

Technical Report

Validity Psychometrics of the Parent and Child Together and the Child Behavior Traits Measures

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Validity Psychometrics of the Parent and Child Together (PACT) and the Child Behavior Traits (CBT) Measures Across Two Samples in a Low-income Urban Context

OVERVIEW | Purpose of Study

The Parent Child Home Program is a home-based early childhood intervention program that aims at improving young children's school readiness skills and parent behaviors. As part of their program model, PCHP uses the Parent and Child Together (PACT) and Child Behavior Traits (CBT) to track and monitor both positive parenting practices and children's developmental progress across two program years. These tools are utilized across all sites and in different contexts. Although these tools are widely used, there is a need to explore the psychometric properties of the PACT and CBT with low-income urban Black and Latino parent-child dyads.

The current study aims to explore the following across two samples: (1) exploratory factor analysis (EFA) of PACT and CBT to assess the structural validity of the measures and (2) determine the extent to which PACT and CBT measures predict to school readiness and positive parenting practice constructs. Differences in results from the psychometric properties of the measures across the Black and Latino parent-child dyads are noted and discussed. Discrepancies across samples are interpreted from a sociocultural perspective and will inform the extent of the generalizability of these measures.

FRAMEWORK | PACT & CBT History

The PACT and CBT measures have been used for the purposes of internal program progress and evaluation for PCHP. The PACT is a 20-item home-visitor report measure assessing the frequency of positive parent-child interactions by using a 5-point Likert scale. The twenty items are classified in four domains: (1) parent's responsiveness to the child; (2) affection towards the child; (3) communication with the child; and (4) consistency with child. The CBT is also a 20-item home-visitor report measure assessing the frequency of positive child behaviors and interactions with materials by using a 5-point Likert scale. The twenty items are classified in five domains: (1) independence; (2) social cooperation; (3) cognitive abilities; (4) emotional stability; and (5) task orientation.

The PACT measure instructs home visitors to select the "frequency" of a particular statement indicating the best description of the child during home visits throughout the past 3 weeks. The home visitor is instructed to use their overall knowledge of the observed parent-child interactions to inform their decision. Frequency is measured by: (0) Never; (1) Rarely (less than half of home visits); (2) Sometimes (about half of the home visits); (3) Often (more than half of the home visits); (4) Always (every home visit). A higher score indicates more favorable parent-child interactions across all items. Sample items from the PACT measure include statements such as "parent shows warmth towards child" and "parent verbalizes affection towards the child."

Similarly, the CBT measure instructs home visitors to indicate the "frequency" observed for child behaviors. Frequency is measured by the following code: (0) Never; (1) Rarely (less than half of home visits); (2) Sometimes (about half of the home visits); (3) Often (more than half of the home visits); (4) Always (every home visit). A higher score indicates more favorable child behaviors across all items. Child-centered items from the CBT measure include statements such as "attentive and concentrated on activities for up to 3 minutes" and "approaches play in a systematic way."

RESEARCH QUESTIONS

1. Which constructs are formed from items on each measure (PACT, CBT), independently for the two samples? How do these constructs inform the structural validity of each measure?
2. How do the constructs from each measure (PACT, CBT) predict later parent-child interactions and child-level outcomes measured through criterion referenced and norm referenced direct assessments of child school readiness skills and parenting practices? How does the relationship between the constructs and other measures of parent-child interactions and child interactions and behaviors inform the predictive validity of each measure across each sample?
3. What differences are noted from the results on structural validity and the predictive validity of each measure across the two samples?

METHODS

Sample Characteristics

Study1 consisted of n = 93 caregiver-child dyads. Approximately half of the caregivers identified themselves as immigrant (50.5%). The ethnic identity of the sample consisted of African-American (16.1%), Afro-Caribbean (34.4%), Latino (38.7%), Asian (1.1%) and other (1.1%). At baseline, caregivers indicated their level of education, employment status, marital status, and annual income . See Table 1 for details regarding the full characteristics of the sample in Study 1.

Study 2 consisted of n = 77 caregiver-child dyads. All caregivers in the sample identified themselves as Latino and immigrant. See Table 2 for details regarding the full characteristics of the sample in Study 2.

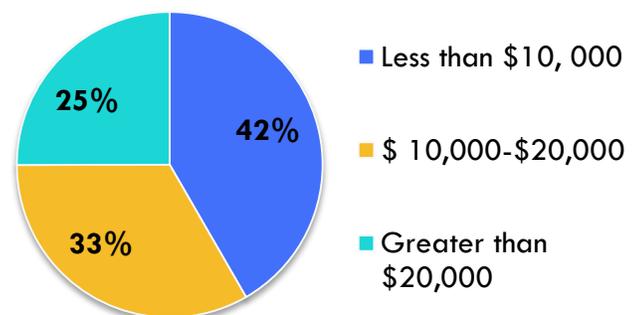
At the time that the PACT and CBT scores were collected (post-program year one), children were M = 2.94 years of age (SD = 0.42) for Study 1 and M = 3.13 (SD = 0.34) for Study 2. For the predictive validity aspect of the study, PACT and CBT factor scores were correlated with school-readiness and parenting practices outcomes when children were M = 3.58 (SD = 0.43) for Study 1 and M = 3.79 (SD = 0.39) for Study 2.

DATA & DESIGN

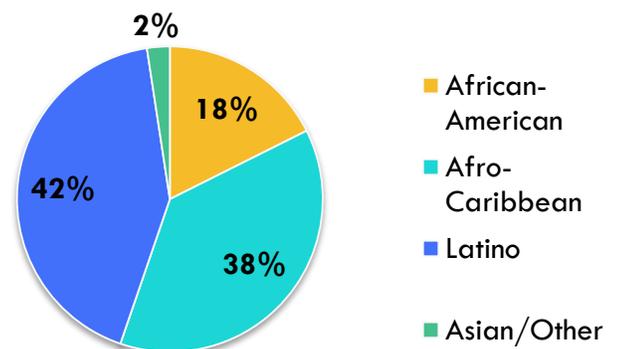
The PACT and CBT measures are ongoing evaluations of child and parent-child interactions. Post-program year one time point was used to assess the psychometric properties of the measures across two distinct samples. This time point reflects the time when most families received approximately 36 home visits, or after one year post-intervention, whichever came first. Additional data on the participants was available from a larger, longitudinal study evaluating the impact of PCHP (i.e., measures of school readiness and parenting practices). Additional data includes parent-report of child behavior, direct child assessments, and parent surveys collected one year post-program intervention.

DEMOGRAPHICS | Study 1

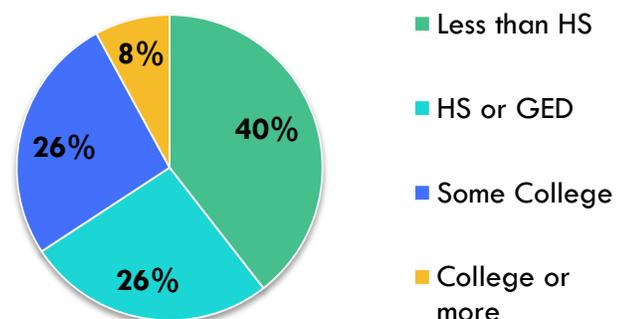
Annual Household Income



Parent Ethnicity

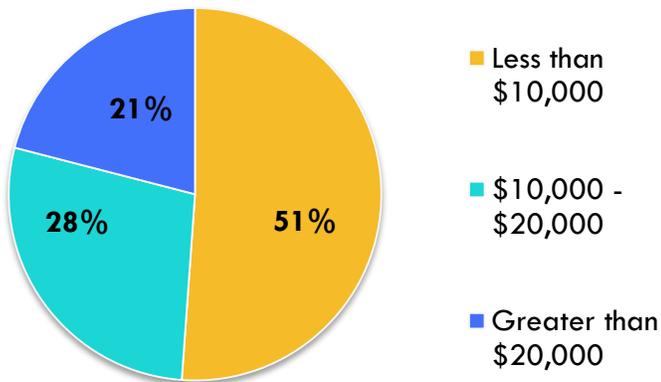


Parent Level of Education

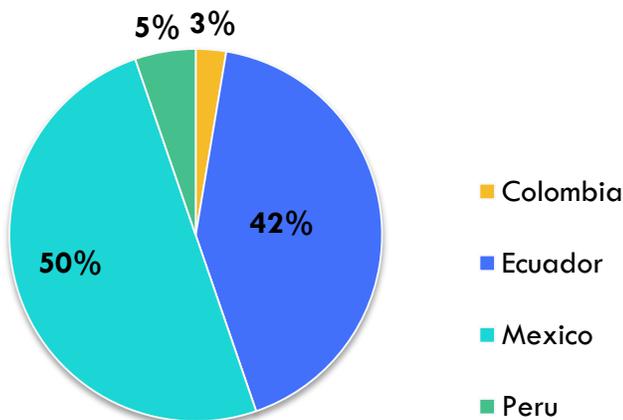


DEMOGRAPHICS | Study 2

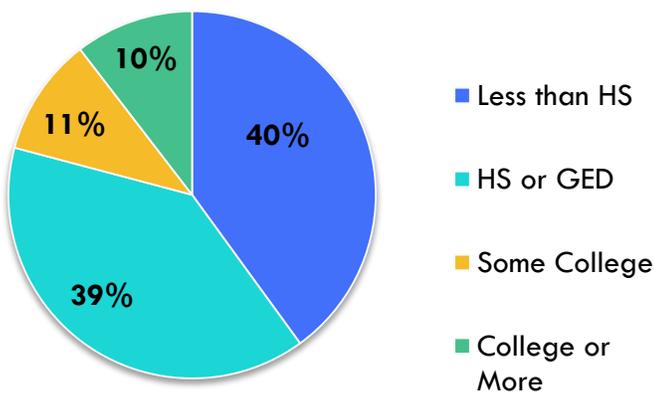
Annual Household Income



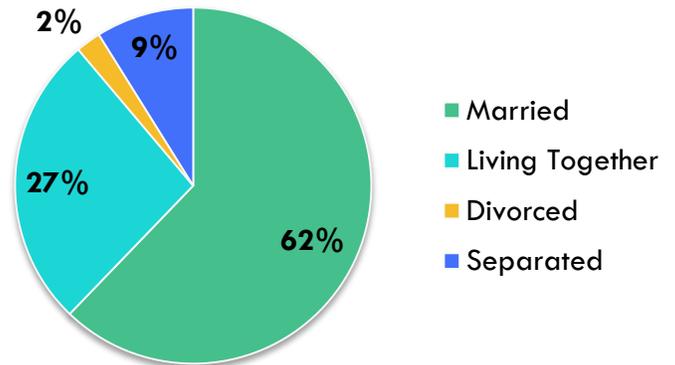
Parent Country of Birth



Parent Level of Education



Marital Status



DATA CLEANING

Data cleaning processes included (1) matching program year data and (2) data-entry check. Data sheets were provided by two separate community-based organizations (CBOs) for each study sample (Study 1 and Study 2). The PACT and CBT data sheets included the score indications for each item, date of assessment, and time point of assessment (e.g., pre-program year 1, post-program year 1). Some of the data sheets did not indicate which time point data was collected. In this case, the date of assessment was matched to a dataset that indicates the number of home visits each family received and the dates of those visits (referred to as face-sheet data). The face sheet data helped inform when the family completed their first program year, which is the time point used for this validation study. Individual data from the PACT and CBT measures was entered into SPSS for each study. After the data were entered, there was a data-entry check protocol that was followed. This included (1) randomly selecting 10% of the cases for each measure for each study sample, (2) re-entering the data for those cases, (3) matching the re-entered data to the original database, and (4) noting any discrepancies. Data-entry check did not indicate any discrepancies between the original dataset and the re-entered data. As a result, the original data set was used for analysis.

OUTCOME MEASURES

Standardized and non-standardized measures of parenting beliefs and practices, child language comprehension, child social-emotional competency, and child self-regulation were used to compare to the PACT and CBT. Spanish versions of assessments were administered if the family was receiving the home intervention in Spanish. Spanish versions of the Parent as a Teacher Inventory, Ages & Stages Questionnaire: SE, Preschool Language Scale- 4 were obtained from the publishers. The self-regulation measures (Day/Night, Tower Turn Taking, and Tower Cleanup Delay) were translated into Spanish by the research team.

Parent beliefs about children's learning. To assess this outcome, the Parent as a Teacher Inventory (PAAT) (Strom, 1995) was administered. The PAAT is questionnaire measuring parental attitudes for young children that includes English- and Spanish-language translations. The five subscales included in this measure are: creativity, frustration, control, play, and teaching/learning. The creativity subscale captures parental acceptance of the child's creativity as well as the parent's willingness to encourage this behavior. The frustration subscale measures a parent's tolerance for their child's behaviors that they deem appropriate for their age (higher scores indicate less tolerance and more frustration). The control subscale assesses parents' willingness to share control with their child with regards to learning, play, and conversation. The play subscale gauges parents' understanding of their role in play and well as their willingness to engage with their children during playtime. The teaching and learning subscale taps parents' understanding of their children's development and perception of their ability to provide a supportive home environment. This measure has been used with diverse, low-income populations and high reliability with parents from diverse backgrounds.

Child language competence. This outcome was assessed with the Preschool Language Scale – 4th Edition (PLS-4) (Zimmerman, Steiner, & Pond, 2000). The PLS-4 is an individually administered test used with children from birth through six years of age, and it includes an English- and Spanish-language version of the assessment. It measures two components of language: expressive communication (PLS Expressive Communication) and auditory comprehension (PLS Auditory Comprehension) (standard scores for each language component were computed and used in the analysis).

Child self-regulation. Self-regulation was assessed using three tasks adapted from two batteries: the Preschool Self- Regulation Assessment (PRSA) (Smith-Donald, Raver, Hayes, & Richardson, 2007) and Effortful Control Batteries (Kochanska, Coy, & Murray, 2001). These tasks, Tower Turn-taking, Tower Cleanup Delay, and Day-Night, were designed to measure children's executive control. In the Tower Turn-taking task children take turns with the examiner, using blocks, to build a tower. Tower turn-taking was scored as 0 = child took no turns or 1 = child took at least one turn. In the two-minute Tower Cleanup Delay task, children were asked to "clean up the blocks" by placing them in a bag. Those children that did not begin nor complete the task, had their wait time added to their delay score. The lower scores in Tower Cleanup Delay task, indicate more executive control. The Day-Night score is a total score combined from several trials of rule-switching e.g. say "night" when they see a picture of the day. Here, a higher score indicates more executive control.

Child social-emotional competence. The Ages & Stages Questionnaires: SE was introduced to measure social-emotional competence. The domains captured child self-regulation, compliance, communication, adaptive functioning, autonomy, affect, and interaction with people. Parents are asked how often the child displays each behavior (most of the time, sometimes, or rarely/never) and "how concerned" they are about each behavior. Total scores are calculated, which indicate children's social competence as a reflection of parent report (ASW Total). Additionally, based on the cut-off scores for each age range, children can be classified as falling in a possible problem range or not (ASQ Possible Problem Behavior range; 0 = no, 1 = yes).

| Constructs | Outcome Measures |
|-----------------------------|---|
| Parenting | Parent as a Teacher |
| Child Language | Preschool Language Scale, 4 th edition |
| Self-Regulation | Preschool Self-Regulation Assessment |
| | Kochanska Effortful Control Tasks |
| Social-Emotional Competence | Ages & Stages-SE Questionnaire |

ANALYTIC PLAN

In order to assess the structural validity of the PACT and CBT measures, first, reliability statistics within each construct/domain were evaluated to determine the relationship between the items in each construct. Additionally, the analysis tested the number of dimensions of each measure by conducting EFA using MPLUS Version 7.0.

In an effort to identify the number of factors, an oblique rotation (geomin) was used, which derive factor loadings under the assumption that factors are correlated with one another (Costello & Osborne, 2005). The Maximum Likelihood (ML) estimation extraction method for EFA provided several model fit indices. The three predominantly accepted model fit indices include the root mean square of error (RMSEA), standardized root mean square residual (SRMSR) and confirmatory fit index (CFI) (Hu & Bentler, 1999; Kline, 2005). The accepted cut-off point of model fit for the RMSEA statistic has an upper limit of 0.07 (Steiger, 2007), a lower limit of CFI \geq 0.95 (Hu & Bentler, 1999), and values of less than 0.05 for the SRMR suggest well-fitted models (Byrne, 1998).

Although these are guidelines for accepting models that fit the data, these indices can be used to compare “model fit” across models with different numbers of factor extractions. As a result, accepted models may not meet the above thresholds but accepted models indicate the model that best fits the data. Limitations and implications of such strategy are discussed below. Indicators that had a factor loading $\lambda \geq$ 0.5 were included as an item in the factor. Items that double loaded or did not load were excluded from subsequent analyses.

The results from the EFA inform the second research question: Do the constructs measured by the PACT and CBT predict later parenting practices and child outcomes in several learning domains? First, composites were created for each construct. The factor scores were computed using weighted sum scores. Weighted sum scores are created by using the factor loading of each item and multiplying it to the scaled score for each item. The weighted sum factor scores provide an advantage over non-refined computations of factor scores because they take into account the strength of each indicator and factor loading (DiStefano, Zhu, & Mindrila, 2009).

Next, the magnitude of the relationship between the factors that the CBT and PACT are measuring (e.g. child’s social-emotional competence, positive parenting practices) was associated with scores that are conceptually relevant to those measures (i.e. self-regulation, social-emotional behaviors, parenting practices). A correlation matrix using IBM SPSS Statistics Version 21 was generated to evaluate the extent of the predictive validity of the PACT and CBT measures. Bivariate correlations were run between the factors of the PACT and CBT and the outcome measures by controlling for child age (in months).

RESULTS | Structural Validity Study 1

CBT Measure. By considering multiple model fit indices, the factor solution for the CBT measure in Study 1 indicated a 2-factor solution; chi squared test of model fit $\chi^2(151) = 276.77$; $p < .001$, RMSEA = 0.112 with 95% CI [0.091, 0.133], and SRMR = 0.07. The correlation between the two factors was $r = 0.721$, $p < .05$. Five indicators loaded on Factor 1 and 8 indicators loaded on Factor 2 (see Table 3).

Factor 1 (*Child Agency*) was composed of the following items: (1) Can describe in words or sentences the pictures in a book, (2) Initiates positive activities, (3) Asserts ownership over toys and possessions, (4) Is creative and inventive during playtime activities, and (5) Expresses a sense of pride by smiling or clapping upon completion of a new activity.

Factor 2 (*Child Social-emotional Competence*) was composed of the following items: (1) Smiles and laughs when involved in play activities, (2) Understands and completes activities that are developmentally appropriate, (3) Accepts or seeks help, (4) Expresses strong positive or negative feelings appropriately, (5) Follows necessary rules in family setting, (6) Tolerates necessary frustration, (7) Demonstrates sharing and tolerates delays in having needs met, and (8) Moods are appropriate to situations. The two factor model proposes differences from the originally conceptualized subscales of the CBT measure. For example, although children's "emotional" and "social" traits are captured through the Child Social-emotional Competence factor, other conceptualized subscales such as "Cognitive Abilities" are reflected within the Child Agency factor for this sample.

PACT Measure. The factor solution for the PACT measure in Study 1 indicated a 3-factor solution; chi squared test of model fit $\chi^2(133) = 230.32$; $p < .001$, RMSEA = 0.107 with 95% CI [0.083, 0.130], and SRMR = 0.052. The correlation between Factor 1 and Factor 2 was $r = 0.543$, $p < .05$, $r = 0.178$, $p < .05$ between Factor 1 and Factor 3, and $r = -0.056$, n.s., between Factor 2 and Factor 3. Five indicators loaded on Factor 1, 6 indicators loaded on Factor 2, and 4 indicators loaded on Factor 3 (see Table 4).

Factor 1 (*Parental Discipline*) was composed of the following items: (1) Parent clearly verbalizes expectations to the child, (2) Parent explains rationale for directions/expectations to the child, (3) Parent verbalizes affection toward the child, (4) Parent provides a verbal rationale for obedience, and (5) Parent listens to child's reaction to a directive and reacts appropriately.

Factor 2 (*Parental Responsivity*) was composed of the following items: (1) Parent responds verbally to child's verbal or non-verbal request for attention, (2) Parent shows warmth toward child (3) Parent satisfies child's needs, signaled verbally or non-verbally, (4) Parent trains child to perform age appropriate activities, (5) Parent comforts child, and (6) Parent smiles, nods, or shows approval in some way when child acts positively.

Factor 3 (*Parental Control*) was composed of the following items: (1) Parent gives child directions and encourages child to follow them, (2) Parent's directions gain the child's attention, (3) Parent is firm with child, and (4) Parent is persistent and consistent in enforcing directions. There is some consistency between the constructs defined from the structural validity results of the measure and the initial conceptualization of the subscales of the PACT. The PACT subscales may be measuring "responsiveness" and "consistency with child," which is similar to the Parental Responsivity and Parental Control factors. However, the loadings as per the factor analysis noted inconsistencies between the loading items and the items initially indicated on the "Subscales and Directions for Assessment" report of the PACT assessment.

RESULTS | Structural Validity Study 1 CBT

Table 3

Study 1 Factor Loadings for the CBT (N =66)

| | Factor 1 Loading | Factor 2 Loading |
|---|-------------------------|-------------------------|
| Factor 1 – Child Agency | | |
| 4. (Can) describe in words or sentences the pictures in a book | 0.631* | 0.225 |
| 5. Initiates positive activities | 0.910* | 0.003 |
| 11. Asserts ownership over toys and possessions | 0.759* | -0.428* |
| 13. Is creative and inventive during playtime activities | 0.646* | 0.222 |
| 15. Expresses a sense of pride by smiling or clapping upon completion of a new activity | 0.586* | 0.324* |
| Factor 2 – Child Social-emotional Competence | | |
| 2. Smiles and laughs when involved in play activities | 0.167 | 0.562* |
| 10. Understands and completes activities that are developmentally appropriate | 0.420* | 0.515* |
| 6. Accepts or seeks help | -0.005 | 0.710* |
| 9. Expresses strong positive or negative feelings appropriately | -0.266 | 1.069* |
| 12. Follows necessary rules in family setting | 0.163 | 0.656* |
| 14. Tolerates necessary frustration | 0.077 | 0.804* |
| 17. Demonstrates sharing and tolerates delays in having needs met | 0.019 | 0.763* |
| 19. Moods are appropriate to situations | 0.004 | 0.860* |
| Non-loading/Double-loading | | |
| 1. Approaches play in a systematic way | 0.456* | 0.341* |
| 3. Does not hit, poke, or bite others | -0.069 | 0.397 |
| 7. Is cooperative with adults | 0.119 | 0.360* |
| 18. Avoids everyday dangers | 0.244 | 0.056 |
| 20. Attentive and concentrates on activities for up to 3 minutes | 0.362* | 0.303 |
| 16. Initiates interaction or responds to others with little hesitation | 0.296 | 0.391* |
| 8. Participates in pretend playtime activities | 0.407* | 0.459* |

Note. Items were considered indicators of a factor if they loaded at 0.50 or greater. Asterisk (*) indicates significant factor loading at the $p \leq 0.05$ level. Numbers in front of each indicator note the item number on the original measure.

RESULTS | Structural Validity Study 1 PACT

Table 4

Study 1 Factor Loadings for the PACT (N =64)

| | Factor 1 Loading | Factor 2 Loading | Factor 3 Loading |
|--|------------------|------------------|------------------|
| Factor 1 – Parental Discipline | | | |
| 6 .Parent clearly verbalizes expectations to the child | 0.761* | 0.048 | 0.131 |
| 7. Parent explains rationale for directions/expectations to the child | 0.837* | -0.003 | 0.175 |
| 8. Parent verbalizes affection toward the child | 0.665* | -0.023 | 0.060 |
| 18. Parent provides a verbal rationale for obedience | 0.789* | -0.052 | -0.007 |
| 19. Parent listens to child’s reaction to a directive and reacts appropriately | 0.584* | 0.064 | 0.112 |
| Factor 2 – Parental Responsivity | | | |
| 2. Parent responds verbally to child’s verbal or non-verbal request for attention | 0.207 | 0.716* | -0.013 |
| 4. Parent shows warmth toward child | -0.005 | 0.868* | 0.129 |
| 12. Parent satisfies child’s needs, signaled verbally or non-verbally | 0.070 | 0.723* | -0.132 |
| 15. Parent trains child to perform age appropriate activities | 0.314* | 0.519* | 0.065 |
| 16. Parent comforts child | -0.006 | 0.819* | 0.104 |
| 20. Parent smiles, nods, or shows approval in some way when child acts positively | -0.013 | 0.938* | 0.103 |
| Factor 3 – Parental Control | | | |
| 1. Parent gives child directions and encourages child to follow them | 0.264* | 0.014 | 0.669* |
| 9. Parent’s directions gain the child’s attention | -0.011 | 0.033 | 0.728* |
| 17. Parent is firm with child | 0.308* | -0.069 | 0.686* |
| 13. Parent is persistent and consistent in enforcing directions | 0.008 | 0.081 | 0.921* |
| Non-loading/Double-loading | | | |
| 10. Parent verbalizes approval of the child | 0.430* | 0.495* | -0.126 |
| 11. Parent encourages child to perform activities that the child can do independently | 0.349* | 0.474* | 0.030 |
| 3. Parent does not help child with tasks that the parent knows the child is able to do for him/herself | 0.451* | -0.032 | -0.017 |
| 14. Parent tries to converse with child | 0.494* | 0.461* | -0.049 |
| 11. Parent encourages child to perform activities that the child can do independently | 0.349* | 0.474* | 0.030 |
| 5. Parent does not yell, nag, or use harmful words with the child | 0.191 | 0.077 | -0.371* |

Note. Items were considered indicators of a factor if they loaded at 0.50 or greater. Asterisk (*) indicates significant factor loading at the $p \leq 0.05$ level. Numbers in front of each indicator note the item number on the original measure.

RESULTS | Structural Validity Study 2

CBT Measure. The factor solution for the CBT measure in Study 1 indicated a 2-factor solution; chi squared test of model fit $\chi^2(151) = 280.21$; $p < .001$, RMSEA = 0.107 with 95% CI [0.087, 0.126], and SRMR = 0.067. The correlation between the two factors was $r = 0.6$, $p < .05$. Seven indicators loaded on Factor 1 and 4 indicators loaded on Factor 2 (see Table 5).

Factor 1 (*Child Engagement in Play and Activities*) was composed of the following items: (1) Approaches play in a systematic way, (2) Can describe in words or sentences the pictures in a book, (3) Initiates positive activities, (4) Asserts ownership over toys and possessions, (5) Is creative and inventive during playtime activities, (6) Participates in pretend playtime activities, and (7) Understands and completes activities that are developmentally appropriate.

Factor 2 (*Child Social-emotional Competence*) was composed of the following items: (1) Is cooperative with adults, (2) Tolerates necessary frustration, (3) Demonstrates sharing and tolerates delays in having needs met, and (4) Moods are appropriate to situations. The “social” and “emotional” subscales re-emerge in the structural validity results of the CBT measure for Study 2. However, the item loadings for the Child Social-emotional Competence factor are somewhat inconsistent with the “Social Cooperation” and “Emotional Stability” subscales. More specifically, the Child Social-emotional Competence factor includes half of the items that were theorized to be indicated by the two subscales. Additionally, the Child Engagement in Play and Activities factor combines items from the initially theorized “Independence,” “Cognitive Abilities,” and “Task Orientation” subscales.

PACT Measure. The factor solution for the PACT measure in Study 1 indicated a 3-factor solution; chi squared test of model fit $\chi^2(133) = 202.18$; $p < .001$, RMSEA = 0.084 with 95% CI [0.059, 0.106], and SRMR = 0.048. The correlation between Factor 1 and Factor 2 was $r = 0.381$, $p < .05$, $r = 0.333$, $p < .05$ between Factor 1 and Factor 3, and $r = 0.262$, $p < .05$ between Factor 2 and Factor 3. Eleven indicators loaded on Factor 1, 3 indicators loaded on Factor 2, and 3 indicators loaded on Factor 3 (see Table 6).

Factor 1 (*Parental Discipline*) was composed of the following items: (1) Parent gives child directions and encourages child to follow them, (2) Parent responds verbally to child’s verbal or non-verbal request for attention, (3) Parent clearly verbalizes expectations to the child, (4) Parent explains rationale for directions/expectations to the child, (5) Parent’s directions gain the child’s attention, (6) Parent verbalizes approval of the child, (7) Parent is persistent and consistent in enforcing directions, (8) Parent tries to converse with child, (9) Parent provides a verbal rationale for obedience, (10) Parent listens to child’s reaction to a directive and reacts appropriately, and (11) Parent is firm with child.

Factor 2 (*Parent Affection*) was composed of the following items: (1) Parent shows warmth toward child, (2) Parent verbalizes affection toward the child, and (3) Parent comforts child.

Factor 3 (*Parental Responsivity*) was composed of the following items: (1) Parent satisfies child’s needs, signaled verbally or non-verbally, (2) Parent trains child to perform age appropriate activities, and (3) Parent smiles, nods, or shows approval in some way when child acts positively. The Parental Affection factor only includes 3 items from the originally conceptualized 6-item subscale of “Affection Toward the Child.” The Parental Responsivity factor includes items from the “Affection Toward the Child” subscale as well as the “Consistency with the Child” subscale. Finally, the Parental Discipline subscale includes a combination of items initially included across each one of the 4 PACT subscales (Parent’s Responsiveness to the Child, Affection Toward the Child, Communication with the Child, and Consistency with the Child).

RESULTS | Structural Validity Study 2 CBT

Table 5

Study 2 Factor Loadings for the CBT (N =75)

| | Factor 1 Loading | Factor 2 Loading |
|---|------------------|------------------|
| Factor 1 – Child engagement in play and activities | | |
| 1. Approaches play in a systematic way | 0.624* | 0.091 |
| 4. (Can) describe in words or sentences the pictures in a book | 0.751* | 0.104 |
| 5. Initiates positive activities | 0.618* | 0.167 |
| 11. Asserts ownership over toys and possessions | 0.538* | -0.243 |
| 13. Is creative and inventive during playtime activities | 0.804* | -0.003 |
| 8. Participates in pretend playtime activities | 0.608* | 0.143 |
| 10. Understands and completes activities that are developmentally appropriate | 0.878* | -0.097 |
| Factor 2 – Child social-emotional competence | | |
| 7. Is cooperative with adults | 0.117 | 0.656* |
| 14. Tolerates necessary frustration | -0.120 | 0.842* |
| 17. Demonstrates sharing and tolerates delays in having needs met | 0.002 | 0.817* |
| 19. Moods are appropriate to situations | 0.036 | 0.726* |
| Non-loading/double-loading | | |
| 18. Avoids everyday dangers | -0.171 | 0.429* |
| 12. Follows necessary rules in family setting | 0.273* | 0.488* |
| 6. Accepts or seeks help | 0.162 | 0.436* |
| 15. Expresses a sense of pride by smiling or clapping upon completion of a new activity | 0.351* | 0.415* |
| 16. Initiates interaction or responds to others with little hesitation | 0.067 | 0.295 |
| 2. Smiles and laughs when involved in play activities | 0.393* | 0.297* |
| 3. Does not hit, poke, or bite others | -0.348* | 0.371* |
| 9. Expresses strong positive or negative feelings appropriately | 0.353* | 0.321* |
| 20. Attentive and concentrates on activities for up to 3 minutes | 0.462* | 0.352* |

Note. Items were considered indicators of a factor if they loaded at 0.50 or greater. Asterisk (*) indicates significant factor loading at the $p \leq 0.05$ level. Numbers in front of each indicator note the item number on the original measure.

RESULTS | Structural Validity Study 2 PACT

Table 6

Study 2 Factor Loadings for the PACT (N =74)

| | Factor 1 Loading | Factor 2 Loading | Factor 3 Loading |
|--|------------------|------------------|------------------|
| Factor 1 – Parental Discipline | | | |
| 1. Parent gives child directions and encourages child to follow them | 0.724* | 0.131 | 0.058 |
| 2. Parent responds verbally to child’s verbal or non-verbal request for attention | 0.637* | 0.080 | -0.008 |
| 6. Parent clearly verbalizes expectations to the child | 0.947* | 0.017 | -0.175 |
| 7. Parent explains rationale for directions/expectations to the child | 0.877* | 0.001 | -0.067 |
| 9. Parent’s directions gain the child’s attention | 0.546* | 0.004 | 0.209 |
| 10. Parent verbalizes approval of the child | 0.512* | 0.209 | 0.200 |
| 13. Parent is persistent and consistent in enforcing directions | 1.015* | -0.192* | -0.137 |
| 14. Parent tries to converse with child | 0.571* | 0.167 | 0.252 |
| 18. Parent provides a verbal rationale for obedience | 0.842* | -0.056 | 0.014 |
| 19. Parent listens to child’s reaction to a directive and reacts appropriately | 0.782* | -0.136 | 0.120 |
| 17. Parent is firm with child | 0.871* | -0.206* | 0.000 |
| Factor 2 – Parent Affection | | | |
| 4. Parent shows warmth toward child | -0.005 | 0.935* | 0.018 |
| 8. Parent verbalizes affection toward the child | 0.234 | 0.680* | -0.276* |
| 16. Parent comforts child | -0.004 | 0.662* | 0.352* |
| Factor 3 – Parental Responsivity | | | |
| 12. Parent satisfies child’s needs, signaled verbally or non-verbally | 0.099 | 0.061 | 0.612* |
| 15. Parent trains child to perform age appropriate activities | 0.476* | 0.020 | 0.547* |
| 20. Parent smiles, nods, or shows approval in some way when child acts positively | 0.203 | -0.038 | 0.694* |
| Non-loading/double loading | | | |
| 11. Parent encourages child to perform activities that the child can do independently | 0.462* | -0.011 | 0.352* |
| 3. Parent does not help child with tasks that the parent knows the child is able to do for him/herself | 0.272* | 0.146 | 0.047 |
| 5. Parent does not yell, nag, or use harmful words with the child | 0.054 | -0.072 | 0.161 |

Note. Items were considered indicators of a factor if they loaded at 0.50 or greater. Asterisk (*) indicates significant factor loading at the $p \leq 0.05$ level. Numbers in front of each indicator note the item number on the original measure.

PREDICTIVE VALIDITY | Study 1

Study 1 CBT Measure. Results indicated that Child Agency of the CBT measure is related to several child outcome measures and a parent outcome measure. Factor 1 is correlated with children's expressive language skills (PLS Expressive Communication; $r = .318, p = 0.046$), related to children's inhibition skills (Day and Night Task; $r = .359, p = 0.011$), and related to children's behavior competencies where a negative correlation means less concern with problem behaviors (ASQ Possible Problem Behaviors (yes/no); $r = -.318, p = 0.026$). Child Agency is also related to the PAAT Play subscale; $r = .334, p = 0.019$, an indicator of the caregiver's willingness to engage in play activities with their child. Child agency as a construct emerging from this sample involves the child engaging with play activities, initiating activities, and describing words or sentences in the pictures in a book, among other indicators. This construct should theoretically be related to children's expressive communication skills, inhibition skills, and less problem behaviors as shown by the statistical findings in these correlations. Child Social-emotional Competence, Factor 2, was not significantly correlated with any outcome measures. This construct should theoretically be able to predict children's social-emotional skills as measured by the ASQ Total score (greater score indicates greater social skills) as well as ASQ Possible Problem Behaviors (where a negative correlation would indicate that the higher the factor score on Child Social-emotional Competence, the less concern with the child being in the possible problem behavior range). Table 7 reports all correlation results between the factors of the CBT measure in Study 1 and the outcome measures.

Study 1 PACT Measure. Parental Discipline of the PACT measure is significantly negatively correlated with children's ASQ Possible Problem Behaviors (yes/no); $r = -.325, p = 0.024$. Parental Discipline is related with a child outcome related to social-emotional competency but not related to a parent outcome as measured by the PAAT subscales. Parental Control of the PACT measure is significantly negatively correlated with children's ASQ Possible Problem Behaviors (yes/no); $r = -.381, p = 0.008$ as well as ASQ Total Score; $r = -.392, p = 0.006$. The Parental Control construct as emerging as a factor from this sample is negatively related with children being in the problem behavior range a year later but also negatively related with the child indicating social competencies. The two statistically significant negative correlations indicate that "parental control" inhibits associated problem behaviors but also inhibits social competencies. Additionally, the Parental Control factor should theoretically be correlated with the PAAT Control subscale as measured by the PAAT. Table 7 reports all correlation results between the factors of the PACT measure in Study 1 and the outcome measures.

PREDICTIVE VALIDITY | Study 2

Study 2 CBT Measure. Child Social-emotional Competence of the CBT measure is significantly negatively correlated with the PAAT Frustration subscale; $r = -.377, p = 0.011$. No additional statistically significant correlations were found between Child Social-emotional Competence and the rest of the outcome measures. The Child Engagement in Play and Activities was not statistically significantly correlated with any outcome measures but is theoretically related to children's communication skills and inhibitions skills. Correlations between this factor and child-related outcomes (e.g., PLS Expressive Communication, Day-Night Task) were not found. Table 8 reports all correlation results between the factors of the CBT measure in Study 2 and the outcome measures.

Study 2 PACT Measure. The factors of the PACT measure is marginally significantly correlated with parent and child outcomes and significantly correlated with children's social competency outcomes. Marginally significant results indicated that Parental Discipline of the PACT is correlated with PAAT Frustration ($r = -.281, p = 0.061$), PAAT Control ($r = .27, p = 0.073$), and children's ASQ Total Score ($r = -.26, p = 0.085$). Parental Responsivity of the PACT is marginally significantly correlated with PAAT Control ($r = .266, p = 0.078$). Parental Responsivity of the PACT was significantly correlated with children's ASQ Possible Problem Behaviors (yes/no); $r = -.422, p = 0.004$ as well as ASQ Total Score; $r = -.335, p = 0.024$. The Parental Responsivity construct as emerging as a factor from this sample is negatively related with children being in the problem behavior range a year later but also negatively related with the child indicating social competencies. The two statistically significant negative correlations indicate that "parental responsivity" inhibits associated problem behaviors but also inhibits social competencies. Table 8 reports all correlation results between the factors of the PACT measure in Study 2 and the outcome measures.

PREDICTIVE VALIDITY | Study 1

Table 7

Correlation Matrix Between CBT and PACT Factors and Parent -Child Outcomes for Study 1 (N = 47)

| Outcome Variable | Child Agency | Child Social-emotional Competence | Parental Discipline | Parental Responsivity | Parental Control |
|---|--------------|-----------------------------------|---------------------|-----------------------|------------------|
| PAAT Creativity | .138 (.344) | -.143 (.327) | -.035 (.811) | .003 (.982) | .114 (.441) |
| PAAT Frustration | .063 (.665) | .024 (.869) | -.118 (.425) | .121 (.411) | .026 (.860) |
| PAAT Control | .073 (.618) | -.107 (.463) | .175 (.233) | .149 (.313) | .172 (.243) |
| PAAT Play | .334 (.019) | .055 (.709) | -.015 (.919) | .054 (.718) | .226 (.123) |
| PAAT Teaching | .154 (.292) | .035 (.810) | -.130 (.378) | -.088 (.554) | -.013 (.931) |
| PLS Auditory Comprehension ^a | .247 (.125) | .204 (.206) | .227 (.160) | .110 (.499) | .239 (.138) |
| PLS Expressive Communication ^a | .318 (.046) | .230 (.153) | .204 (.206) | .092 (.574) | .239 (.137) |
| Tower Turn-Taking | .092 (.528) | .199 (.171) | .148 (.314) | .161 (.273) | -.002 (.988) |
| Tower Cleanup Delay ^b | .077 (.598) | .001 (.996) | -.134 (.363) | .136 (.356) | -.089 (.546) |
| Day-Night Task | .359 (.011) | .153 (.294) | .190 (.195) | .153 (.298) | .117 (.430) |
| ASQ Possible Problem Behaviors ^c | -.318 (.026) | .026 (.861) | -.325 (.024) | -.155 (.294) | -.381 (.008) |
| ASQ Total Score | -.114 (.434) | .125 (.391) | -.092 (.533) | .040 (.788) | -.392 (.006) |

Note. The bivariate correlation coefficient is reported followed by the *p*-value in parentheses. Correlations control for child age (in months) at the time the outcome variable was measured. ^a For the PLS subscales, only the English speaking sub-sample is reported (N = 38). ^b A lower score on Tower Cleanup Delay indicates more executive control. ^c ASQ Problem Behaviors were coded as 0 = child not in the problem behavior range, and 1 = child in the problem behavior range.

PREDICTIVE VALIDITY | Study 2

Table 8

Correlation Matrix Between CBT and PACT Factors and Parent -Child Outcomes for Study 2 (N = 43)

| Outcome Variable | Child Engagement in Play and Activities | Child Social-emotional Competence | Parental Discipline | Parent Affection | Parental Responsivity |
|---|---|-----------------------------------|---------------------|------------------|-----------------------|
| PAAT Creativity | .119 (.437) | -.026 (.864) | -.199 (.190) | .112 (.462) | .096 (.532) |
| PAAT Frustration | -.049 (.752) | -.377 (.011) | -.281 (.061) | .083 (.586) | .206 (.174) |
| PAAT Control | -.039 (.801) | .032 (.833) | .270 (.073) | -.016 (.915) | .266 (.078) |
| PAAT Play | -.010 (.946) | -.199 (.191) | -.190 (.210) | -.044 (.775) | -.080 (.600) |
| PAAT Teaching | -.024 (.876) | -.113 (.459) | .068 (.659) | .240 (.112) | .147 (.334) |
| PLS Auditory Comprehension | .246(.104) | .159 (.296) | .036 (.816) | -.138 (.365) | .246 (.103) |
| PLS Expressive Communication | .198 (.191) | .065 (.674) | .200 (.188) | -.213 (.161) | .104 (.495) |
| Tower Turn-Taking | -.148 (.333) | -.151 (.323) | -.144 (.346) | .214 (.158) | -.166 (.275) |
| Tower Cleanup Delay ^a | -.072 (.637) | -.106 (.489) | -.001 (.996) | -.200 (.189) | -.063 (.680) |
| Day-Night Task | .065 (.669) | -.142 (.353) | .083 (.589) | .161 (.289) | -.132 (.388) |
| ASQ Possible Problem Behaviors ^b | -.208 (.171) | -.151 (.322) | -.224 (.139) | -.228 (.132) | -.422 (.004) |
| ASQ Total Score | -.074 (.630) | -.062 (.688) | -.260 (.085) | -.126 (.409) | -.335 (.024) |

Note. The bivariate correlation coefficient is reported followed by the *p*-value in parentheses. Correlations control for child age (in months) at the time the outcome variable was measured. ^a A lower score on Tower Cleanup Delay indicates more executive control. ^b ASQ Problem Behaviors were coded as 0 = child not in the problem behavior range, and 1 = child in the problem behavior range.

DISCUSSION

Cross-Community Comparisons

What major comparisons are noted from the results on structural validity and the predictive validity of each measure across the two samples?

Structural Validity. The exploratory factor analysis results indicated that the factor structure of the CBT and the PACT measures differ from the initial conceptualization of these measures. There are some consistencies between the subscale “names” and the factor analysis results, however the structure of these measures differ in the number of indicators and the combination of indicators (i.e., items). Additionally, the factor structure differs between the study samples. The structure of the CBT and PACT measures compare across Study 1 (predominantly African-American and Afro-Caribbean parents) and Study 2 (Latino parents) in the following key ways:

1. The CBT measure indicates a two-factor solution across both samples. For Study 1, the factors that emerged are Child Agency and Child Social-emotional Competence. For Study 2, the factors that emerged are Child Engagement in Play and Activities and Child Social-emotional Competence. Although the number of factors between samples are the same and there is some overlap between factors, Child Social-emotional Competence for Study 1 included additional items such as “Smiles and laughs when involved in play activities” and “Understands and completes activities that are developmentally appropriate.”
2. About half of the items of the CBT measure for Study 2 are either non-loading items or double loading items. These items may be measuring similar constructs relating to “Child Engagement in Play Activities” or “Child Social-emotional Competence.” This could not be investigated due to the constraints of the study.
3. The “reversely” phrased items of the CBT measure, originally item 3 “Does not hit, poke, or bite others” and item 18 “Avoids every day dangers,” did not load on factors above the 0.5 level across both studies. This suggests that these items should be re-phrased to focus on children’s strengths regarding their behavior.
4. “Parental Discipline” appeared as a construct in both studies from the PACT measure. However there are differences in what indicators measure “parental discipline” across a predominantly African-American and Afro-Caribbean sample when compared to a Latino sample. For example, the “discipline” perspective for the Latino sample (Study 2) includes an approach towards discipline as well as an approach towards directing the child’s behavior. This pattern of items is not indicated in the “parental discipline” factor in Study 1. The implication of this is that parental discipline practices encompass different approaches across cultures.
5. Parent responsivity as a factor also emerged across both samples as per the PACT measure. For the predominantly African-American and Afro-Caribbean sample (Study 1), responsivity encompasses items that also reflect affection, meanwhile for the Latino sample, “Parent Affection” emerged as a separate factor. The discrepant item is “Parent verbalizes affection toward child,” which is an indicator of affection for Latino mother-child dyads but is an indicator of parental discipline for the predominantly African-American and Afro-Caribbean sample. This indicates

DISCUSSION | Predictive Validity

Predictive Validity. The predictive validity examination indicates that the factors that emerged from each study across the PACT and CBT significantly correlated with several outcome measures but not with other measures that are theoretically relevant to the constructs. Several key examples and implications are below:

1. For the CBT factors in Study 1, Child Agency is correlated with child outcomes (PLS Expressive Communication, Day-Night Task, and ASQ Possible Problem Behaviors) and a parent-related outcome (PAAT Play). The Child Social-emotional Competency factor was not shown to be correlated with any outcome measures although it is theoretically similar to children's behaviors and children's social competencies (the ASQ measure served as an assessment of these constructs).
2. For the PACT factors in Study 1, Parental Responsivity was not correlated with any outcome measures, Parental Discipline was correlated with lower child problem behaviors, and Parental Control was correlated with lower child problem behaviors but also lower child social competencies. Some relationships that are theoretically expected were not observed; for example, the Parental Control factor was not correlated with the PAAT Control subscale.
3. For the CBT factors in Study 2, Child Engagement in Play and Activities was not correlated with any outcome measures and the Child Social-emotional Competence factor was correlated with a parent-related outcome measure (PAAT Frustration). These two factors were not observed to be correlated with measures that theoretically relate to them (for example, social competency as measured by ASQ).
4. For the PACT factors in Study 2, the statistically significant correlations were observed between the Parental Responsivity factor and the ASQ measure. Parental Responsivity was negatively related with children being in the problem behavior range a year later but also negatively related with the child indicating social competencies.
5. For Study 1, the Parental Control factor and for Study 2, the Parental Responsivity factor are negatively related with children being in the problem behavior range a year later but also negatively related with the child indicating social competencies. These patterns in relationships across communities indicate that children's social skills are related to different parenting practices that are explained by cultural differences.

Limitations

This study informs the structural validity and predictive validity of the PACT and CBT measures by using several psychometric methods. Although there are informative implications based on the study findings, limitations are worth noting. Increasing sample size would help better provide insight to the structure of each factor and further explore the double loading and non-loading items on each measure across different samples. By increasing the sample size, the model fit indices would indicate better model fit between the structure of the factors and the data. The current study findings generalize to other samples that have similar demographic characteristics (Afro-Caribbean, African-American, and Latino) living in low-income, urban communities—not other communities. The findings suggested in this report are also limited because a confirmatory factor analysis is needed to further refine the measures and confirm the structural model which emerged through the EFA. Additionally, the study only explored two aspects of psychometric properties of a measure (structural and predictive validity). Additional aspects of validating measures are discussed in the recommendations section.

RECOMMENDATIONS | Practical & Analytical Next Steps

Practical recommendations include arranging an action plan meeting with the National Center to discuss if and how to modify the measures in specific communities, brainstorm concrete changes to items on each measure, and inform practices for future use. Specifically:

1. Measure adaptations such as adding new items and exploring the possibility of forming new constructs from non-loading items. The non-loading items across each study and measure should be taken into consideration for rephrasing, removing, or adapting to fit the constructs that have emerged as a result of the EFA. For example, the item on the PACT “Parent *trains* child to perform age appropriate activities” can be changed to indicate that a parent supports the child’s development of activities such as bedtime routine, brushing teeth, and washing hands.
2. Refining the constructs based on the exploratory factor analysis results. The constructs that emerged from each community indicated that the measures need to be culturally sensitive. Aspects about parenting practices emerged in one community that was different from the other. For example, Parental Control did not emerge as a factor in the Latino sample (Study 2). This implies that such parenting aspect may be integrated with other parenting practices such as “responsivity” and “affection.” The cultural sensitivity of these measures needs to be refined as a result.

The following analytical recommendations would provide next steps towards providing additional evidence for the validity of the PACT and CBT measures across communities:

1. Content Validity and Face Validity: Do the items on the CBT and the PACT reflect the overall constructs and domains of children’s school-readiness competencies and positive parenting practices, respectively? Evidence of content validity will be assessed through a literature review and a qualitative comparison of other assessments that measure the same constructs.
2. Structural Validity: This analysis will answer the question: How do the items on each measure relate to one another.
3. For new samples (e.g., White, rural communities) analytic steps would include a similar protocol to the one executed in this study for samples not represented in this study by using EFA.
4. For similar samples (Afro-Caribbean, African-American, and Latino caregiver-child dyads living in low-income, urban communities) a confirmatory factor analysis (CFA) would be conducted to confirm the results of this study and further refine the measure for these subgroups. The CFA analysis would include a new independent sample of approximately $n = 300$ participants of who the PACT and CBT has been gathered on, creating databases and preparing for statistical analyses, using modification indices that show how different items on each measure relate to one another, and exploring the relationships among factors within each measure (PACT and CBT).
5. Discriminant Validity: Will be assessed using the multitrait-multimethod matrix (MTMMM) approach to provide the information whether correlations among measures of different constructs using the same method are low (i.e. Correlation between the PACT and CBT within the same sample should measure different aspects of child competencies versus parenting practices).
6. Generalizability and Cultural Sensitivity: By interpreting correlation statistics, results from the structural and external validity of the PACT and CBT measures could be compared between different samples. For example, does one factor of a measure significantly correlate with child language scores for one sample but not another? Do the correlation patterns generalize across different groups?

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