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Measuring Implementation Fidelity in a Community Based Parenting Intervention

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## 1 Abstract

2 *Background:* Establishing the feasibility and validity of implementation fidelity monitoring  
3 strategies is an important methodological step in taking evidence based interventions to scale.

4 *Objectives:* This study examined the reliability and validity of The Fidelity Checklist, a measure  
5 designed to assess group leader adherence and competence delivering a parent training  
6 intervention (the Chicago Parent Program) in childcare centers serving low-income families.

7 *Method:* The sample included 9 parent groups (12 group sessions each), 12 group leaders, and  
8 103 parents. Independent raters reviewed 108 audio recorded parent group sessions and coded  
9 group leaders' fidelity on the Adherence and Competence Scales of The Fidelity Checklist.  
10 Group leaders completed self-report adherence checklists and a measure of parent engagement in  
11 the intervention. Parents completed measures of consumer satisfaction and child behavior.

12 *Results:* The Fidelity Checklist achieved high interrater agreement (Adherence Scale = 94%;  
13 Competence Scale = 85%) and good ICC (Adherence Scale = .69; Competence Scale = .91).  
14 Group leader adherence changed over time, but competence remained stable. Percent agreement  
15 between group leader self-report and ratings on the Adherence Scale was 85%; disagreements  
16 were more frequently due to positive bias in group leader self-report. Positive correlations were  
17 found between group leader adherence and parent attendance and engagement in the intervention  
18 and between group leader competence and parent satisfaction. No relationships were found  
19 between fidelity and short-term improvements in child behavior.

20 *Discussion:* This study suggests that using audio recordings, The Fidelity Checklist is a feasible,  
21 reliable and valid measure of group leader implementation fidelity in a group-based parenting  
22 intervention. Future research will focus on testing The Fidelity Checklist with diverse and larger  
23 samples and generalizing to other group-based interventions using a similar facilitation model.

24

## Introduction

Few empirically-supported parenting interventions have been adopted for use in community-based settings (Prinz & Sanders, 2007). This is due, in part, to the failure of program developers to create practical strategies for moving their interventions from controlled settings typical of clinical trials to community settings where larger scale adoption can take place. With increased attention to dissemination and implementation of evidenced based interventions found to be effective in controlled trials, the role of implementation fidelity becomes increasingly important. Indeed, implementation fidelity is a key component to building a scientific knowledge base related to the replication, dissemination, and implementation strategies of effective prevention programs (Elliott & Mihalic, 2004). In fact, Dusenbury and colleagues (2003) recommend extensive measurement development of fidelity assessment for successful dissemination. The purpose of this study is to test the reliability and validity of an instrument for measuring implementation fidelity for a group-based prevention intervention targeting low-income parents of young children.

## Definitions of Fidelity

The NIH Behavior Change Consortium (BCC) work group on treatment fidelity defines treatment fidelity as the methodological strategies to monitor and enhance the reliability and validity of behavioral interventions in health behavior research (Bellg et al., 2004). The BCC fidelity work group identified five components of fidelity monitoring related to the intervention design, training of interventionists, delivery of the intervention, and participant receipt and enactment of the intervention (Bellg et al., 2004; Resnick et al., 2005). Attention to these five components allow for comprehensive consideration and assessment of fidelity (Resnick et al., 2009).

1           This study examined the reliability and validity of a tool to measure treatment fidelity  
2 related to the delivery of the intervention. Several terms are used in the literature for fidelity  
3 related to the delivery of an intervention. Terms used include implementation fidelity, treatment  
4 integrity, fidelity, treatment fidelity, and intervention fidelity (Dumas, Lynch, Laughlin, Smith,  
5 & Prinz, 2001; Carroll et al., 2007; Eames et al., 2008; Fixsen, Naoom, Blase, Friedman, &  
6 Wallace, 2005; Forgatch, Patterson, & DeGarmo, 2005; Lee et al., 2008; Mihalic, 2004;  
7 Moncher & Prinz, 1991; Mowbray, Holter, Teague, & Bybee, 2003; Perepletchikova, Treat, &  
8 Kazdin, 2007; Santacroce, Maccarelli, & Grey, 2004; Stein, Sargent, & Rafaels, 2007). In the  
9 cited reviews and studies, these terms share the broad definition of the intervention being  
10 delivered as intended by the program developers and consistent with the program model.

11           In this study, the term implementation fidelity will be used in regards to the assessment of  
12 the degree to which group leaders deliver the intervention competently and according to  
13 protocol. Implementation fidelity was chosen because it is a term frequently used in prevention  
14 and community based interventions (Carroll et al., 2007; Gottfredson et al., 2006; Lee et al.,  
15 2008; Mihalic, 2004). There are two relevant dimensions for implementation fidelity assessment,  
16 adherence and competence. Adherence refers to the extent to which the interventionists'  
17 behaviors conform to the intervention protocol while competence relates to the skillfulness in the  
18 delivery of the intervention related to facilitation and process skills (Forgatch et al., 2005;  
19 Perepletchikova & Kazdin, 2005; Stein et al., 2007).

20           In this study, implementation fidelity was measured using The Fidelity Checklist, a  
21 measure constructed to capture adherence to the protocol and the competent delivery of the  
22 intervention. The intervention in this study was the Chicago Parent Program (CPP). The CPP is a  
23 12-session group-based parenting program shown to improve parenting and reduce behavior  
24 problems in young children (Gross, Garvey, et al., 2009; Gross, Garvey, Julion, & Fogg, 2007).

1 Research shows that evidence-based parent training is effective for early intervention and  
2 prevention in reducing behavioral risk among children from low-income families (Conduct  
3 Problems Prevention Research Group, US, 1999; Dumas, Prinz, Smith, & Laughlin, 1999;  
4 Gottfredson et al., 2006). In order to support dissemination efforts in early childhood centers,  
5 feasible, reliable, and valid measures of fidelity are critical in ensuring successful  
6 implementation. Therefore, implementation fidelity of the CPP was monitored across multiple  
7 community sites and group leaders using audio recordings of the CPP groups.

### 8 *Implementation Fidelity Monitoring in Parent Training Interventions*

9 In a review of parent training studies between 1980-1988 only 6% of studies reported  
10 fidelity related to implementation (Rogers Wiese, 1992), however, there is beginning to emerge  
11 greater attention to implementation fidelity in the parenting research literature. Dumas and  
12 colleagues (2001) developed a fidelity plan and checklist specific to their parenting program  
13 targeting risk reduction among older children. Although their intervention was delivered to  
14 individual families rather than parent groups, the results of their study showed it was possible to  
15 obtain high inter-rater agreement on fidelity ratings using audio recorded data. Forgatch and  
16 colleagues (2005) evaluated the reliability and validity of implementation fidelity of their parent  
17 management training program using direct observations from video recorded data. They found  
18 that higher fidelity ratings predicted improved parenting practices. However, this intervention,  
19 delivered by graduate-prepared therapists, is conducted with individual mother-father dyads.  
20 Therefore, the measure does not include leader competence in facilitating group processes, an  
21 important component of the CPP.

22 Eames and colleagues (2008) developed a leader observation tool to measure  
23 implementation fidelity of a group based parenting program via live or video recorded  
24 observations. The authors report good reliability for the tool. The coding of the evaluation tool

1 captures frequency of group leader behavior. While frequency is important, facilitating group  
2 process incorporates complex skills implemented in response to group participants' needs.  
3 Therefore, The Fidelity Checklist was designed to capture the frequency and presence of  
4 behavior deemed essential to the CPP intervention and the underlying facilitation model (Gross  
5 et al., 2007). Additionally, The Fidelity Checklist assesses the quality which group leaders  
6 deliver a group based parenting intervention in response to the dynamics and needs of group  
7 participants.

### 8 *Study Aims*

9 The purpose of this study was to examine the reliability and validity of The Fidelity  
10 Checklist. Specifically, the aims were to: (a) Establish inter-rater reliability of The Fidelity  
11 Checklist, (b) assess agreement between group leader self-report and independent ratings of  
12 adherence, (c) describe systematic changes in implementation fidelity over time and by session,  
13 (d) examine the relationship between mean adherence and competence scores and parent  
14 attendance, engagement in and satisfaction with parent groups, and (e) test the relationship  
15 between mean adherence and competence and improvements in parent-rated child behavior  
16 problems from baseline to post-intervention. As a measure of criterion validity, it was  
17 hypothesized that group leader adherence and competence would be positively related to parent  
18 attendance, satisfaction, engagement, and improvements in child behavior problems.

### 19 Methods

20 This descriptive study was conducted under approval by the institutions Internal Review  
21 Board. Informed consent was obtained from intervention participants and group leaders.

### 22 *Sample*

23 *CPP groups and participants.* The sample included 103 parents or legal guardians of 2-5  
24 year old children enrolled in child care centers serving low-income families in Chicago and 12

1 group leaders who co-led one or more 12-session parent groups using the CPP. A convenience  
2 sample of nine CPP groups implemented in community based day care settings was used in this  
3 study, which were drawn from a larger study on the effectiveness of the CPP (Gross, Fogg, et al.,  
4 2009). All day care settings were licensed by the State Department of Children and Family  
5 Services and served predominantly ethnic minority families.

6 Inclusion criteria for parent participation were (a) agreement to participate in the CPP  
7 groups, (b) the parent or legal guardian of a child between the ages of 2 to 5 years old attending  
8 day care at the participating centers, and (c) agreement to having their parent group sessions  
9 audio-recorded. In this study, 96% of the target population was African American or Latino.  
10 Group participants were mothers (80.6%), fathers (12.5%), and grandparent or aunt (6.9%) of the  
11 child.

12 All group leaders (n=12) completed a CPP group leader training workshop. Each parent  
13 group was facilitated by two trained group leaders. However, if enrollment fell below 4 parents  
14 in a group, only one group leader facilitated the group. Five group leaders (42%) were African  
15 American, five (42%) were non-Latino White, and two (17%) were Latino. Six group leaders  
16 (50%) had graduate degrees, two (17%) had bachelor degrees, three (25%) had associate degrees,  
17 and one (8%) had a high school diploma. Five group leaders (42%) were novices, never having  
18 led a CPP group prior to this study, while three (25%) had previously facilitated one to two  
19 groups and four (33%) had experience conducting three or more groups. Novice group leaders  
20 were paired with more experienced group leaders for their first CPP group-leading experience.  
21 All groups were conducted in English.

## 22 *Description and Format of the CPP*

23 The CPP is a 12-session community based health promotion and prevention intervention  
24 for parents of preschoolers designed to promote parenting competence and prevent behavior

1 problems in young children (Gross et al., 2007). The structure of the CPP groups consists of 11-  
2 standardized weekly group sessions and one booster session. The booster session is scheduled 1-  
3 2 months after the 11<sup>th</sup> group session and is intended to provide support to parents for continuing  
4 to use program principles after the group has ended.

5           Research has demonstrated the effectiveness of the CPP with ethnically and  
6 economically diverse families with young children (Gross, Garvey, et al., 2009). Specifically,  
7 parents who participated in the CPP demonstrated improvements in parenting behavior and  
8 reported greater parenting self-efficacy, more consistent use of discipline, and reduced reliance  
9 on corporal punishment. In addition, children of parents who participated in the program  
10 demonstrated greater reductions in behavior problems in the child care classroom and during  
11 interactions with their parents.

12           During two-hour weekly sessions, videotaped vignettes are shown to parents and used to  
13 stimulate discussion and problem solving related to child behavior and parenting skills. Group  
14 leaders facilitate discussions and conduct the CPP groups guided by a comprehensive group  
15 leader manual. The group leader manual standardizes the group sessions. The manual includes  
16 the content of the vignettes, discussion questions, and commonly occurring questions related to  
17 the vignettes. Also included in the manual are activities (e.g., make a list of behaviors you want  
18 to change in your child) to facilitate learning and application of the program principles.

### 19 *Variables and Measures*

20           Outcome data was collected using multiple informants (group leaders, parents, and  
21 independent raters) and methods (questionnaires and audio recordings). Variables of interest in  
22 this study were implementation fidelity (adherence and competence), participant attendance,  
23 satisfaction and engagement in the intervention, and parent/guardian reports of improvements in  
24 child behavior problems. Variables and measures are described below.

1            *Implementation Fidelity.* The Fidelity Checklist was constructed to measure group leader  
2 adherence and competence in delivering the CPP intervention. Consistent with strategies  
3 suggested by Stein and colleagues (2007) and Mowbray and colleagues (2003), the following  
4 steps were used in the development of The Fidelity Checklist: (1) identification of the essential  
5 elements of the CPP based on the theory underlying the intervention and facilitation model for  
6 group leaders, (2) construction of scale items related to adherence to content and competence in  
7 delivering the intervention, and (3) development of item scaling. Content validity for The  
8 Fidelity Checklist was established by review of the checklist by developers of the CPP, experts  
9 in delivering parent interventions, and experts in fidelity monitoring. Multiple iterations occurred  
10 during the development of the checklist. All iterations were reviewed by the content experts until  
11 consensus was met on item content and scaling. There was agreement that items represented the  
12 contents of the CPP curriculum and required skills for competent delivery.

13            The Adherence and Competence Scales make up The Fidelity Checklist. *Adherence* to  
14 the defined CPP intervention protocol for each group session is measured by 12-16 items  
15 (depending on the specific session), each coded as yes or no, depending on whether the group  
16 leader performed the expected action during that group session. Examples of adherence items  
17 include, the group leader (a) reviews last week's practice assignments, (b) distributes and  
18 reviews the "Summary of Important Points", and (c) makes a list of misbehaviors that might be  
19 handled with logical consequences (session 6 only).

20            Group leader *competence* in delivering the intervention, engaging, communicating, and  
21 responding to group participants and facilitating the group process while delivering the  
22 intervention was assessed by 15 items. These items were invariant across sessions and were rated  
23 on a 3-point scale of 1 (skill rarely or never demonstrated), 2 (skill emerging, needs further  
24 development), or 3 (skill demonstrated and done well). Examples of competence items include,

1 the group leader (a) correctly conveys and communicates program principles, (b) effectively uses  
2 role-play to teach a principle or strategy, (c) effectively responds when parents are resistant to  
3 new strategies or ideas, and (d) facilitates problem solving. When rating competence, raters make  
4 note of *missed opportunities*. Missed opportunities are defined as times the group leader missed  
5 opportunities to perform the competencies outlined in the checklist. Missed opportunities are  
6 important as group leader competence is rated on what was done well and how effective group  
7 leaders respond to the process, dynamics, and needs of the group members.

8 As a feasibility measure, raters were asked to evaluate the overall quality of the audio  
9 recording. Quality of the audio recording was rated as good (>90% of audio recording of good  
10 quality and could be coded), adequate (at least 50% of audio recording of good quality and could  
11 be coded), or poor (less than half of audio recording of good quality and could be coded).

12 *Implementation adherence by group leader self-report.* Group leaders completed a  
13 weekly Adherence Scale after each group session. The items on the Adherence Scale, group  
14 leader report are parallel to the items on the Adherence Scale of The Fidelity Checklist. Group  
15 leaders report whether or not (yes or no) they performed tasks related to the intervention for that  
16 week's session. Group leader report of adherence was compared to independent observer ratings  
17 to assess agreement between self-report and independent adherence ratings.

18 *Parent Attendance.* Attendance was calculated for each group as the percent of parents  
19 enrolled in the group who attended each session.

20 *Parent Satisfaction.* Parent satisfaction with the group sessions was measured by parent  
21 report on a weekly satisfaction survey. The 5-item weekly survey asked parents to rate the  
22 quality of the content, vignettes, practice assignments, and group leaders' facilitation for that  
23 session on a scale of 1 (not helpful) to 4 (very helpful). In this study Cronbach's Alpha for the  
24 weekly survey was .87.

1            *Parent Engagement.* Engagement in the weekly sessions was assessed by group leader  
2 report using the Engagement Form (EF; (Garvey, Julion, Fogg, Kratovil, & Gross, 2006). The 7-  
3 item EF was developed to assess the extent to which group attendees were actively participating  
4 in the group sessions. Active participation was defined as the extent to which the group  
5 participants attended to the videotaped scenes, participated in the discussion, were open and  
6 supportive to other group participants, were not resistant to new ideas, and correctly applied the  
7 program principles. Items were scored on a scale of 1 (not at all) to 4 (most of the time) and  
8 summed for a total EF score. Validity of the EF is supported by its significant associations with  
9 improvements in teachers' and parents' ratings of child behavior problems and reductions in  
10 parent depressive symptoms ( $p < .04$ ) (Garvey et al., 2006). Cronbach's alpha of the EF in this  
11 study was .92.

12            *Improvements in child behavior.* The Child Behavior Checklist 1 ½ - 5 (CBCL) is a  
13 measure of frequency of problem behavior for children aged 1 ½- 5 on two scales, externalizing  
14 (a measure of disruptive behavior problems, aggression, hyperactivity) and internalizing  
15 (measure of anxiety, inhibition, depression, social withdrawal) behavior problems (Achenbach &  
16 Rescorla, 2000). Parents or guardians answered 100 questions related to their child's behavior  
17 *now or within the past two months* on a 3-point scale ranging from 0 (not true as far as you  
18 know), 1( somewhat or sometimes true), or 2 (very true or often true). The CBCL shows  
19 significant discrimination ( $p \leq .01$ ) between referred and nonreferred children (Keenan &  
20 Wakschlag, 2000) and validity across racial and ethnic populations, as well as economically and  
21 linguistically diverse samples (Gross et al., 2006). Cronbach's alpha of the CBCL in this study  
22 were .88 (internalizing scale), and .92 (externalizing scale).

23            *Procedures*

1 Each CPP group session was audio recorded with a digital recorder by the group leader  
2 and submitted to the study team. Of the 108 parent group sessions, two were not recorded due to  
3 equipment malfunction. The 106 audio-recorded group sessions were later reviewed and coded  
4 by independent raters using The Fidelity Checklist. Missing data was imputed for the two  
5 missing groups using the 'Hot Deck' method (Rubin, 1987). Of the recorded groups, 97% of the  
6 recordings were rated as having good quality and 3% as having adequate quality; none were  
7 rated as poor quality.

8 Audio recordings were reviewed in their entirety to capture overall adherence and  
9 competence. Although others have suggested and used samples of intervention sessions for  
10 fidelity assessment (Dumas et al., 2001; Forgatch et al., 2005; Hogue, Liddle, Singer, &  
11 Leckrone, 2005), it was decided to rate all recordings for two reasons. First, collection of all  
12 sessions would provide information of fidelity ratings over time and inform the frequency  
13 needed to measure implementation fidelity in the future. Second, coding of full sessions nets all  
14 interactions and group leader behavior. Coding full sessions captures critical incidents that may  
15 be missed by sampling of sessions but are important for comprehensive assessment of group  
16 leader adherence and competence.

17 For inter-rater reliability estimates, 30% of CPP group session (n=32) recordings were  
18 coded by two independent raters. Satisfaction, attendance, and group leader report on the  
19 Adherence Scale were collected weekly. Engagement data was collected between the 11<sup>th</sup> and  
20 12<sup>th</sup> (booster) session. Parents completed the CBCL at baseline and post intervention.

21 *Coding of The Fidelity Checklist.* Independent observers used for this study were  
22 knowledgeable of the CPP intervention and experienced in facilitating groups. A detailed coding  
23 manual describing each item on the checklist guided the rating of the CPP groups. Rater training  
24 included: (a) Instruction on the philosophy and purpose of fidelity monitoring, (b) review of the

1 theoretical underpinnings of the CPP intervention, and (c) thorough review of The Fidelity  
2 Checklist Coding Manual. Audio recordings are reviewed in their entirety. Raters take notes  
3 throughout the recording and assign codes at the end of the recording.

4 During pilot testing of The Fidelity Checklist and coding procedures, raters reviewed  
5 discrepancies in coding, clarified directions and provided examples to guide item coding. During  
6 the coding period of this study, raters reviewed ongoing coding issues and discussed agreements  
7 and disagreements.

8 *Data analysis.* Two estimates of interrater reliability for the Adherence and Competence  
9 Scales were conducted, percent agreement of independent raters and Intraclass Correlation  
10 Coefficients (ICC). Internal consistency estimates (Cronbach's Alpha) was conducted for the  
11 Competence Scale. Internal consistency estimates were not conducted on the Adherence Scale  
12 because items vary by group session and measure discrete behaviors of group leaders defined by  
13 CPP protocol rather than an underlying trait of adherence.

14 A repeated measure ANOVA over time was used to examine changes in Adherence and  
15 Competence Scale ratings. Improvements in parent report of child behavior were calculated as  
16 the difference between pre and post intervention CBCL scores. Correlations were used to assess  
17 the relationship of mean adherence and competence with mean group outcome measures  
18 (attendance, satisfaction, engagement, improvements in child behavior problems). The p-value  
19 for significance was set at 0.10 because the small number of groups greatly reduced the power of  
20 the analysis and the preliminary nature of the study (Burns & Grove, 2005, p. 451).

## 21 Results

### 22 *Reliability of The Fidelity Checklist*

23 Mean percent agreement across two independent raters was 94% (range = 89 - 100%) on  
24 the Adherence Scale and 85% (range = 75 - 97%) on the Competence Scale. The ICC assesses

1 rating reliability by comparing the variability of different ratings of the same subject (group) to  
2 the total variation across all ratings and all subjects. ICCs were .69 and .91 on the Adherence and  
3 Competence Scales, respectively. Cronbach's Alpha was .70 for the Competence Scale.

#### 4 *Group Level Data*

5 Table 1 presents group level data for the 108 CPP group sessions used in the study.  
6 Average attendance was 50% of group sessions (range= .38 - .69). Of the 103 enrolled  
7 participants, eleven (10%) parents enrolled but never attended a group session. Mean group  
8 attendance without these 11 non attenders increased to 60% (range = .38 - .92). These parent  
9 group attendance rates are consistent with other group based community preventive  
10 interventions. (Dumka, Garza, Roosa, & Stoerzinger, 1997; Garvey et al., 2006; Irvine, Biglan,  
11 Smolkowski, Metzler, & Avry, 1999; Nicholson, Brenner, & Fox, 1999).

12 Mean score on the Adherence Scale was .89 indicating that group leaders adhered with  
13 the protocol 89% of the time (range = .74 - .95). Mean score on the Competence Scale was 2.62,  
14 suggesting that group leaders demonstrated a fairly high degree of competence across all group  
15 sessions (range = 2.30 - 2.86 on a 3-point scale). Overall, parent satisfaction with the quality of  
16 the intervention and group leaders facilitation across all sessions was high (mean = 3.73; range =  
17 3.46 – 4 on a 4-point scale). Mean parent engagement scores were 3.28 (range = 2.75 – 3.79 on a  
18 4-point scale).

#### 19 *Group Leader and Rater Agreement on the Adherence Scale*

20 Percent agreement between group leader adherence self-report and independent ratings of  
21 audio-taped parent groups using the Adherence Scale was 85% (range = 70 - 92%) across  
22 sessions. One item on the adherence scale, *post the ground rules*, was removed from the analysis  
23 because coding this item required a visual cue to rate and was not amenable to the method of

1 rating using audio recordings. The majority (87%) of disagreements was due to the independent  
2 rater coding behavior as not occurring and group leader reporting that the behavior had occurred.

### 3 *Implementation Fidelity Over Time and Session*

4 Group leader ratings of adherence and competence were assessed over time and session  
5 (See Figure 1 and 2). There was a significant, single peaked quadratic effect ( $F(1, 8) = 12.67$ ;  
6  $p < .01$ ) of adherence over time and a significant linear effect ( $F(1, 8) = 4.85$ ;  $p < .10$ ) over time.  
7 There was no significant effect (linear or quadratic) over time of competence. These findings  
8 suggest that (a) group leaders initially exhibited improved adherence over time, peaking at  
9 session seven, then declining below the mean by the twelfth session and (b) competence was  
10 stable across time.

### 11 *Criterion Validity of The Fidelity Checklist*

#### 12 *Relationship of implementation fidelity and attendance, satisfaction, and engagement.*

13 Correlations among implementation fidelity and parent attendance, satisfaction, and engagement  
14 are presented in Table 2. Outcomes of these process variables were aggregated to the group  
15 level ( $n = 9$ ). There was a positive, significant relationship between mean adherence scores and  
16 parent engagement ( $r = .50$ ;  $p < .10$ ) and attendance ( $r = .45$ ,  $p < .10$ ). Mean competence scores  
17 were significantly correlated with parent satisfaction ( $r = .64$ ;  $p < .05$ ). There were no significant  
18 correlations between the adherence and parent satisfaction or between competence scores and  
19 parent attendance or engagement.

20 *Relationship of implementation fidelity and improvement in child behavior.* Children's  
21 behavior improved from baseline to post-intervention. Mean improvements in parent report of  
22 child behavior problems were 2.47 ( $SD = 3.58$ ) on the Internalizing Scale and 2.50 ( $SD = 3.97$ )  
23 on the Externalizing Scale. However, there were no significant correlations between mean

1 adherence and competence scores and parent reports of improved child behavior problems on the  
2 externalizing or internalizing scales.

### 3 Discussion

4 The current study was conducted to establish the reliability and validity of The Fidelity  
5 Checklist measuring implementation fidelity of the CPP and further understand the role of  
6 fidelity in implementation of evidenced based interventions. As noted by Zvoch (2009),  
7 understanding measurement and analysis of implementation fidelity data highlights the processes  
8 impeding or promoting successful implementation of interventions. Therefore, validating and  
9 establishing reliability of implementation fidelity evaluation is an important step in  
10 implementation and dissemination efforts of group-based parenting programs like the CPP.

#### 11 *Reliability*

12 Overall scale ICC on the Adherence and Competence Scales was adequate and there was  
13 high percent of rater agreement on both scales. Although raters had high percent agreement  
14 (95%) across sessions on the Adherence Scale, the ICC was low (.69). Lack of variability of  
15 items, dichotomous scaling, and changes in adherence items across sessions may account for the  
16 lower ICC.

#### 17 *Group Leader and Rater Agreement on the Adherence Scale*

18 Although there was substantial agreement between group leader self report and  
19 independent rater on the Adherence Scale, the results of this study suggest that group leader self-  
20 reports of adherence may be inflated. That is, group leaders tended to report higher adherence to  
21 the protocol than did independent raters.

22 In terms of the discrepancy of group leader and rater agreement, positive bias in self report  
23 ratings is occurring. It is also possible that group leaders do not fully appreciate the importance  
24 of their reports of adherence and at the end of a group session report adherence to all components

1 by rote. To address this issue, discussing with group leaders the need for transparency in  
2 reporting adherence and the utility of this information may decrease the bias. It is important for  
3 implementers to know the function of the adherence measure for their supervision as well as  
4 having a valid measure to understand the relationship of adherence to intervention outcomes.  
5 Nevertheless, there was substantial agreement between group leader and independent rater  
6 reports of adherence, suggesting that self-report may provide a relatively good estimate of  
7 adherence to intervention protocol when no other method is available.

### 8 *Implementation Fidelity Over Time and Session*

9 A strength of this study is the assessment of ratings on the Adherence and Competence  
10 Scale over time. In fact, Zvoch (2009) notes that little attention is paid to intervention providers  
11 adherence to protocol over the course of an intervention. There was no time by session effect of  
12 mean competence scores, indicating competency was a stable trait in this sample.

13 Although mean adherence scores remained high across all sessions, mean adherence scores  
14 varied by time and session. That is, group leaders initially exhibited improved adherence over  
15 time, peaking at session seven and then declining below the mean by the twelfth session. There  
16 are several explanations for changes in adherence over time. First, because this study initiated  
17 audio recording procedures, it is possible that adherence was higher at the beginning of the  
18 intervention because group leaders were aware of being recorded, but later, habituated to the  
19 presence of the recorder, thus a true measure of adherence to protocol occurred. This suggests  
20 that implementation fidelity methods should include audio recordings of all group sessions with  
21 a random selection of recordings for obtaining accurate estimates of implementation fidelity.  
22 Further, adherence data should be collected from more than one time point throughout the  
23 intervention length in order to collect a valid assessment across time.

1           A second explanation of changes in adherence over time is as group leaders become more  
2 confident in their conduct of CPP groups and more familiar with the parents in their group, they  
3 may “flex” the protocol in response to what they believe the parents in their group most need.  
4 Although research relating adherence and outcomes has shown variable results (Barber et al.,  
5 2006; Hogue et al., 2008; Huey, Henggeler, Brondino, & Pickrel, 2000), there is some support  
6 that moderate adherence may be a better predictor of outcome than strict adherence (Barber et  
7 al., 2006). It is possible that adjusting to the needs of the individuals in the group while staying  
8 true to the theoretical underpinnings of the intervention may be more related to outcomes than  
9 strict adherence. However, further understanding of what adherence components are flexed,  
10 group leader process in making these changes, and identifying components that allow flexibility  
11 of the intervention needs to occur. In doing so, a clearer understanding of the relationship of  
12 adherence over time and intervention outcome can occur.

13           Finally, changes in adherence over time may be representative of group leader drift from  
14 the intervention protocol over time. In response, group leader supervisors or technical assistance  
15 personnel should discuss and promote adherence to intervention protocol around session six or  
16 seven with the goal of maintaining adherence through the remainder of intervention sessions.

### 17 *Criterion Validity of The Fidelity Checklist*

18           Mean adherence scores were positively correlated with attendance and engagement in the  
19 intervention, while, competence scores were positively correlated with group participant reports  
20 of satisfaction. According to Cohen (1988) effect sizes for these significant correlations are  
21 considered ‘large’, referring to correlation coefficients close to .50 (p. 80). These results support  
22 the concept of adherence and competence as two separate but distinct components. However,  
23 what remains unknown is the potential role of group leader adherence and competence as  
24 mediators of process variables with more distal outcomes of the intervention (e.g., parenting

1 practices and child behavior outcomes) and what factors (e.g., context or intervention  
2 environment) might converge with fidelity to influence intervention outcomes.

3       There were no significant correlations between group leader fidelity ratings and  
4 improvements in parent-reported child behavior problems. This may be due to insufficient  
5 power. Although mean child behavior scores improved from baseline to post-intervention, these  
6 improvements were relatively small (.63 - .69 standard deviations). It is also possible that three  
7 months is too brief a period of time to detect substantial improvements in children's behavior.  
8 Research on the CPP indicates that the greatest improvements in parents' ratings of child  
9 behavior problems occur over a longer period of time, after parents have had many opportunities  
10 to apply what they have learned and to see how the changes they've made are influencing their  
11 children's behavior (Gross, Garvey, et al., 2009). Future research will focus on the relationship  
12 of fidelity to more distal outcomes from parent training.

### 13 *Quality of Implementation*

14       In this study, group leaders were rated high on adherence and competence, indicating high  
15 quality implementation. This result supports the efficacy of CPP group leader training and  
16 ongoing supervision of group leaders for achieving a relatively high level of fidelity. In addition,  
17 group leaders in this study may be considered early adopters of the intervention. Early adopters  
18 of an intervention tend to be more motivated, have higher perceived benefit of the intervention  
19 and support the theoretical foundations of the intervention (Rogers, 2003). However, as  
20 dissemination efforts persist, it is possible that levels of investment change resulting in changes  
21 in implementation fidelity. The potential for this shift highlights the need for a reliable and valid  
22 measure of ongoing implementation fidelity. Further, fidelity data can provide timely clinical  
23 information to group leaders for supervision during dissemination and inform changes in group  
24 leader training protocols.

## 1 *Study Limitations*

2       There were several limitations to this study worth noting. First, because the unit of analysis  
3 for fidelity is at the group level, aggregation of data significantly decreased the power to detect  
4 differences and find significant relationships. Future research will include a larger sample of  
5 parent groups for examining the relationship between fidelity and intervention outcomes. A  
6 second limitation to the current study is the lack of variability in overall mean scores of fidelity.  
7 Although this finding is positive in indicating overall good adherence and competence in  
8 delivering the CPP intervention, limited range and lack of variability in fidelity items limits the  
9 ability to understand the distinct items that influence outcomes. Further work will focus on  
10 specific item analysis on The Fidelity Checklist. Finally, there is limited generalizability of these  
11 findings to other groups and settings. However, since the purpose of the study was to establish  
12 the reliability and validity of the checklist, further work can progress to assess generalizability  
13 across settings and groups. Although the Adherence Scale is specific to the CPP intervention, the  
14 Competence Scale may be applied to other group-based interventions using a similar facilitation  
15 model.

16       Despite these limitations, this study adds to the growing body of knowledge related to  
17 fidelity measurement and assessment. This study advances research on implementation fidelity  
18 research by utilizing multi-informant, multi method assessments of fidelity and outcomes and  
19 assessing adherence and competence as discrete components. This study suggests that The  
20 Fidelity Checklist is a feasible, reliable and valid measure of group leader implementation  
21 fidelity to the CPP. Establishing the psychometric properties for implementation fidelity  
22 monitoring is an important methodological step in taking evidence based interventions to scale.  
23 Assuring implementation fidelity provides confidence that the intervention is being delivered as  
24 intended to effect the desired change. Thus, the ultimate goal of reaching those who will benefit

- 1 most from the intervention can be achieved. Further, reliable and valid measures of
- 2 implementation fidelity allows for systematic assessment of potential adaptations or changes that
- 3 may occur in community settings. In this way, we are setting the stage for further empirical
- 4 testing of implementation strategies and issues as dissemination efforts broaden.

## References

- Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children.
- Barber, J. P., Gallop, R., Crits-Christoph, P., Frank, A., Thase, M. E., Weiss, R. D., et al. (2006). The role of therapist adherence, therapist competence, and alliance in predicting outcome of individual drug counseling: Results from the National Institute Drug Abuse Collaborative Cocaine Treatment Study. *Psychotherapy Research, 16*(2), 229-240.
- Bellg, A. J., Borrelli, B., Resnick, B., Hecht, J., Minicucci, D. S., Ory, M., et al. (2004). Enhancing treatment fidelity in health behavior change studies: Best practices and recommendations from the NIH Behavior Change Consortium. *Health Psychology, 23*(5), 443-451.
- Burns, N. & Grove, S.K. (2005). *The Practice of Nursing Research: Conduct, Critique, and Utilization* (5<sup>th</sup> ed.). St. Louis, MO: Elsevier Saunders.
- Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity [Electronic version]. *Implementation Science, 2*: 40.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2<sup>nd</sup> ed.). Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc,
- Conduct Problems Prevention Research Group (1999). Initial impact of the Fast Track prevention trial for conduct problems: I. the high-risk sample. *Journal of Consulting and Clinical Psychology, 67*(5), 631-647.
- Dumas, J. E., Lynch, A. M., Laughlin, J. E., Smith, E. P., & Prinz, R. J. (2001). Promoting intervention fidelity: Conceptual issues, methods, and preliminary results from the EARLY ALLIANCE prevention trial. *American Journal of Preventive Medicine, 20*(Suppl1), 38-47.

- Dumas, J. E., Prinz, R. J., Smith, E. P., & Laughlin, J. (1999). The EARLY ALLIANCE prevention trial: An integrated set of interventions to promote competence and reduce risk for conduct disorder, substance abuse, and school failure. *Clinical Child and Family Psychology Review, 2*(1), 37-53.
- Dumka, L., Garza, C., Roosa, M., & Stoerzinger, H. (1997). Recruitment and retention of high-risk families into a preventive parent training intervention. *The Journal of Primary Prevention, 18*(1), 25-39.
- Dusenbury, L., Brannigan, R., Falco, M., & Hansen, W. B. (2003). A review of research on fidelity of implementation: Implications for drug abuse prevention in school settings. *Health Education Research, 18*(2), 237-256.
- Eames, C., Daley, D., Hutchings, J., Hughes, J. C., Jones, K., Martin, P., et al. (2008). The Leader Observation Tool: A process skills treatment fidelity measure for the Incredible Years parenting programme. *Child: Care, Health and Development, 34*(3), 391-400.
- Elliott, D. S., & Mihalic, S. (2004). Issues in disseminating and replicating effective prevention programs. *Prevention Science, 5*(1), 47-53.
- Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: A synthesis of the literature*. Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network (FMHI Publication #231).
- Forgatch, M. S., Patterson, G. R., & DeGarmo, D. S. (2005). Evaluating fidelity: Predictive validity for a measure of competent adherence to the Oregon model of parent management training. *Behavior Therapy, 36*(1), 3-13.

- Garvey, C., Julion, W., Fogg, L., Kratovil, A., & Gross, D. (2006). Measuring participation in a prevention trial with parents of young children. *Research in Nursing & Health, 29*(3), 212-222.
- Gottfredson, D., Kumpfer, K., Polizzi-Fox, D., Wilson, D., Puryear, V., Beatty, P., et al. (2006). The Strengthening Washington D.C. Families Project: A randomized effectiveness trial of family-based prevention. *Prevention Science, 7*(1), 57-74.
- Gross, D., Fogg, L., Garvey, C., Julion, W., Ridge, A., Ordaz, I., Breitenstein, S., & Brusius, A. (2009). Effect of childcare discounts on parent participation rates in preventive parent training. Poster presented at the 17<sup>th</sup> Annual Meeting of the Society for Prevention Research, Washington, DC, May 28, 2009.
- Gross, D., Fogg, L., Young, M., Ridge, A., Cowell, J. M., Richardson, R., et al. (2006). The equivalence of the Child Behavior Checklist 1 1/2-5 across parent race/ethnicity, income level, and language. *Psychological Assessment, 18*(3), 313-323.
- Gross, D., Garvey, C., Julion, W., & Fogg, L. (2007). Preventive Parent Training with Low-Income, Ethnic Minority Families of Preschoolers. In J.M. Briesmeister & C.E. Schaefer (Eds.), *Handbook of Parent Training: Helping Parents Prevent and Solve Problem Behaviors* (3<sup>rd</sup> ed., pp. 5-24). Hoboken, New Jersey: John Wiley & Sons, Inc.
- Gross, D., Garvey, C., Julion, W., Fogg, L., Tucker, S., & Mokros, H. (2009). Efficacy of the Chicago Parent Program with low-income African American and Latino parents of young children. *Prevention Science, 10*(1), 54-65.
- Hogue, A., Henderson, C. E., Dauber, S., Barajas, P. C., Fried, A., & Liddle, H. A. (2008). Treatment adherence, competence, and outcome in individual and family therapy for adolescent behavior problems. *Journal of Consulting and Clinical Psychology, 76*(4), 544-555.

- Hogue, A., Liddle, H. A., Singer, A., & Leckrone, J. (2005). Intervention fidelity in family-based prevention counseling for adolescent problem behaviors. *Journal of Community Psychology, 33*(2), 191-211.
- Huey, S. J., Jr., Henggeler, S. W., Brondino, M. J., & Pickrel, S. G. (2000). Mechanisms of change in multisystemic therapy: Reducing delinquent behavior through therapist adherence and improved family and peer functioning. *Journal of Consulting and Clinical Psychology, 68*(3), 451-467.
- Irvine, B. A., Biglan, A., Smolkowski, K., Metzler, C., & Avry, D. (1999). The effectiveness of a parenting skills program for parents of middle school students in small communities. *Journal of Consulting and Clinical Psychology, 67*(6), 811-825.
- Keenan, K., & Wakschlag, L. S. (2000). More than the terrible twos: The nature and severity of behavior problems in clinic-referred preschool children. *Journal of Abnormal Child Psychology, 28*(1), 33-46.
- Lee, C. Y., August, G. J., Realmuto, G. M., Horowitz, J. L., Bloomquist, M. L., & Klimes-Dougan, B. (2008). Fidelity at a distance: Assessing implementation fidelity of the Early Risers Prevention Program in a going-to-scale intervention trial. *Prevention Science, 9*(3), 215-229.
- Mihalic, S. (2004). The importance of implementation fidelity. *Emotional and Behavioral Disorders in Youth, 4*, 83-105.
- Moncher, F. J., & Prinz, R. J. (1991). Treatment fidelity in outcome studies. *Clinical Psychology Review, 11*(3), 247-266.
- Mowbray, C. T., Holter, M. C., Teague, G. B., & Bybee, D. (2003). Fidelity criteria: Development, measurement, and validation. *American Journal of Evaluation, 24*(3), 315-340.

- Nicholson, B., Brenner, V., & Fox, R. (1999). A community-based parenting program with low-income mothers of young children. *Families in Society: The Journal of Contemporary Human Services, 3*, 247-253.
- Perepletchikova, F., & Kazdin, A. E. (2005). Treatment integrity and therapeutic change: Issues and research recommendations. *Clinical Psychology: Science and Practice, 12*(4), 365-383.
- Perepletchikova, F., Treat, T. A., & Kazdin, A. E. (2007). Treatment integrity in psychotherapy research: Analysis of the studies and examination of the associated factors. *Journal of Consulting & Clinical Psychology, 75*(6), 829-841.
- Prinz, R. J., & Sanders, M. R. (2007). Adopting a population-level approach to parenting and family support interventions. *Clinical Psychology Review, 27*(6), 739-749.
- Resnick, B., Galik, E., Pretzer-Aboff, I., Gruber-Baldini, A., Russ, K., Cayo, J., et al. (2009). Treatment fidelity in nursing home research: The Res-Care intervention study. *Research in Gerontological Nursing, 2*(1), 30-38.
- Resnick, B., Bellg, A. J., Borrelli, B., DeFrancesco, C., Breger, R., Hecht, J., et al. (2005). Examples of implementation and evaluation of treatment fidelity in the BCC studies: Where we are and where we need to go. *Annals of Behavioral Medicine, 29*(SpecSuppl), 46-54.
- Rogers Wiese, M. R. (1992). A critical review of parent training research. *Psychology in the Schools, 29*(3), 229-236.
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
- Rubin, D. (1987). *Multiple Imputations for Nonresponses in Surveys*. New York: John Wiley and Sons.
- Santacroce, S. J., Maccarelli, L. M., & Grey, M. (2004). Intervention fidelity. *Nursing Research, 53*(1), 63-66.

Stein, K. F., Sargent, J. T., & Rafaels, N. (2007). Intervention research: Establishing fidelity of the independent variable in nursing clinical trials. *Nursing Research, 56*(1), 54-62.

Zvoch, K. (2009). Treatment fidelity in multisite evaluation: A multilevel longitudinal examination of provider adherence status and change. *American Journal of Evaluation, 30*(1), 44-61.

Figure and Table Legend

Figure 1: Mean Adherence Ratings (n = 9) over Time

Figure 2: Mean Competence Ratings (n = 9) over Time

Table 1: CPP Group Level Data

Table 2: Pearson r Correlations of Adherence and Competence Scales with Intervention Outcome (n=9)

Table 1

## CPP Group Level Data

Group	Group enrollment	Group Attendance <sup>1</sup>		Adherence Scale Score <sup>2</sup>		Competence Scale Score <sup>3</sup>		Group Participant Weekly Satisfaction <sup>4</sup>		Group Participant Engagement <sup>5</sup>	
		M	SD	M	SD	M	SD	M	SD	M	SD
A	14	0.45	0.35	0.94	0.07	2.86	0.14	3.72	0.51	3.29	1.26
B	11	0.69	0.22	0.94	0.10	2.45	0.10	3.62	0.50	3.75	0.46
C	19	0.38	0.30	0.74	0.22	2.45	0.15	3.71	0.49	2.88	0.74
D	12	0.42	0.29	0.82	0.19	2.77	0.13	3.60	0.54	2.75	0.51
E	18	0.48	0.45	0.92	0.15	2.30	0.13	3.46	0.55	2.97	1.00
F	7	0.49	0.44	0.94	0.06	2.73	0.16	4.0	0.0	3.43	.90
G	5	0.38	0.37	0.95	0.07	2.80	0.11	3.89	0.32	3.29	.86
H	14	0.62	0.34	0.87	0.16	2.51	0.15	3.66	0.51	3.42	.75
I	3	0.61	0.53	0.87	0.13	2.72	0.08	3.88	0.39	3.79	.10

Note. <sup>1</sup> Attendance reported as percent of 12 sessions attended; <sup>2</sup> Adherence Scale scored as 0 (not observed) or 1 (observed); <sup>3</sup> Competence Scale scored on a 3-

point scale with higher scores indicating greater competence; <sup>4</sup> Satisfaction rated on a 4-point scale with higher scores indicating greater parent satisfaction;

<sup>5</sup> Engagement rated on a 4-point scale with higher scores indicating greater parent engagement in the parent groups.

Table 2

Pearson r Correlations of Adherence and Competence Scales with Intervention Outcome (n = 9)

---

	M Attendance	M Satisfaction	M Engagement
M Adherence	.45* <sup>^</sup>	.19	.50* <sup>^</sup>
M Competence	-.13	.64** <sup>^</sup>	.10

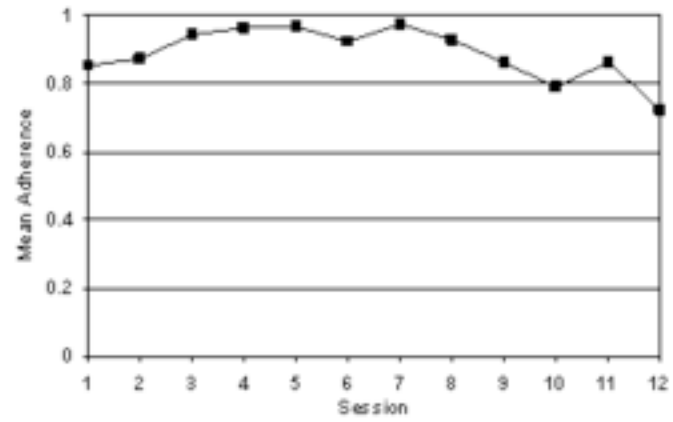
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Note. \* p < 0.10 level, \*\*p < .05, <sup>^</sup> large correlation effect size (Cohen, 1988, p. 80)



Figure 1

Mean Adherence Ratings (n = 9) over Time



# Figure

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Figure 2:

Mean Competence Ratings (n = 9) over Time

