# Validity of evidence-derived criteria reactive attachment disorder: indiscriminately social/disinhibited and emotionally withdrawn/inhibited types

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## Abstract

**Objective**—In this study, we examine the validity of criteria for indiscriminately social/disinhibited and emotionally withdrawn/inhibited RAD.

**Methods**—As part of a longitudinal intervention trial of previously institutionalized children, caregiver interviews and direct observational measures provided continuous and categorical data used to examine the internal consistency, criterion validity, construct validity, convergent and discriminant validity, association with functional impairment, and the stability of these disorders over time.

**Results**—Our findings, like those in other studies, show distinctions between the two types of RAD. Evidence-derived criteria for both types of RAD showed acceptable internal consistency and criterion validity. In this study, rates of the indiscriminately social/disinhibited RAD at baseline, 30 months, 42 months, and 54 months were 41/129 (31.8 %), 22/122 (17.9%), 22/122 (18.0%), and 22/125 (17.6%), respectively. Signs of indiscriminately social/disinhibited RAD showed little association with caregiving quality. Nearly half of children with indiscriminately social/disinhibited RAD had organized attachment classifications. Signs of indiscriminately social/

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disinhibited RAD were associated with signs of activity/impulsivity and of ADHD and modestly to inhibitory control, but were distinct from the diagnosis of ADHD.

At baseline, 30, 42, and 54 months, 6/130 (4.6%), 4/123 (3.3%), 2/125(1.6%), and 5/122 (4.1%) of children met criteria for emotionally withdrawn/inhibited RAD. Emotionally withdrawn/inhibited RAD was moderately associated with caregiving at the first three time points and strongly associated with attachment security. Signs of this type of RAD were associated with depressive symptoms, although two of the five children with this type of RAD at 54 months did not meet criteria for major depressive disorder. Signs of both types of RAD contributed independently to functional impairment and were stable over time.

**Conclusions—**Evidence-derived criteria for indiscriminately social/disinhibited and emotionally withdrawn/inhibited RAD define two statistically and clinically cohesive syndromes that are distinct from each other, shows stability over 2 years, have predictable associations with risk factors and attachment, can be distinguished from other psychiatric disorders, and cause functional impairment.

## Keywords

Reactive attachment disorder; diagnosis; early childhood

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Descriptions of clinical syndromes in very young children exposed to social deprivation appeared as early as the mid-20th century.[1] These syndromes comprised a range of impairing clinical problems that included social interactions, affect, growth, and immune-mediated responses in young children in institutions and those who had experienced maltreatment.[2–4] In the first major, systematic, longitudinal study, Barbara Tizard and colleagues, described the two major types of "affectional" disorders in very young institutionalized children who experienced social deprivation despite adequate attention to nutrition and basic needs.[5] The first was an emotionally withdrawn type, in which children showed limited social responsiveness, little positive affect and emotion dysregulation, as well as failure to seek comfort when distressed. The second was a socially indiscriminant type, in which children exhibited social boundary violations and were non-selective in their use of adult caregivers for comfort-seeking and overly engaging with relative strangers. The two behavioral phenotypes were later defined as Reactive Attachment Disorder (RAD), with a requirement that the signs result from pathogenic care..[6, 7] Despite appearing in DSM since 1980, and appearing both in the fourth edition of the DSM[8] and the 10th edition of ICD, there was little formal study of the disorders until the past 10–12 years. Recently, there has been a growing literature examining indiscriminant social behaviors in children exposed to caregiving adversity, (reviewed elsewhere[9],[10]), but the validation of the two disorders are incomplete. Questions remain about the conditions necessary for the two disorders to develop. Other questions include the degree to which these syndromes represent distinct disorders that impair functioning, how they relate to the developmental construct of selective attachment relationships, and the validity of the diagnostic criteria The criteria have been criticized for being insufficiently informed by the substantial developmental literature on selective attachments, and there are questions about the relation between RAD and selective attachments.[11, 12]

In order to address disordered attachment, it is important to understand the construct of attachment. By 7–9 months of age, a young child begins to direct attachment behaviors selectively towards a parent figure in times of distress. This process occurs cross-culturally, and a large literature describes variations and perturbations in attachment under species-typical rearing conditions.[13] When securely attached, a young child approaches the parent for comfort and is effectively calmed by physical proximity to the parent and the parents' soothing.[14, 15] Secure attachment is more likely to develop with higher quality caregiving. A securely attached child is more likely to have normal physiological status and more positive psychological outcomes.[16–18] Disorganized attachment patterns, on the other hand, describe the most disturbed classifications of selective attachments, though they are not in and of themselves evidence of psychopathology and occur in roughly 15% of low-risk dyads.[19] This classification describes behaviors that demonstrate that the child lacks a coherent strategy for eliciting comfort from a caregiver. Disorganized attachment is associated with substantially increased risk for subsequent psychopathology.[19–21] In contrast to these normal variants of formed attachments, extreme violations of the expectable environment, such as institutional rearing, which limit opportunities for a young child to form selective attachments, create conditions in which disorders of attachment may develop.

Unlike classifications of attachment security, which are specific to the relationship between a child and caregiver, the diagnostic criteria for the two types of RAD describe cross-situational, within-the-child, disorders. The DSM-IV TR[8] indiscriminately social/disinhibited type of RAD includes criteria describing attachment behaviors ("lack of selectivity in choice of attachment figures") as well as generalized social behaviors of the child with strangers ("excessive familiarity with relative strangers"). The emotionally withdrawn type of RAD is defined by problems in "most social interactions."

## Research Diagnostic Criteria for RAD

In 2003, a task force of early childhood mental health researchers proposed empirically derived research diagnostic criteria (RDC) modified from the DSM-IV TR.[22] The modified diagnostic criteria for RAD maintain the requirement for pathogenic caregiving for both diagnoses but the criteria more closely adhere to focused attachment behaviors than either DSM-IV-TR or ICD-10. In the RDC, the indiscriminately social/disinhibited type is defined by the child's lack of selective approaching caregivers in situations that should activate attachment behaviors and by the presence of non-selective attachment behaviors towards strangers, such as proximity-seeking.[22, 23] The inhibited type of RAD is defined by a pervasive lack of active attachment behaviors, with the child failing to seek proximity, obtain comfort, or share positive affect with adult caregivers These two distinct patterns of RAD have been identified in institutionalized and maltreated children.[7, 10, 24, 25]

## Establishing the validity of a psychiatric disorder

This report examines the validity of the research diagnostic criteria for the two types of RAD in a young children with a history of institutional care, using an approach derived from Robins and Guze's criteria[26] for defining a psychiatric disorder. A clinical disorder must demonstrate internal consistency, that is, the clinical signs cluster together, and criterion

validity, that is, the clinical signs predict a specific measurable outcome or gold standard. The clinical presentation, including associations with putative etiologic factors should be part of the characterization of a psychiatric disorder. A disorder also must show discriminant validity, that is, the clinical signs reflect a disorder that can be differentiated from other known disorders. This is particularly important when a disorder has some apparent overlap with more established disorders. In addition, a disorder must also show some stability over time. Finally, although not required by Robins and Guze, we think that the criteria must define a clinical entity associated with functional impairment. Although the two types of RAD are linked in the DSM nomenclature, they are defined as two distinct disorders in ICD-10,[27] and extant research suggests that the research describing aspects of the disorders' validity ought to be examined independently.

## One or two disorders

Several studies have examined the two types of RAD concurrently and provided some evidence that they represent separate clinical entities due to distinctive symptoms, divergent relation with quality of caregiving, and differing courses.[24, 28, 29] In a study of signs of RAD among institutionalized young children (mean age 39 months), four clusters of disordered attachment patterns were identified. Although the vast majority of the group demonstrated no signs of attachment disorder, the remainder were nearly equally divided among three groups: children demonstrating the signs of emotionally withdrawn/inhibited RAD, children with signs of indiscriminately social/disinhibited RAD, and a fourth cluster of children who demonstrated signs of both types of RAD.[29] Other studies of previously institutionalized children suggest that the two types of RAD have significantly different courses. The emotionally withdrawn/inhibited type is virtually non-existent in large follow-up studies of children placed in adoptive homes, whereas the persistence of RAD indiscriminately social/ disinhibited is much higher.[24, 30] There is growing agreement within the field that these two syndromes should be considered distinct disorders.[6, 31]

### Indiscriminately Social/disinhibited RAD

Previous research has demonstrated a link between history of caregiving adversity, including institutional care, and indiscriminately social/disinhibited RAD.[9, 10, 32, 33] Although the specific nature or threshold of caregiving adversity required is only vaguely defined in diagnostic criteria, it is a critical requirement for the diagnosis as it distinguishes these children from those with indiscriminant sociability related to abnormalities of chromosome 7 (i.e., Williams syndrome). Internal consistency and criterion validity, on the other hand, have not been established, and there are substantial inconsistencies in reports of associated clinical findings, especially regarding attachment security and externalizing behaviors.[10, 34–37 10–12] Stability of the signs over time beginning after removal from adverse caregiving has been demonstrated in post-adoption studies, but the trajectory from the time of institutional care and the influence of potential selection bias in adopted children remain unaddressed.[11, 18, 20]

## Emotionally withdrawn/inhibited RAD

Compared to the literature focused on the indiscriminately social/disinhibited type of RAD, the literature focused on emotionally withdrawn/inhibited RAD is quite small. Cross-sectional studies in the U.S., Britain, and Romania have demonstrated acceptable statistical internal consistency of the criteria,[25, 29] an association with caregiving adversity including institutional rearing,[25, 29, 32, 34] and an association between emotionally withdrawn/inhibited RAD and completely developed attachment.[28] Beyond these scattered findings, there has been limited study of emotionally withdrawn/inhibited RAD

## Goals of this study

To address these inconsistent findings and examine the validity of each of the two types of RAD, we examined the clinical signs and trajectory of RAD signs in children enrolled in the Bucharest Early Intervention Project (BEIP). In this paper, we first examine the clinical presentation by assessing internal consistency of the signs and criterion validity of the two types of RAD, comparing adult-reported signs of RAD with the diagnosis as determined by a diagnostic interview and, for indiscriminately social/disinhibited RAD, also with observed behaviors. We examine the construct validity by examining the predicted associations between caregiving quality, a putative risk factor for both types of RAD, and attachment security, which is inconsistently linked to indiscriminately social/disinhibited RAD and more consistently linked with emotionally withdrawn/inhibited RAD in the existing literature. Next, we examine convergent and discriminant validity. Specifically, we hypothesized that indiscriminately social/disinhibited RAD would have some overlap with signs of ADHD, but would diverge from ADHD diagnosis and that emotionally withdrawn/inhibited RAD would be distinct from major depressive disorder, although we also hypothesized some shared clinical characteristics. In sum, we hypothesized that the two RAD disorders are separate from more established disorders in young children. We predicted that signs of each type of RAD would show moderate stability and over time and be associated with functional impairment, as would be expected for a clinically relevant disorder.

## Methods

### Participants

This study presents data from the Bucharest Early Intervention Project (BEIP), which has been described in detail elsewhere.[38–42] BEIP is the first randomized, controlled trial of foster care as an alternative to institutional care. Children were followed from baseline (mean age 22 months) to 54 months. Initially, 187 children less than 31 months of age (range 6–30 months) living in six institutions for young children in Bucharest, Romania, were screened for participation in the study. Figure 1 presents the flow diagram for the study. Children in the study spent a mean of 86% of their lives in institutional care. For most, specific details of their early experiences were unavailable. Children were excluded from BEIP if they had genetic syndromes, dysmorphic features of fetal alcohol syndrome, or microcephaly. Eligible children were assessed comprehensively and then randomly assigned to care as usual (continued institutional care) or placement in foster care. The foster care

network was created and supported by the research team because of limited foster care availability in Bucharest at the time of the study. Foster parents were trained by a Romanian NGO and received ongoing support from social workers with the project, with consultation from U.S. consultants with expertise in foster care, a process described in detail elsewhere.[38] For children in the study, all placement decisions after randomization were made by the Romanian National Authority for Child Protection in accordance with Romanian law. The only difference from the usual practice was a negotiated commitment that any child placed in foster care by the study would never return to an institution.[43]

Children in both the care as usual group and foster care group were at risk of developing RAD by virtue of their experience in institutional caregiving and are the focus of this paper. Table 1 describes the demographic characteristics of the participants, and Figure 1 presents the gender and placement of children at baseline and 54 months.

### Measures

All measures used in this study were originally developed in English and were translated into Romanian and back-translated to confirm accuracy by bilingual Romanian research team members. For children living in a family, the foster mother reported on caregiver report measures. If a child in an institution had a favorite caregiver, that caregiver completed the measures. For children who had no known favorite caregiver, a caregiver who knew the child well and worked with the child regularly completed the measures.

**Disturbances of Attachment Interview—**The Disturbances of Attachment Interview (DAI)[29] is a semi-structured examiner based interview of a caregiver who reports on signs of RAD in very young children. The complete DAI items are included as supplemental online material (Figure S1, available online). Responses to each item are coded on a 3-point scale, where "0" is "clearly demonstrates" a behavior, "1" is "sometimes or somewhat" demonstrates a behavior, and "2" is "rarely or minimally" demonstrates a behavior. The DAI includes 3 items focused on signs of indiscriminately social/disinhibited RAD and 5 items focused on signs of emotionally/withdrawn inhibited signs of RAD.

The indiscriminately social/disinhibited items examine how the child uses the caregiver in unfamiliar settings, whether the child exhibits reticence with unfamiliar adults, and whether the child is likely to leave with a stranger. This total score on this scale can range from "0" to "6," with higher scores indicating more signs of indiscriminately social/disinhibited RAD. The emotionally withdrawn/inhibited items focus on how well the child differentiates among adults, and includes whether the child shows a clear preference for a particular caregiver, seeks comfort from a preferred caregiver, and responds to comforting when offered, as well as the degree to which the child responds reciprocally in social interactions and whether the child shows developmentally appropriate levels of emotional regulation. The emotionally withdrawn/inhibited scale produces scores of "0" to "10," with higher scores representing increasing signs of emotionally withdrawn/inhibited RAD.

The DAI scales have demonstrated strong internal validity in previous research for both types of RAD (Cronbach's alpha 0.83 and 0.80 respectively).[29] Interrater reliability for the DAI was demonstrated to be excellent ($\kappa$=0.88).[29] Both scales of the DAI distinguish

between institutionalized and never institutionalized children and vary as predicted in children experiencing differing levels of caregivers.[28, 29] The indiscriminately social/disinhibited scale of the DAI has been shown to converge with other measures of this construct.[37] The emotionally withdrawn/inhibited scale was moderately associated with degree to which attachment had formed in very young children (mean age 22 months).[28]

The research diagnostic criteria for RAD were applied to the DAI items to create categorical variables for each type of RAD. For indiscriminately social/disinhibited RAD, 2 or more DAI items must be endorsed and for emotionally withdrawn/inhibited RAD, at least 3 items must be endorsed.

The DAI was administered at baseline (mean 22 months), 30, 42 and 54 months of age by interviewers trained to reliability of kappa = 0.80. In this study, the respective DAI scales for indiscriminately social/disinhibited RAD and emotionally withdrawn/inhibited RAD were used to examine continuous ratings of the signs of RAD at each time point. Scores on this measure are presented in Table 1.

### Measures of Criterion Validity

**Preschool Age Psychiatric Assessment:** The Preschool Age Psychiatric Assessment (PAPA) is a comprehensive parent-report psychiatric diagnostic interview for preschool children.[44, 45] Based on responses to the PAPA, an algorithm generates diagnoses, scale scores, and scores reflecting the number of domains in which the child is impaired. For this study, we applied DSM-IV criteria for all diagnoses except reactive attachment disorder, for which we used the Research Diagnostic Criteria: Preschool Age criteria. The test-retest reliability of the PAPA is similar to the reliability of structured psychiatric interviews focused on older children and adults.[45] The interview was administered when children were 54 months of age. For this study, we examined each RAD diagnosis, categorical and symptom count measures of ADHD, disruptive behavior disorder, major depressive disorder, and continuous scores of functional impairment.

**Stranger at the Door:** This procedure was developed specifically for this study as an observational measure of indiscriminate behavior at 54 months. Caregivers were instructed ahead of time to be at the door with the child when a research assistant who was unknown to the child (stranger) arrived. When the parent/caregiver opened the door, this stranger looked at the child and said, "Come with me. I have something to show you." The parent/caregiver was instructed to look at the child but not to signal any directions. The child's behavior was coded as 0= "stayed with parent" and 1= "left with the stranger." If the child left with the research assistant, they walked around the corner, where they found a familiar research assistant who said, "Hello, I am here to play with you again," and then resumed the visit. Raters coded written descriptions of the child's behavior that were composed by the research assistant at the time of the procedure. Kappa was 1.0 on the coding of stayed versus left using 2 coders blinded to the child's placement.

## Measures of Construct Validity

**Observational Record of the Caregiving Environment:** The Observational Record of the Caregiving Environment (ORCE)[46], with adaptations for institutional use, was used to assess the quality of the caregiving environment at baseline, 30 and 42 months. Children were videotaped during naturalistic interactions in their caregiving setting with their preferred caregiver for 1½ hours. The caregiving quality score was calculated by averaging the score on each of the following five factors: sensitivity, stimulation of development, positive regard for child, flat affect [reversed], detachment [reversed]), all of which were rated from 1 (not at all characteristic) to 4 (highly characteristic) and averaged. The training process, which included overview of the ORCE items used in the BEIP, coding and discussion of practice tapes, led to excellent internal and interrater reliability (Cronbach's α 0.86 and 0.88–0.99 respectively) and has been described elsewhere.[47]

**Strange Situation Procedure:** Strange Situations were administered at 42 months and coded using the MacArthur Preschool Attachment Classification System,[48] as described elsewhere[49], with the categories of secure, avoidant, ambivalent, disorganized, controlling, and insecure-other. Coding is based upon the same principles as the Ainsworth infant strange situation coding, but involves developmental modifications. For example, secure attachment behaviors in preschoolers include positive engagement and attention to both verbal and nonverbal interactions. Physical proximity-seeking is less commonly seen than in infants. The Preschool Attachment Classification System has been validated in studies that demonstrate that predicted associations between attachment classifications and observed parent-child interaction qualities, parental internal representations and well being,[50] and child's narrative qualities[51] Stability of these classifications is moderate-high (44%–78%) over 2.5 years and stability from infant classifications to preschool classifications is variable, but associated with exposure to stressful life events.[52] Native Romanian coders were blind to the child's group status. In addition, 75% of the procedures were double coded to assess interrater reliability, which was more than acceptable (for every classification, kappa ≥0.87).[28, 49]

A continuous rating of the child's security of attachment to the caregiver was also coded, with 1= "no security evident" and 9= "most secure".[48] Interrater reliability for this scale was excellent ($r$=.87).[53]

In this study, we examined the continuous rating of security and classifications of attachment.

## Measures of convergent and discriminant validity

**Wechsler Preschool Primary Scale of Intelligence:** The Wechsler Preschool Primary Scale of Intelligence (WPPSI-R)[54] was used to measure cognitive development at 54 months. The WPPSI-R's 14 subtests assess intellectual functioning in verbal and performance domains. In this study, we included a measure of a child's general intellectual ability (full-scale IQ) as a potential factor which contributed to functional impairment.

**Infant Toddler Social Emotional Assessment:** The Infant Toddler Social Emotional Assessment (ITSEA) uses caregiver report to assess social and emotional well-being and behavior problems. The ITSEA includes 166 items rated on a 3-point scale. U.S. normative scores can be converted into T scores for children 12–48 months of age.[55, 56] The ITSEA's psychometric properties are well-established, with strong test-retest reliability, convergence with the Child Behavior Checklist and with observed parent-child interactions.[57, 58] The ITSEA was administered at baseline, 30, and 42 months.

In this study, ITSEA's scales of activity/impulsivity and aggression/defiance were examined as predicted correlates of indiscriminately social/disinhibited RAD and depressive signs were included because of the shared clinical presentation with emotionally withdrawn/ inhibited RAD. The competency scale was used as a measure of functional adaptation in children with signs of both types of RAD.

**Bear-Dragon—**Bear-Dragon is a test of inhibitory control.[59] In this task, the experimenter used two hand puppets, a Bear and a Dragon, that each provides directions to the child. The child was instructed to follow the Bear's instructions, but not to follow the Dragon's directions. Each puppet gave five directions and children were coded on a four point scale that reflected the degree to which the child responded to the command. The Bear-Dragon task has demonstrated high interrater reliability, strong consistency with other measures of inhibitory, and, as a composite, is associated with maternal report of inhibitory control.[59, 60] Typically developing children show substantial developmental changes in performance on the task in the preschool years.[61] For this study, a composite score of Bear minus Dragon was calculated as a measure of inhibitory control. Bear Dragon was examined as a correlate of the clinical presentation of indiscriminately social/disinhibited RAD.

### Informed Consent

The Institutional Review Boards of Tulane University School of Medicine, University of Maryland, and the University of Minnesota (institutions of the 3 PIs), as well as the commissions on child protection in each sector (city district) of Bucharest and by the Romanian Institute of Maternal Child Health reviewed and approved the study. In 2002, the Romanian Ministry of Health established an ad hoc ethics committee that reviewed and also approved the project.

Informed consent was obtained from each child's legal guardian. For children in institutions or foster care, the local child protection commission for the sector in which the child lived, who were their legal guardians, gave consent. In addition, institutional caregivers and foster parents provided assent at the time of each procedure.

### Data analyses

Because of preliminary research suggesting that the two types of RAD have different patterns of association with attachment, with concurrent caregiving quality, and vastly different responses to adoption, we predicted that the syndromes would show different patterns of associations. Thus, although the overall analytic approach was similar with each

type of the disorder, different hypothesis-driven analyses were done when examining associations between the RAD signs and other clinical signs.

For most analyses, the sum of scores on the indiscriminately social/disinhibited scale of the DAI provided the continuous measure of indiscriminately social/disinhibited RAD and the sum of the emotionally withdrawn/inhibited items on the DAI provided the continuous measure of emotionally withdrawn/inhibited RAD. The categorical DAI variable for each type of RAD derived from the RDC were used for categorical analyses at baseline, 30, and 42 months. The PAPA RAD diagnoses were used in analyses at 54 months because this measure is a more extensive interview than the DAI and could be considered closer to a "gold standard." For continuous variables (DAI sum scores, ITSEA scores, sums of PAPA symptoms, and incapacity scores), two-tailed Pearson moment correlations were applied. Associations among categorical variables were assessed using chi-square analyses. Fisher's exact test was applied when cells had fewer than 5 subjects.

For baseline analyses, children 10 months of age and above were included, as focused attachment behaviors would not be expected in younger children, making measurements of attachment disorders inappropriate.

For analyses that involved longitudinal analyses (predictive validity), only children randomized to the care as usual group were included to avoid potential confound of the experimentally induced changes in caregiving. Repeated measure analysis, using a mixed model approach, was used to examine predictive validity, a longitudinal measurement. For each type of RAD, the DAI score at each time point was entered, with time as a fixed effect and within subjects effect. For these analyses, we used a random intercept. Model covariance structure for each type of RAD was selected based on model fit as demonstrated by −2 restricted log likelihood (−2RLL), after testing autoregressive and unstructured models. For RAD indiscriminately social/disinhibited RAD, an unstructured model demonstrated the best fit (−2RLL=994.0.0) and autoregressive covariance model showed best fit for emotionally withdrawn/inhibited RAD (−2RLL=1114.7).

## Results

### Rates of RAD

Mean scores for both types of RAD on the DAI are presented in Table 1. As presented in Tables 2 and 3, at baseline, 30 months, 42 months, and 54 months 41/129 (31.8 %), 22/122 (17.9%), 22/122 (18.0%), and 22/125 (17.6%) of children met criteria for indiscriminately social/disinhibited RAD. At the same ages, 6/130 (4.6%), 4/123 (3.3%), 2/125(1.6%), and 5/122 (4.1%) of children met criteria for emotionally withdrawn/inhibited RAD.

### Internal consistency

At baseline, 30, 42, and 54 months, the internal consistencies of the indiscriminately social/disinhibited RAD criteria analyzed using Cronbach alpha were .68, .68, .72, and .75 respectively. The same analyses for emotionally withdrawn/inhibited type of RAD revealed Cronbach alphas of .69, .70, .70, and .84.

### Association between two types of RAD

Signs of indiscriminately social/disinhibited RAD and emotionally withdrawn/inhibited RAD were moderately and significantly correlated at baseline, 30 months, 42 months, and 54 months (r= .40, 34, .41, and .43 respectively, $p \leq 0.001$). However, as would be anticipated by extant research on the two types of RAD, there was no association between the two categorical diagnoses at baseline, 30, 42 or 54 months using Fisher's exact test analyses.

### Criterion Validity

We examined the criterion validity of each type of RAD by comparing the DAI results with the concurrent PAPA diagnoses, thereby using two different approaches to measure the same outcome. For indiscriminately social/disinhibited RAD, we also compared the diagnosis by observed social indiscriminance.

Using categorical diagnoses, the diagnosis of indiscriminately social/disinhibited RAD on the DAI at 54 months and PAPA indiscriminately social/disinhibited RAD showed concordance in 85.8% (103/120) cases (Fisher's exact test $p \leq 0.001$). Of the children who completed the stranger at the door procedure, 85.0% (51/60) behavior on the stranger at the door as would be predicted by indiscriminately social/disinhibited RAD status on the DAI (Fisher's exact test $p \leq 0.001$). That is, 13 children met criteria for RAD and left with the stranger and 38 children neither met diagnostic criteria nor left. Of the 15 children who met diagnostic criteria for RAD on the DAI, 86.7% (13/15) left with the stranger and 13.3% (2/15) did not.

As presented in Table 3, the diagnosis of emotionally withdrawn/inhibited RAD on the DAI at 54 months showed 98.3% concordance with the corresponding PAPA RAD diagnosis (118/120, (Fisher's exact test, $p \leq 0.001$)).

### Construct Validity: Caregiving quality

All children in the study experienced institutional care, thus meeting the pathogenic care criteria of RAD. There was, however, no association between duration of exposure to institutional care, measured as percent of life in the institution, and signs of either type of RAD at baseline.

The association between signs of the two types of RAD and concurrent caregiving quality are presented in Table 4. There was no significant association between concurrent caregiving quality and indiscriminately social/disinhibited RAD at baseline or at 30 months. At 42 months, there was a small association between caregiving quality and signs of indiscriminately social/disinhibited RAD. For the emotionally withdrawn/inhibited type of RAD, signs of RAD were associated with concurrent caregiving at baseline and 30 months.

### Construct validity: Selective Attachment Patterns

Signs of indiscriminately social/disinhibited RAD were moderately and inversely associated with security of attachment at 42 months as shown in Table 4. Of the 22 children who met the RDC criteria for indiscriminately social/disinhibited RAD at 42 months, 2 (9%) were classified as secure, 4 (18.2%) as avoidant, 1 (4.5%) as ambivalent, 3 (13.6%) as

disorganized/controlling, and 12 (54.6%) as insecure-other. Overall, 7/15 (46.7%) of those who met criteria for indiscriminately social/disinhibited RAD showed an organized attachment pattern. By comparison, 39 of the 101 (39%) who did not meet the RAD criteria were classified as secure and an additional 22 were avoidant (22%), 11 were ambivalent (11%), 7 were disorganized/controlling (7%), and 22 were insecure-other (22%). When attachment classification was dichotomized into organized and disorganized, children who met criteria for indiscriminately social/disinhibited RAD were less likely to be classified as having an organized attachment pattern ($x^2(2)$= 12.3, $p \leq 0.001$), but one third of them were classified as having an organized attachment pattern.

Signs of emotionally withdrawn/inhibited RAD were negatively correlated with concurrent level of observed attachment security at 42 months. Both of the children who met the RDC criteria for emotionally withdrawn/inhibited RAD at 42 months were classified as insecure-other on the Macarthur Preschool Attachment Classification, although there was no statistical difference in distributions (Fisher's exact test, $p>0.1$).

### Convergent and Discriminant Validity: ADHD patterns and inhibitory control

Signs of indiscriminately social/disinhibited RAD showed no association with activity level or aggression on the ITSEA at the first three assessment points, but a substantial relationship with signs of ADHD on the PAPA at 54 months. There was a modest association between concurrent signs of indiscriminately social/disinhibited RAD with low levels of inhibitory control, as assessed by the Bear-Dragon task at 54 months.

To assess discriminant validity, we compared diagnoses of RAD indiscriminately social/disinhibited to ADHD. Only (4/16) of the children who met RDC criteria for indiscriminate/disinhibited RAD on the PAPA also met criteria for ADHD, and there was no statistical association between the two.

### Discriminant Validity: Depression

As predicted and reported in Table 6, signs of emotionally withdrawn/inhibited RAD were associated with higher levels of depressive symptoms at all time points. However, despite the association between emotionally withdrawn/inhibited RAD and depressive signs, two of the five children who met PAPA RDC criteria for emotionally withdrawn/inhibited RAD did not met criteria for major depressive disorder, demonstrating discriminant validity for the diagnosis, although there was a statistical association (Fisher's exact test $p \leq 0.001$).

### Stability of indiscriminately social/disinhibited RAD over time

Next, we examined the stability of RAD over time. Because of a substantial but experimentally imposed change in caregiving experiences (from institutional care to family care), we examined only the children randomized to the care as usual group for this analysis. Linear mixed modeling demonstrated that there was a decrease in signs of RAD from baseline to 54 months over the four time points (F(2,22505)= 4.0, $p \leq 0.01$). However, at every time point, the estimated marginal means showed overlapping 95% confidence intervals, a finding that is equivalent to $p \geq 0.05$, or no significant difference. Examination of the pairwise comparisons demonstrated that there were no significant differences between

signs of indiscriminately social/disinhibited RAD at any time points ($p \geq 1$). Post-hoc analysis examining the effect of remaining in the institution throughout the study period approached significance (F(1,88)= 3.4, $p \leq 0.06$). Signs of emotionally withdrawn/inhibited RAD also showed a decline in time over the course of the study in the care as usual group (F(4, 122)= 25.4, $p \leq 0.001$). As seen in the indiscriminately social/disinhibited type of RAD, 95 % confidence intervals for the estimated marginal means were overlapping at every time point, indicating that there is no difference in the intervals between the time points. Similarly, pairwise comparisons revealed no significant difference between any consecutive time points (e.g. between baseline and 30 months, 30 and 42 months). The only significant difference was between baseline and 54 months (mean difference 0.9, $p \leq 0.04$).

### Functional Impairment

We predicted that both types of RAD would be associated with functional impairment. Using the ITSEA social competence at the first three time points and the PAPA incapacity scale at 54 months, there was a statistically significant association between indiscriminately social/disinhibited RAD and impairment at all ages except baseline, with a large association at age 54 months. At 30 and 54 months, these associations remained significant in a linear regression, after controlling for two other potentially impairing factors-- signs of ADHD and IQ-- as shown in Table 8.

As predicted, having more signs of emotionally withdrawn/inhibited RAD was moderately associated with measures of social emotional competence and functional impairment in the predicted directions at all time points. Controlling for DQ or IQ and clinical signs of depression, signs of emotionally withdrawn/inhibited RAD independently contributed to the variance in competence on the ITSEA at baseline, 30, and 42 months, but not at 54 months.

We also predicted that signs of emotionally withdrawn/inhibited RAD at each age would predict functional impairment at age 54 months in children randomized to care as usual, and this finding was confirmed. The magnitude of the association between impairment at 54 months and signs of emotionally/withdrawn/inhibited RAD was moderate at baseline, 42, and 54 months. The association remained significant in a stepwise regression which included independent contributions both DQ and signs of depression at baseline (adjusted $R^2$= .15, F(1)=9.6, beta= .4 t(1)=3.7, $p \leq 0.003$).

## Discussion

These findings represent the most complete assessment of the reliability and validity of two types of RAD in young children published in a single study to date. First, we replicated previous suggestive findings that the indiscriminately social/disinhibited and the emotionally withdrawn/inhibited types appear to be distinct clinical disorders. Statistically, although the continuous variable of signs of RAD showed moderate intercorrelations between the two disorders, the categorical diagnoses were not associated at any time point. These findings extend the literature demonstrating that these two constructs likely represent clinically distinct disorders that should be considered separately.

With regard to indiscriminately social/disinhibited RAD, we replicated previous findings of high levels of internal consistency of the signs of indiscriminately social/disinhibited RAD over multiple time points.[28] The mean internal consistency of 0.71 indicates statistical cohesion[62], similar to that found in other studies of validated preschool and school age criteria.[63, 64] Second, criterion validity was demonstrated by the convergence of diagnoses by different measures, including a psychiatric diagnostic interview, an observational measure, and a structured interview assessing indiscriminate behavior. Convergence with an observational measure extends previously reported findings that different interviews showed convergence with one another.[11]

We also examined the association of indiscriminately social/disinhibited RAD with caregiving quality and attachment. Caregiving quality is asserted to be an etiologic contributor to indiscriminately social/disinhibited RAD.[8] However, in our study, concurrent caregiving quality was associated with signs of indiscriminately social/disinhibited RAD only at 42 months and then only modestly. In other studies, indiscriminate behavior has been associated with maternal psychopathology and history of maltreatment,[25, 50] disrupted affective communication and duration of institutional care,[9, 10, 12] but only one of these studies included direct assessments of caregiving behavior. It is possible that low quality caregiving in institutions is necessary to potentiate the development of indiscriminately social/disinhibited RAD, at least in some children, but that once indiscriminate behavior develops, the importance of caregiving quality diminishes. This could explain why post-institutional caregiving environments in other populations do not eliminate signs of indiscriminately social/disinhibited RAD even when they are of high-quality.[10, 30] At this time, the relationship between specific characteristics of caregiving and indiscriminately social/disinhibited RAD appears to be less than straightforward and warrants further investigation.

Regarding the relationship between indiscriminately social/disinhibited RAD and selective attachment patterns, our findings were mixed. A continuous rating of secure attachment was moderately and inversely related to signs of indiscriminately social/disinhibited RAD at 42 months. On the other hand, several studies, including this one, have demonstrated that organized classifications in the Strange Situation Procedure does not preclude high levels of indiscriminate behavior.[12, 30] In fact, in our study, nearly half of children who met criteria for indiscriminately social/disinhibited RAD showed organized attachment classifications. Others have reported similar findings,[10, 12, 30] including Lyons-Ruth, who showed that indiscriminate behavior carried additional risks for adverse mental health outcomes over and above disorganized attachment.[50] Our results support a growing empirical base that indicates that, although the signs of indiscriminately social/disinhibited RAD are moderately associated with the construct of attachment, indiscriminately social/disinhibited RAD reflects a separate construct that often can occur independent of the quality of the child's selective attachment relationships and concurrently with organized attachment patterns. These and similar findings have led some to question whether indiscriminately social/disinhibited RAD is best considered something other than an attachment disorder.[7, 19]

Other researchers have suggested that indiscriminately social/disinhibited RAD represents an adaptive process for children vying for attention in institutions,[65] or a failure to develop

committed social relationships.[7] Our findings allow us to comment on these hypotheses. In our study, this type of RAD was not adaptive, as signs of this type of RAD were associated with functional impairment. In this study, some children with indiscriminately social/ disinhibited RAD showed organized attachment patterns, thus not supporting the hypothesis that the core deficit in this type of RAD is a failure of committed social relationships. The finding that signs of RAD were only modestly associated with cognitive measures of inhibitory control on the bear-dragon task is intriguing and suggests that socially indiscriminant behavior in these children is a separate construct from cognitive disinhibition. Further research examining the core deficit in children with indiscriminately social/ disinhibited RAD is warranted.

Our study also allowed an investigation of other constructs that can be differentiated from indiscriminately social/disinhibited RAD. Previous studies have provided mixed findings about the association between this type of RAD and externalizing signs. In our study, signs of indiscriminately social/disinhibited RAD before 54 months were minimally associated with externalizing behavior problems, thereby providing support for discriminant validity. Few previous studies have explored this association in children this young. Our study confirmed the previously reported association between indiscriminately social/disinhibited RAD and clinical signs of ADHD at 54 months, but also showed that these disorders most often occur independently of each other. Taken together, these findings and the modest association between indiscriminately social/disinhibited RAD and lower observed levels of inhibitory control suggest that indiscriminately social/disinhibited RAD is driven by a process that may be related to problems with social inhibitory control but is distinct from the processes involved with ADHD. The more modest association between activity and impulsivity and RAD at the first three time points than with ADHD at 54 months may reflect a developmental process in which problematic indiscriminately social behaviors are the first clinical presentation of an inhibitory control problem that progresses and generalizes over time or facilitates the development of other forms of disinhibition. Alternatively, it is possible that the differences reflect differences in measurements between a parent report questionnaire and a structured psychiatric interview format or increased specificity of these measurements with age.

Indiscriminately social/disinhibited RAD in the care as usual group showed significant stability at all time intervals in the study, although overall, there was a decline in levels of RAD over the course of the study. We postulated that the decline in signs of RAD in the group randomized to care as usual could be related to caregiving changes because some of the care as usual children moved out of the institutions, a hypothesis that was not supported, but warrants further examination particularly because the subgroup of children who remained in the institutions by 54 months was relatively small. The caregiving experiences of the children in the care as usual groups were determined by non-random factors including a range of family and non-family experiences, which may contribute to the overall decline of signs of RAD. The overall finding of stability in the intervals measured is consistent with other studies that demonstrate persistence of signs of indiscriminately social/disinhibited RAD after removal from institutional care and extends the findings by demonstrating stability of symptoms beginning institutional care.[10, 24] Overall, these findings reflect presence of a non-transient pattern of a clinical syndrome.

We also demonstrated that indiscriminately social/disinhibited RAD signs were associated with functional impairment, which is a necessary to distinguish the disorder from children who are adaptably sociable. The magnitude of the association between signs of RAD and impairment was strongest at 54 months. At both 54 months and 30 months, signs of indiscriminately social/disinhibited RAD contributed to impairment even when controlling for DQ and signs of ADHD, adding to the evidence that, at least at those ages, this type of RAD is impairing to children above and beyond other impairing clinical factors. It should be noted that the measure of impairment used for the first three time points only measures social competence, and that PAPA measures impairment in a broader range of domains, including family, peer, school, and public settings. Thus, the earlier measurements may not fully reflect the magnitude of cross-domain impairment seen in children with RAD during toddlerhood and the early preschool years. It is also possible that the cumulative experience associated with having signs of RAD, or the experiences that facilitated the persistence of the signs up to 54 months account for the strong association at that time point.

In summary, the findings in this study demonstrate that indiscriminately social/disinhibited RAD is a distinct disorder that has minimal association with concurrent caregiving quality, can be seen in the context of an organized attachment relationship, is distinct from externalizing disorders and cognitive inhibitory control, and is associated with the same level of stability across at least 2 years as other DSM disorders in this age group. Like other disorders, this type of RAD is associated with functional impairment. In sum, RAD appears to be a distinct clinical disorder whose underlying core deficit warrants further examination.

To the best of our knowledge, this is the most comprehensive assessment of emotionally withdrawn/ inhibited RAD reported to date, including attention to coherence of the signs of the disorder, association with expected risk factors and clinical syndromes, distinguishing the disorder from other types of psychopathology, functional impairment, and stability of signs over time. Our results support the validity of emotionally withdrawn/inhibited RAD as a distinct disorder.

First, we demonstrated that the emotionally withdrawn/inhibited RDC criteria have significant internal consistency at four different ages in the first 5 years of life. In addition, we demonstrated criterion validity by finding that two different structured, independently administered psychiatric interviews converged on the same diagnosis.

Second, we demonstrated construct validity by demonstrating an association between poorer caregiving quality and signs of emotionally withdrawn/inhibited RAD at 30 months, and 42 months, thereby extending previously reported findings of institutionalized toddlers and children with histories of institutional care living in the US, Britain, and Romania[28, 29, 34] In addition, we demonstrated an inverse relationship between signs of emotionally withdrawn/ inhibited RAD and security of attachment behavior at 42 months, extending the previously reported findings.[28]

As expected, emotionally withdrawn/inhibited RAD was associated with signs of depressive disorders, which share overlapping clinical presentations. Although the number of children who met categorical RDC criteria for emotionally withdrawn/inhibited RAD was extremely

limited and the findings must be interpreted with caution, two of the five children who met RAD criteria did not meet criteria for major depressive disorder, suggesting that these may be distinct diagnostic entities.

Like signs of indiscriminately social/disinhibited RAD, emotionally withdrawn/inhibited RAD showed stability at each interval in the care as usual group. This finding is particularly important because previous studies of children post-institutional care have identified almost no children with emotionally withdrawn/inhibited RAD. This is the first demonstration of the stability of emotionally withdrawn/inhibited RAD in children in institutional care. Remaining in institutional care throughout the study period was not significantly associated with higher stability of RAD, an unexpected finding as research focused on children with histories of institutional care demonstrates that type of RAD is extraordinarily rare.[24]

At all 4 ages of assessment, signs of emotionally withdrawn/inhibited RAD were associated with functional impairment. These associations demonstrate that these clinical signs not only have clinical and statistical coherence, but that they are clinically relevant and associated with problems with functioning in a range of domains, even when controlling for associated developmental delays and depressive signs.

To summarize, signs of emotionally withdrawn/inhibited RAD were distinct from the indiscriminately social/disinhibited type of RAD, were associated with poorer caregiving quality in infants and toddlers and preschoolers, and were inversely associated with attachment security. Taken together, these findings suggest that that the essence of the emotionally withdrawn inhibited RAD is lack of selective attachment. The disorder shares some clinical signs with depression, but can occur independently of major depressive disorder. The stability of the disorder between consecutive time points in the care as usual group is demonstrated and it is associated with substantial functional impairment at all ages assessed.

Although these findings support all of our hypotheses, several limitations must be acknowledged. First, this study did not examine the disorders in children exposed to pathogenic caregiving conditions other than institutionalization and may not be generalizable to children exposed to other types of adverse caregiving. Second, we do not have detailed information about caregivers' history, such as psychiatric status or maltreatment history, and thus cannot explore these factors as predictors of signs of either type of RAD, nor do we have access to information that would allow us to characterize children's pre-institutional experiences and relationships. Third, caregivers reporting on the same child with different measures may conflate levels of agreement. However, the convergence of interviews and observational measures for both types of RAD increases confidence in caregiver report measures we used. Next, the low rates of emotionally withdrawn/inhibited RAD limited statistical analyses using categorical measures and raise questions about whether the threshold of the diagnostic criteria may be too high. Finally, biological markers were beyond the scope of this study.

These findings provide support for the diagnostic validity of indiscriminately social/ disinhibited RAD and emotionally withdrawn/inhibited RAD in children with a history of

institutional rearing. Our findings provide significant support for the criterion validity, construct validity, discriminant validity, and predictive validity of these two disorders. This study adds significantly to the existing knowledge about the two types of RAD through examination of the clinical constructs in a group of vulnerable children who were followed longitudinally using both observational and interview methodologies. Future studies will examine shared and distinct characteristics of indiscriminately social/disinhibited RAD and of Williams syndrome, which may serve as a biological model for the disorder. In addition, further research will examine biological markers associated with each type of RAD, and will explore effective treatments for each type of RAD.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## References

1. Spitz R. Anaclitic depression: An inquiry into the genesis of psychiatric conditions in early childhood. Psychoanalytic Study of the Child. 1946; 1:47–53.

2. Goldfarb W. The effects of psychological deprivation in infancy. Am J Psychiatry. 1945; 102:18–33.

3. Provence, S.; Lipton, RC. Infants in institutions. New York: International Publisher Press; 1962.

4. Levy RJ. Effects of institutional care vs. Boarding home care on a group of infants. Journal of Personality. 1947; 15:233–241.

5. Tizard B, Rees J. The effect of early institutional rearing on the behaviour problems and affectional relationships of four-year-old children. J Child Psychol Psychiatry. 1975; 16(1):61–73. [PubMed: 1123417]

6. Zeanah CH, Gleason MM. Reactive attachment disorder: A review for DSM-IV. http://www.dsm5.org/Pages/Default.aspx.

7. Rutter M, Kreppner J, Sonuga-Barke E. Emanuel miller lecture: Attachment insecurity, disinhibited attachment, and attachment disorders: Where do research findings leave the concepts? J Child Psychol Psychiatry. 2009; 50(5):529–543. [PubMed: 19298474]

8. APA. Diagnostic and Statistical manual of mental disorders IV-tr. 4 ed.. Washington, D.C: American Psychiatric Association; 2000.

9. Bruce J, Tarullo AR, Gunnar MR. Disinhibited social behavior among internationally adopted children. Development and Psychopathology. 2009; 21(1):157. [PubMed: 19144228]

10. Rutter M, Colvert E, Kreppner J, et al. Early adolescent outcomes for institutionally-deprived and non-deprived adoptees. I: Disinhibited attachment. J Child Psychol Psychiatry. 2007; 48(1):17–30. [PubMed: 17244267]

11. Zeanah CH. Beyond insecurity: A reconceptualization of attachment disorders in infancy. J Consult Clin Psychol. 1996; 64(1):42. [PubMed: 8907083]

12. O'Connor TG, Marvin RS, Rutter M, Olrick JT, Bretner PA. The English and Romanian Adoptees (ERA) Study Team. Child-parent attachment following early institutional deprivation. Dev Psychopathol. 2003; 15:19–38. [PubMed: 12848433]

13. Ainsworth MS, Bowlby J. An ethological approach to personality development. American Psychologist. 1991; 46(4):333.

14. Bowlby, J. A secure base: Parent-child attachment and healthy human development. New York: Basic Books; 1988.

15. Ainsworth, MDS.; Blehar, M.; Waters, E.; Wall, S. Patterns of attachment. Hillsdale, N.J: Erlbaum; 1978.

16. Ahnert L, Gunnar M, Lamb ME, Barthel M. Transition to child care: Associations with infant-mother attachment, infant negative emotion, and cortisol elevations. Child Dev. 2004; 75(3):639–650. [PubMed: 15144478]

17. Sroufe L. Attachment and development: A prospective, longitudinal study from birth to adulthood. Attach Hum Dev. 2005; 7(4):349. [PubMed: 16332580]

18. Main M, Cassidy J. Categories of response to reunion with the parent at age 6: Predictable from infant attachment classifications and stable over a 1-month period. Dev Psychopathol. 1998; 24(1–12)

19. van Ijzendoorn MH, Scheungel C, Bakermans-Kranenburg MJ. Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. Development and Psychopathology. 1999; 11:225–249. [PubMed: 16506532]

20. Bakermans-Kranenburg MJ, Van Ijzendoorn MH, Juffer F. Disorganized infant attachment and preventive interventions: A review and meta-analysis. Infant Mental Health Journal. 2005; 26(3):191.

21. Luijk MPCM, Saridjan N, Tharner A, et al. Attachment, depression, and cortisol: Deviant patterns in insecure-resistant and disorganized infants. Developmental Psychobiology. 2010; 52(5):441. [PubMed: 20583141]

22. AACAP Task Force on Research Diagnostic Criteria: Infancy Preschool Age. Research diagnostic criteria for infants and preschool children: The process and empirical support. J Amer Acad Child Adolescent Psychiatry. 2003; 42(12):1504–1512.

23. O'Connor TG, Zeanah CH. Attachment disorders: Assessment strategies and treatment approaches. Attach Hum Dev. 2003; 5(3):223–244. [PubMed: 12944216]

24. O'Connor TG, Rutter M. Attachment disorder behavior following early severe deprivation: Extension and longitudinal follow-up. J Amer Acad Child Adolescent Psychiatry. 2000; 39(6):703.

25. Zeanah CH, Scheeringa M, Boris NW, Heller SS, Smyke AT, Trapani J. Reactive attachment disorder in maltreated toddlers. Child Abuse Negl. 2004; 28(8):877. [PubMed: 15350771]

26. Robins E, Guze SB. Establishment of diagnostic validity in psychiatric illness: Its application to schizophrenia. Am J Psychiatry. 1970 Jan; 126(7):983–987. [PubMed: 5409569]

27. WHO. The IDC-10 classification of mental and behavioral disorders: Clinical descriptions and diagnostic guidelines. 10th ed.. Geneva, Switzerland: World Health Organization; 1992.

28. Zeanah CH, Smyke AT, Koga SF, Carlson E. Attachment in institutionalized and community children in Romania. Child Dev. 2005; 76(5):1015–1028. [PubMed: 16149999]

29. Smyke AT, Dumitrescu A, Zeanah CH. Attachment disturbances in young children I: The caretaking casualty continuum. J Amer Acad Child Adolescent Psychiatry. 2002; 41(8):972–982.

30. Chisholm K. A three year follow-up of attachment and indiscriminate friendliness in children adopted from Romanian orphanages. Child Dev. 1998; 69(4):1092–1096. [PubMed: 9768488]

31. Zeanah CH, Smyke AT. Attachment disorders in family and social context. Infant Mental Health Journal. 2008; 29(3):219.

32. Boris NW, Hinshaw-Fuselier SS, Smyke AT, Scheeringa MS, Heller SS, Zeanah CH. Comparing criteria for attachment disorders: Establishing reliability and validity in high-risk samples. J Amer Acad Child Adolescent Psychiatry. 2004; 43(5):568–577.

33. Lyons-Ruth K, Bureau J, Riley C, Atlas-Corbett A. Socially indiscriminate attachment behavior in the strange situation: Convergent and discriminant validity in relation to caregiving risk, later behavior problems, and attachment insecurity. Development and Psychopathology. 2009; 21:355–372. [PubMed: 19338688]

34. Tizard B, Rees J. The effect of early institutional rearing on the behavior problems and affectional relationships of four-year-old children. J Child Psychol Psychiatry. 1975; 27:61–73. [PubMed: 1123417]

35. O'Connor TG, Bredenkamp D, Rutter M. Attachment disturbances and disorders in children exposed to early severe deprivation. Infant Mental Health Journal. 1999; 20(1):10.

36. Chisholm K, Carter MC, Ames EW, Morison SJ. Attachment security and indiscriminately friendly behavior in children adopted from Romanian orphanages. Development and Psychopathology. 1995 Spr;7(2):283.

37. Zeanah CH, Smyke AT, Dumitrescu A. Attachment disturbances in young children. II: Indiscriminate behavior and institutional care. J Amer Acad Child Adolescent Psychiatry. 2002; 41(8):983.

38. Smyke AT, Zeanah CH, Fox NA, Nelson CA. A new model of foster care for young children: The Bucharest early intervention project. Child and Adolecent Psychiatric Clinics of North America. 2009; 18(3):721–734.

39. Nelson CA, Zeanah CH, Fox NA, Marshall PJ, Smyke AT, Guthrie D. Cognitive recovery in socially deprived young children: The Bucharest early intervention project. Science. 2007; 38(5858):1937–1940. [PubMed: 18096809]

40. Zeanah CH, Koga SF, Simion B, et al. Ethical considerations in international research collaboration: The Bucharest early intervention project. Infant Mental Health Journal. 2006; 27:559–576.

41. Zeanah CH, Egger HL, Smyke AT, et al. Institutional rearing and psychiatric disorders in Romanian preschool children. Am J Psychiatry. 2009 Jun 1.166:777–785. 2009. [PubMed: 19487394]

42. Zeanah CH, Nelson CA, Fox NA, et al. Designing research to study the effects of institutionalization on brain and behavioral development: The Bucharest early intervention project. Dev Psychopathol. 2003; 15:885–897. [PubMed: 14984131]

43. Stovall, McClough KC, Dozier M. Forming attachments in foster care: Infant attachment behaviors during the first 2 months of placement. Development and Psychopathology. 2004; 16(02):253–271. [PubMed: 15487595]

44. Egger HL, Angold A. Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. J Child Psychol Psychiatry. 2006; 47(3–4):313–337. [PubMed: 16492262]

45. Egger HL, Erkanli A, Keeler G, Potts E, Walter B, Angold A. Test-retest reliability of the Preschool Age Psychiatric Assessment (PAPA). J Amer Acad Child Adolescent Psychiatry. 2006; 45(5):538–549.

46. NICHD Early Child Care Research Network. Characteristics of infant child care: Factors contributing to positive caregiving. Early Childhood Res Quart. 1996; 11:296–306.

47. Smyke AT, Koga SF, Johnson DE, et al. The caregiving context in institution-reared and family-reared infants and toddlers in Romania. J Child Psychol Psychiatry. 2007; 48(2):210–218. [PubMed: 17300560]

48. Cassidy J, Marvin RS. with the MacArthur Working Group. Attachment organization in preschool children: Procedures and coding manual (4th ed.). 1992 *Unpublished manuscript.*

49. Smyke AT, Zeanah CH, Fox NA, Nelson CA, Guthrie D. Placement in foster care enhances quality of attachment among young institutionalized children. Child Development. 2010; 81(1):212–223. [PubMed: 20331663]

50. Lyons-Ruth K, Bureau J-Fo, Riley CD, Atlas-Corbett AF. Socially indiscriminate attachment behavior in the strange situation: Convergent and discriminant validity in relation to caregiving risk, later behavior problems, and attachment insecurity. Development and Psychopathology. 2009; 21(2):355. [PubMed: 19338688]

51. Moss E, Bureau J-Fo, Cyr C, Mongeau C, St-Laurent D. Correlates of attachment at age 3: Construct validity of the preschool attachment classification system. Developmental Psychology. 2004; 40(3):323. [PubMed: 15122960]

52. Moss E, Cyr C, Bureau J-Fo, Tarabulsy GM, Dubois-Comtois K. Stability of attachment during the preschool period. Developmental Psychology. 2005; 41(5):773. [PubMed: 16173874]

53. Smyke AT, Zeanah CH, Fox NA, Nelson CA, Guthrie D. Placement in foster care enhances quality of attachment among young institutionalized children. Child Dev. 2010; 81(1):212. [PubMed: 20331663]

54. Wechsler preschool and primary scale of intelligence. San Antonio, TX: 2000.

55. Carter, AS.; Briggs-Gowan, MJ. Manual for the infant-toddler social and emotional assessment. San Antonio: 2006.

56. Carter AS, Briggs-Gowan MJ. Addendum to infant-toddler social and emotional assessment (ITSEA) manual, version 1.1. 2002

57. Carter AS, Briggs-Gowan MJ, Jones SM, Little TD. The infant-toddler social and emotional assessment (ITSEA): Factor structure, reliability, and validity. J Abnorm Child Psychol. 2003; 31(5):495. [PubMed: 14561058]

58. Briggs-Gowan MJ, Carter AS. Applying the infant-toddler social & emotional assessment (ITSEA) and brief-ITSEA in early intervention. Infant Mental Health Journal. 2007; 28(6):564.

59. Kochanska G, Murray K, Jacques TY, Koenig AL, Vandegeest KA. Inhibitory control in young children and its role in emerging internalization. Child Dev. 1996; 67(2):490. [PubMed: 8625724]

60. Carlson SM, Moses LJ. Individual differences in children's inhibitory control and theory of mind. Child Dev. 2001; 72(4):1032–1053. [PubMed: 11480933]

61. Reed M, Pien D, Rothbart M. Inhibitory self-control in preschool children. Merrill Palmer Quarterly. 1984; 30:131–137.

62. Cicchetti DV. Guidelines, criteria and rules of thumb for evaluating normed and standardized assessment instruments in psychology. Psychological Assessment. 1994; 6(4):284–290.

63. Keenan K, Wakschlag LS, Danis B, et al. Further evidence of the reliability and validity of DSM-IV odd and cd in preschool children. J Amer Acad Child Adolescent Psychiatry. 2007; 46(4):457–468.

64. Scheeringa MS, Wright MJ, Hunt JP, Zeanah CH. Factors affecting the diagnosis and prediction of PTSD symptomatology in children and adolescents. Am J Psychiatry. 2006 Apr 1; 163(4):644–651. 2006. [PubMed: 16585439]

65. Chisolm K. A three year follow-up of attachment and indiscriminate friendliness in children adopted from Romanian orphanages. Child Development. 1998; 69(4):1092–1096. [PubMed: 9768488]
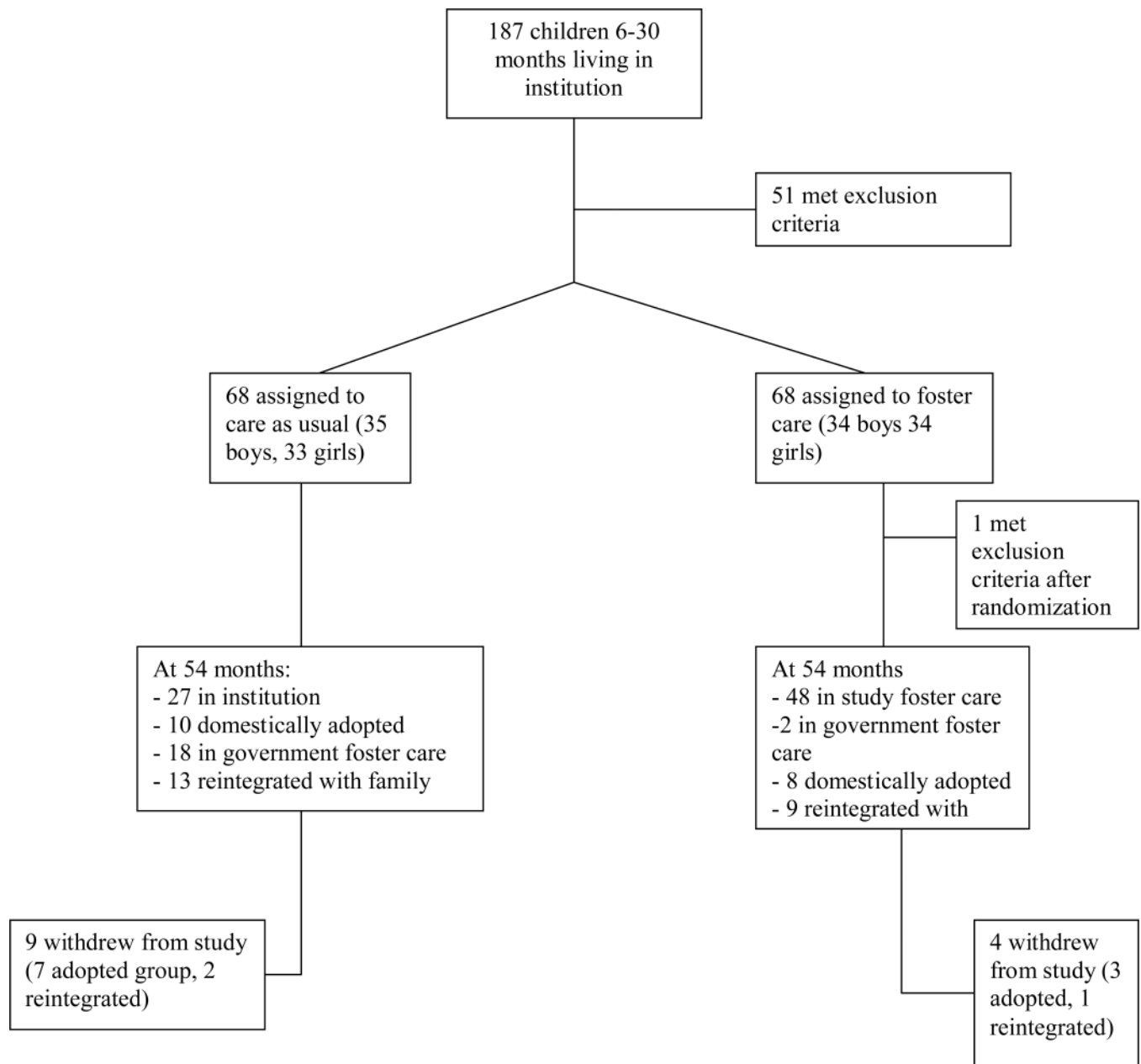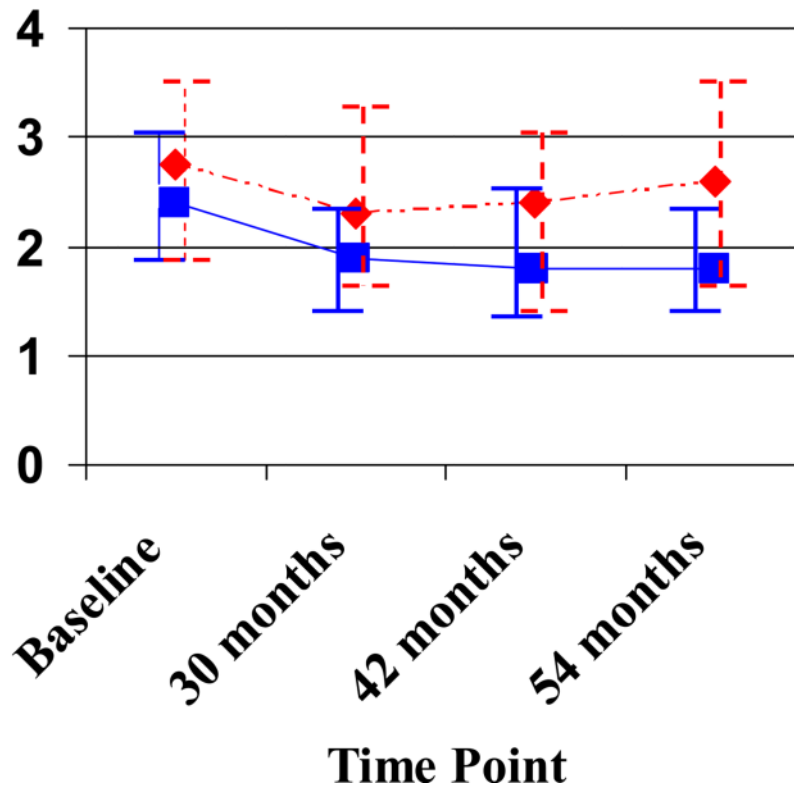
**FIGURE 1.**
Participant Flow Diagram

**FIGURE 2.**
Signs of indiscriminately social/disinhibited RAD across time points by placement status at 54 months
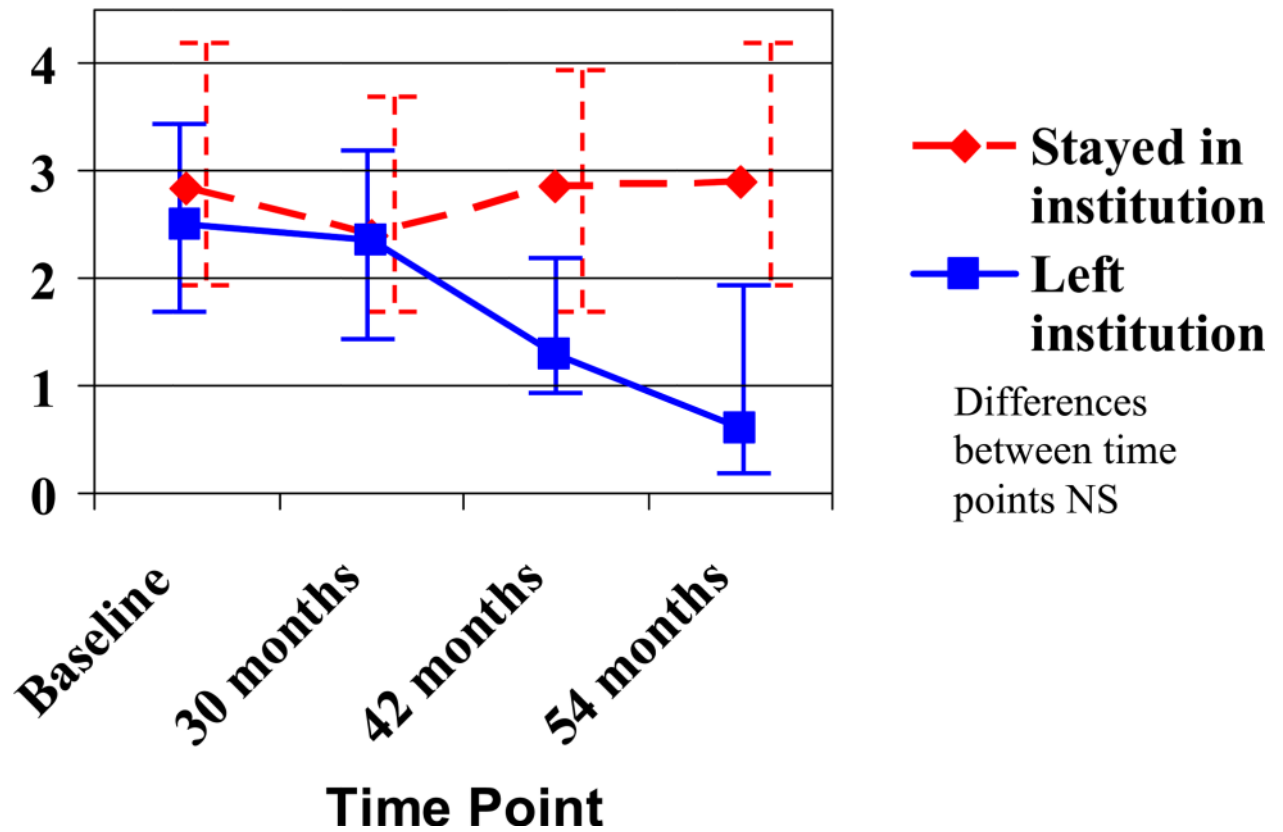
**FIGURE 3.**
Signs of emotionally withdrawn/inhibited RAD across time points by placement status at 54 months

**TABLE 1**

Demographic characteristics of participants, caregiving conditions, and Disturbances of Attachment scores

|  |  | N (%) | % |
|---|---|---|---|
| Ethnicity | Romanian | 75 | 53.9 |
|  | Roma | 39 | 28.9 |
|  | Other | 21 | 15.6 |
| Gender | Girl | 68 | 50.4 |
|  | Boy | 67 | 49.6 |
|  | **Mean** | **SD** |  |
| Age at randomization | 20.7 | 7.2 |  |
| Percent life in institution at baseline | 86.5 | 20.6 |  |
| Disturbances of Attachment |  |  |  |
| Indiscriminately social/disinhibited | Range: 0–6 |  |  |
| Baseline | 2.6 | 1.8 |  |
| 30 months | 1.9 | 1.8 |  |
| 42 months | 1.6 | 1.9 |  |
| 54 months | 1.8 | 2.1 |  |
| Emotionally withdrawn/inhibited | Range 0–10 |  |  |
| Baseline | 2.6 | 2.5 |  |
| 30 months | 1.5 | 2.0 |  |
| 42 months | 1.2 | 1.9 |  |
| 54 months | 1.1 | 2.2 |  |

**TABLE 2**

Criterion validity: Rates of children meeting criteria for indiscriminately social/disinhibited RAD by Disturbances of Attachment Interview (DAI) and Preschool Age Psychiatric Assessment (PAPA) 54 months

| | | RAD Indiscriminately social/disinhibited (DAI) | | |
|---|---|---|---|---|
| | | No | Yes | Total |
| **RAD Indiscriminately social/disinhibited (PAPA)** | No | 90 | 14 | 104 |
| | Yes | 3 | 13 | 16 |
| **Total** | | 93 | 27 | 120 |

Concordance 103/120= 85.3%, associations significant by Fisher's exact test at level of $p \leq 0.001$

**TABLE 3**

Criterion validity: Rates of children meeting criteria for emotionally withdrawn/inhibited RAD by Disturbances of Attachment Interview (DAI) and Preschool Age Psychiatric Assessment (PAPA) at 54 months

| | | RAD emotionally withdrawn/inhibited (DAI) | | |
| --- | --- | --- | --- | --- |
| | | No | Yes | Total |
| **RAD emotionally withdrawn/inhibited (PAPA)** | No | 114 | 1 | 115 |
| | Yes | 1 | 4 | 5 |
| Total | | 115 | 5 | 120 |

Concordance 118/120= 98.3, associations significant by Fisher's exact test at level of $p \leq 0.001$

**TABLE 4**

Construct Validity: Correlations between signs of RAD and caregiving quality and security of attachment

|  |  | **Caregiving Quality** | **Security of attachment** |
|---|---|---|---|
| Indiscriminately social/disinhibited RAD | Baseline | −.11 |  |
|  | 30 months | −.11 |  |
|  | 42 months | −.21[*] | −.39[***] |
| Emotionally withdrawn/Inhibited RAD | Baseline | −.33[***] |  |
|  | 30 months | −.38[***] |  |
|  | 42 months | −..29[**] | −.51[***] |

[*]
$p \leq 0.05$,

[**]
$p \leq 0.01$;

[***]
$p \leq 0.001$

**TABLE 5**

Convergent Validity: Associations between signs of indiscriminately social/disinhibited RAD and externalizing signs

| | ITSEA Activity/ Impulsivity | ITSEA Aggression/ Defiance | Bear-Dragon Procedure | PAPA ADHD signs | PAPA ODD, CD signs |
|---|---|---|---|---|---|
| Baseline (n=130) | −.−01 | −.07 | | | |
| 30 months (n=126) | .12 | .07 | | | |
| 42 months (n=123) | .19[*] | .14 | | | |
| 54 months (n=123) | | | −.28[*] | .45[***] | .30[**] |

[*]
$p \leq 0.05$,

[**]
$p \leq 0.01$;

[***]
$p \leq 0.001$

ITSEA= Infant Toddler Social Emotional Assessment
PAPA= Preschool Age Psychiatric Assessment

**TABLE 6**

Convergent validity: Correlation between emotionally withdrawn/inhibited RAD and depressive signs

| | ITSEA Depression | PAPA depression |
|---|---|---|
| Baseline (n=121) | .44*** | |
| 30 months (n=123) | .35*** | |
| 42 months (n=126) | .72*** | |
| 54 months | | .62* |

*
$p \leq 0.05$,

**
$p \leq 0.01$;

***
$p \leq 0.001$

ITSEA= Infant Toddler Social Emotional Assessment
PAPA= Preschool Age Psychiatric Assessment

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**TABLE 7**

Predictive Validity: Estimated marginal mean (EMM) scores of RAD across 4 time points in care as usual group

| | Baseline EMM score | 95% confidence Interval | 30 months EMM score | 95% confidence Interval | 42 months EMM score | 95% confidence Interval | 54 months EMM Score | 95% confidence Interval |
|---|---|---|---|---|---|---|---|---|
| Signs of indiscriminately social/disinhibited RAD | 2.5 | 0.4–4.7 | 2.1 | 0–2.3 | 2.1 | 0–4.2 | 2.2 | 0.01–4.3 |
| Signs of emotionally withdrawn/inhibited RAD | 2.8 | 2.1–3.4 | 2.4 | 1.8–3.0 | 2.0 | 1.4–2.7 | 1.9 | 1.2–2.5 |

**TABLE 8**

Functional Impairment: Indiscriminately social/disinhibited RAD and Concurrent and Predictive

| | | Concurrent associations | |
| --- | --- | --- | --- |
| | | Total Sample (n=135) | |
| | | Social Competence (ITSEA) | Total Impairment (PAPA) |
| Indiscriminately social/disinhibited RAD | Baseline (n=130) | −.13 | |
| | 30 months (n=126) | −.28[**] | |
| | 42 months (n=123) | −.21[*] | |
| | 54 months | | .49[***] |
| Emotionally withdrawn/inhibited RAD | Baseline (n=130) | −.64[***] | |
| | 30 months (n=126) | −.25[**] | |
| | 42 months (n=123) | −.60[***] | |
| | 54 months (n=123) | | .41[**] |

[*]
 $p \leq 0.05$,

[**]
 $p \leq 0.01$;

[***]
 $p \leq 0.001$

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**TABLE 9**

Contribution of RAD in logistic regression predicting functional impairment when controlling for psychiatric signs and IQ

| | | Std. Coefficient Beta | T | Statistical significance ($p \leqslant$) |
|---|---|---|---|---|
| **Signs of indiscriminately social/disinhibited RAD** | **Baseline** | −.11 | 1.7 | NS |
| | Model $R^2$= .14; F(3)=6.8 | | | |
| | **30 months** | −.24 | −2.7 | 0.01 |
| | Model $R^2$= .16; F(3)=8.3 | | | |
| | **42 months** | | | |
| | Model $R^2$= .24; F(3)=14.2 | −.05 | −.54 | NS |
| | **54 months** | .19 | 2.3 | 0.03 |
| | Model $R^2$= .43; F(3)=27.6 | | | |
| **Signs of emotionallywithdrawn/inhibited RAD** | **Baseline** | −.47 | −6.2 | 0.001 |
| | Model $R^2$= .43; F(3)=36.6 | | | |
| | **30 months** | −.20 | −2.1 | 0.04 |
| | Model $R^2$= .2 F(3)=12.0 | | | |
| | **42 months** | −.24 | −2.4 | 0.02 |
| | Model $R^2$= .46; F(3)= 34.5 | | | |
| | **54 months** | .46 | −.1 | NS |
| | Model $R^2$= .04; F(3)= 2.6 | | | |