaching and corrective feedback				—	.78**	.87**	.21	.22	.05	.06	.08
5. Hope and motivation are generated					—	.90**	.38**	.23*	.13	.07	.01
6. COACH composite score						—	.40**	.14	.05	.14	.09
7. Observed client engagement in the feedback session							—	3.01	.21	.04	.05
8. Positive behavior support (child age 2)								—	.44*	3.29*	3.39**
9. Positive behavior support (child age 3)									—	3.31**	3.30**
10. Child problem behavior on CBCL (age 2)										—	.12
11. Child problem behavior on CBCL (age 4)											—
<i>M</i>	5.81	5.59	5.40	5.62	5.67	5.59	6.00			66.37	6.30
<i>SD</i>	1.33	1.56	1.47	1.51	1.70	1.28	1.61			57.64	10.47

Note. *N* = 79. Correlations were calculated using a Pearson's *r*. Means and standard deviations are not reported for positive behavior support because this variable is a *z*-score. Externalizing scores on the Child Behavior Checklist (CBCL) are reported as a *T*-score. FCU = Family Check-Up.

* *p* < .05.

** *p* < .01.

Table 2

Results of Path Analysis

Model path	<i>B</i>	Posterior <i>SD</i>	β	95% Credibility interval
A. Fidelity → engagement	.51***	.12	.41	.207 .579
B. Engagement → PBS (age 3)	.11**	.05	.28	.049 .484
C. PBS (age 3) → problem behavior (age 4)	-5.30***	1.93	-.32	-.497 -.052
D. Fidelity → PBS (age 3)	-.05	.05	-.10	-.328 .091
E. PBS (age 2) → engagement	-.22	.27	-.08	-.271 .127
F. PBS (age 2) → PBS (age 3)	.51***	.12	.48	.298 .671
G. Problem behavior (age 2) → problem behavior (age 4)	.04	.19	.02	-.228 .263
<i>R</i> ²				
Engagement	.19***	.08		.051 .344
PBS (age 3)	.29***	.09		.134 .461
Problem behavior (age 4)	.11***	.06		.015 .249

Note. *N* = 79. PBS = positive behavior support construct; problem behavior = primary caregiver report of child's problem behavior. Behaviors on the Child Behavior Checklist.

**
p < .01.

p < .001.

Table 3

Indirect Effects

Indirect effects	<i>B</i>	Posterior <i>SD</i>	95% CI
1. Fidelity → engagement → PBS	.06	.03	.007 .129
2. Fidelity → engagement → PBS → problem behavior	-.24	.19	-.664 3.019

Note. Effect is considered significant if the 95% confidence interval (CI) does not contain zero. PBS = positive behavior support construct at age 3; problem behavior = primary caregiver report of child's problem behavior on the Child Behavior Checklist at age 4.