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Validity of the Nursing Child Assessment Feeding Scale During Toddlerhood

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Abstract

This study examined the validity of the Nursing Child Assessment of Feeding Scale (NCAFS) during toddlerhood, using a longitudinal design to assess the scale's convergence with the Toddler Snack Scale (TSS) between 12 and 36 months, and comparing videotaped interactions of 116 mother–toddler dyads. Differences between TSS mutuality classifications were found for the NCAFS subscales at each age. The pattern of mean scores followed expected directions at 12 and 36 months, but only two of the six NCAFS subscales maintained this pattern at 24 months. Significant differences were found between TSS mutuality classifications and NCAFS dyadic scores at each age. With one exception, “connected” and “marginal” dyads had consistently higher dyadic scores than dyads classified as “poor” in mutuality. There were no differences between connected and marginal dyads. The NCAFS does not appear to capture control-autonomy balance as well as the TSS, and a revision for toddlerhood may be needed.

Keywords

child; feeding; parenting; observational measurement

The dependent nature of the human infant implicates parental feeding behavior as a major contributor to subsequent eating patterns in the developing child. Feeding interactions between parents and their children typically occur several times daily during the child's early years of life, and it is the quality of these interactions over time that has been proposed to modify the child's developing self-regulatory feeding/eating behaviors (Birch & Fisher, 1998; Bruch, 1973; Costanzo & Woody, 1985). Indeed, feeding interactions characterized by decreased sensitivity (Hagekull, Bohlin, & Rydell, 1997) and less responsive, more interfering and controlling parental behaviors have been observed in studies of young children with failure to thrive (Ammaniti, Ambrozzi, Lucarelli, Cimino, & D'Olimpio, 2004; Chatoor, Egan, Getson, Menvielle, & O'Donnell, 1987; Chatoor et al., 2004; Chatoor, Hirsch, Ganiban, Persinger, & Hamburger, 1998; Crittenden, 1987; Lucarelli, Ambrozzi,

Cimino, D'Olimpio, & Finistrella, 2003). Interest in feeding interaction quality as a contributor to the etiology of obesity in childhood has emerged in the literature (Faith, Scanlon, Birch, Francis, & Sherry, 2004), yet this topic has received relatively little attention during late infancy and toddlerhood, a period when children become more capable and demanding of autonomy in eating.

To address questions of etiology during a period of rapid development, we need research that uses the strength of longitudinal designs and behavioral measures of feeding interaction that are valid from infancy throughout toddlerhood. Few such measures exist and those that do have limitations in either scope or dissemination. The Feeding Scale (Chatoor et al., 1997) is specifically focused on interactions involving feeding disorders, thereby limiting its use in other populations. Another measure, the Toddler Snack Scale (TSS; Spegman & Houck, 2005), was specifically designed for toddlers up to 36 months of age, and captures salient issues of control and autonomy in feeding interactions in mother-child dyads, yet it has not been widely used. Given these limitations, we questioned whether the Nursing Child Assessment Feeding Scale (NCAFS; Sumner & Spietz, 1994a), a behavioral measure with established reliability and validity for infants to 12 months of age, which has been widely used both clinically and in research, could validly be used during toddlerhood.

Thus, the primary aim of this article is to examine the level of convergent validity between the NCAFS and the TSS, with specific attention to measurement characteristics during the transition from infancy to toddlerhood. The two scales were assessed for convergence, given their focus on the contribution of caregiver and child-interactive behaviors to feeding-interaction quality.

Method

This study involved a reanalysis of existing data collected in a longitudinal observational study of mother-child interactions at 12, 24, and 36 months (Houck, 1999); details about sample selection and procedures can be found in a previous report about reliability of the NCAFS (Hodges, Houck, & Kindermann, 2007). The Oregon Health & Science University institutional review board approved the study, and mothers provided written consent for themselves and their infants during intake into the study, at the infant age of 8 months.

Sample

Complete self-report and feeding/eating observational data at 12, 24, and 36 months were available for 116 of the 126 mother-toddler dyads. Initial demographic data were collected at intake via maternal self-report; updates were collected at each observation. This sample of mothers was mostly Caucasian (78.4%; $n = 91$) with 18% ($n = 21$) African American; four mothers were of other ethnicity. The mothers were from 17 to 47 years of age ($M = 28.3$; $SD = 7.5$) at intake into the study. Most of the mothers were high school graduates (72.4%, $n = 84$) with nearly a fifth having obtained college degrees (17.2%; $n = 20$). The proportion of mothers that were employed at intake (8 months) increased only slightly by the 36-month observation, from 54% ($n = 63$) to 60% ($n = 70$). Nearly three fourths of the mothers had partners (73%; $n = 85$), with most married ($n = 74$). Fifty-one percent ($n = 59$) of the families reported an annual income less than \$18,000, and nearly 30% (28.4%; $n = 33$)

reported an annual income more than \$28,000; the remaining one fifth (20.7%; $n = 24$) reported income between \$18,000 and \$28,000. Two thirds ($n = 76$) of the children were boys and a third ($n = 40$) were girls; most were full-term ($n = 102$), and half were firstborn ($n = 56$). Only an isolated few ($n = 5$) were reported by their mothers as having had feeding difficulties in the first few months of life; those with a diagnosed physical or cognitive disability were not included in the study. Most children were cared for in their homes rather than day care (70% at 12 months, 58% at 24 months, and 61% at 36 months).

Observational Setting

Video recording of the mother–toddler dyads occurred through a one-way mirror in a university laboratory setting. The same food items (“snack”) were provided to the dyads at each age; apple juice, cheese, crackers, and bear-shaped graham crackers were placed on a tray so that the mother could establish the feeding session for the child. At 12 months of age, the snack was served on a high chair. At 24 and 36 months, there were a child-sized table and chairs; the snack tray was placed on the table between the mother and toddler. No toys or other play items were available during snack time. For each observation, mothers were instructed that the camera would continue recording but that the snack would serve as a break. The feeding session ended after 10 minutes or sooner if the mother said so. The termination of the episode at 10 minutes meant that the natural termination of feeding was not observed for most dyads. Interactions were coded using both the NCAFS and the TSS coding systems, by separate teams of coders.

Coding Procedures

The first author was trained for coding accuracy on the NCAFS by a certified Nursing Child Assessment Satellite Training (NCAST) instructor. The second coder was also an NCAST instructor and highly trained for accuracy on the NCAFS. The coders individually coded 58 tapes and cross-coded 9 tapes for each age. The coding order of 12-month tapes was reversed for the 24-month tapes and reversed back to the original order for the 36-month tapes. Three numbers were randomly drawn every 19 (or 20) tapes to determine which tapes would be cross-coded. Interrater agreement was high as assessed by percentage agreement (average range: 90.86–94.57), Cohen’s kappa (average range: .69–.86), correlations (range: .61–.75), and t tests (Hodges et al., 2007).

Observational Measures

The NCAFS (Sumner & Spietz, 1994a) was used to assess videotaped interactions of mothers and toddlers at 12, 24, and 36 months. The NCAFS assesses mother–child interaction in the context of feeding/eating. The observational checklist of 76 binary behavioral items scored as present/absent is organized into six subscales. The four caregiver subscales include sensitivity to cues (the extent to which the caregiver accurately reads her child’s cues, reflected in positioning, the kinds of stimulation provided, and timing of stimulation, i.e., “caregiver comments verbally on child’s hunger cues prior to feeding”), response to the child’s distress (the effectiveness of the caregiver’s recognition of child distress and appropriate response to alleviate the distress, e.g., “caregiver stops or starts feeding” or “caregiver changes the child’s position” in response to a potent disengagement cue), social–emotional growth fostering (the caregiver’s ability to initiate social- and

emotional-growth fostering activities, by varying the pitch and tone of her voice, facial expressions, touch, and social interaction, e.g., “caregiver engages in social forms of interaction [plays games with child] at least once during feeding”), and cognitive-growth fostering (behaviors that reflect competency for stimulating cognitive growth by introducing the child to sights, sounds, and experiences, e.g., “caregiver verbally describes food or feeding situation to child during feeding”). The two child subscales are clarity of cues (skill and clarity with which the child sends cues to the caregiver, making it easy or difficult for the cues to be read, e.g., “child displays a build-up of tension at the beginning of feeding” or “child averts gaze, looks down or turns away during feeding”) and responsiveness to the caregiver (ability to read and respond to the caregiver’s communication cues and to adjust behaviorally, e.g., “child responds to feeding attempts most of the time”, or “child vocalizes or smiles within five seconds of caregiver’s vocalization.” See Sumner and Spietz (1994a) for subscale and item definitions and behavioral indicators. The total caregiver score (sum of four subscale scores) can range from 0 to 50 and the total child score (sum of two subscales) ranges from 0 to 26. The sum of the two scores yields a dyadic score with a maximum of 76. A high score represents more favorable interaction between the caregiver and child.

Behavioral contingency scores may also be calculated. Caregiver contingency items are behavioral responses that are consistent and timely in response to the child, as identified from the caregiver subscale; scores range from 0 to 15. Child contingency items reflect the child’s consistent and appropriate behavioral responses to the caregiver; these are typically less frequent and scores range from 0 to 3. The sum of the caregiver and child contingency scores yields a dyadic contingency score with a maximum of 18. Again, a high score represents more favorable contingency between caregiver and child.

Although extensive validity information has been reported for the NCAFS scales (Sumner & Spietz, 1994a), we are unaware of prior convergent validity studies involving the NCAFS. Concurrent validity was established with Bradley and Caldwell’s Home Observation for Measurement of the Environment (HOME) scale, $r_s = .48, .36$, and $.54$ with the caregiver, child, and dyadic scores respectively (Sumner & Spietz, 1994a). As Sumner and Spietz noted, these moderate positive correlations between the two scales were expected because, although the HOME is not focused on feeding interactions, it does address cognitive and social-emotional support for the infant.

The TSS (Spegman & Houck, 2005) was used to assess validity of extending the NCAFS to 24 and 36 months. The TSS was developed to assess mother-child interaction during feeding/eating a snack or meal through a coding system that classifies mothers on the dimensions of sensitive-responsiveness (responsiveness to the child’s cues and the initiation of behavior appropriate to the child’s developmental level and current state; Skinner, 1985) and control (directive behavior or efforts to channel the child’s behavior; Schaffer & Crook, 1980), while classifying children on the dimensions of engagement (the ability to respond positively to the initiations or approaches of others; Sumner & Spietz, 1994a, 1994b) and the ability to read the social situation and adapt behavior to the ongoing flow of interaction (Putallaz, 1983) and autonomy (independently initiated social behavior and other activity; Asher, 1983). The coding scheme was designed for the first 3 minutes of the videotaped feeding interaction only, based on the premise that the first few minutes of the interaction

challenges the dyad to negotiate control–autonomy balance and engagement as they establish the rhythm of feeding/eating. Among other behavioral classifications for mother and child, the TSS also requires a mutuality rating: 1 = *poor* (little awareness of the other's agenda, minimal negotiation, few shared goals or social interaction), 2 = *marginal* (moderate level of cooperation and some negotiation, occasions of joint goals shared or acknowledgement of the other's agenda), 3 = *connected* (predominant engagement, with agendas shared, frequent negotiation, and social interaction with both partners asserting and following), which provides a global assessment of the overall sense of social connection, cooperation, and negotiation between mother and child (Houck & Spegman, 1999). The scale has been shown to be highly reliable (Spegman & Houck, 2005).

In an observational study involving 126 mother–infant dyads at 12, 24, and 36 months, mutuality was significantly stable across all age levels: 12 to 24 months, $\chi^2(df=4) = 47.80$, $p < .000$; 24 to 36 months, $\chi^2(4) = 50.46$, $p < .000$, and 12 to 36 months, $\chi^2(4) = 39.10$, $p < .000$ (Spegman, 2000). Although these findings show that feeding-interaction patterns can be relatively stable across toddlerhood, some caution may be necessary; Hodges et al. (2007), using the NCAFS, found significant stability correlations for dyadic total scores only across the entire time window from 12 to 36 months.

Convergent validity of the TSS was previously examined in relation to the Control Autonomy Balance Scale (CABS; Booth & Houck, 1985) and the Nurse Child Assessment Teaching Scale (NCATS; Sumner & Spietz, 1994b). Associations between the TSS mutuality ratings and the CABS ratings of dyadic fit were examined using chi-square analysis. The ratings for TSS snack and CABS play were significantly associated at 12 months, $\chi^2(df=4) = 38.91$, $p < .003$; and at 36 months, $\chi^2(df=4) = 14.88$, $p < .005$, although the patterns of association suggested that mutuality and dyadic negotiation were context dependent for many dyads at 24 months and for several at 12 and 36 months (Spegman, 2000).

Analyses of variances (ANOVAs) were conducted to assess whether the TSS mutuality ratings differentiated interactional quality on the NCATS. The NCATS dyadic score differed significantly according to mutuality ratings at every observation, with the differences becoming very slightly more robust with the toddler's increasing age, $F(2, 103) = 3.05$, $p < .05$ at 12 months; $F(2, 103) = 3.28$, $p < .04$ at 24 months; $F(2, 103) = 3.77$, $p < .03$ at 36 months. In addition, ANOVAs revealed that the NCATS contingency score significantly differed by TSS mutuality ratings at 12 months, $F(2, 103) = 3.48$, $p < .04$, with a trend toward differences at 36 months, $F(2, 103) = 2.88$, $p < .06$. The pattern of means for both dyadic quality and contingency differed according to the quality of mutuality ratings in the same way at every observation (connected > some > poor). As expected, connected dyads had the highest interactional quality and contingent responsiveness, and those with poor mutuality had the lowest quality and contingent responsiveness (Spegman, 2000).

Results

Convergent validity was assessed via one-way multivariate analysis of variance (MANOVA) between the TSS mutuality ratings (connected, marginal, or poor) and NCAFS subscale

scores for the mother–child dyad. TSS ratings served as the grouping variables, and NCAFS subscale scores were the dependent variables. Validity was also assessed via one-way ANOVA between the TSS mutuality ratings as the grouping variable and the NCAFS dyadic (total) scores and NCAFS contingency scores as dependent variables. All 116 dyads were included in the analysis and no transformation of variables was deemed necessary.

12-Month Dyadic Assessment

In the MANOVA between the TSS mutuality ratings and NCAFS subscale scores at 12 months, the assumption of homogeneity of variance–covariance matrices was violated (Box's $M = 75.91$; $F(42, 10038) = 1.61$; $p < .01$), potentially distorting the estimate of error variance (Tabachnick & Fidell, 2001). Therefore, Pillai's criterion was used to evaluate multivariate significance (Olson, 1979). Significant differences on the interactional dependent variables were found between the 12-month mutuality classifications, Pillai's $V = .23$, $F(12, 218) = 2.34$, $p < .01$. The multivariate η^2 based on Pillai's V was modest at .11, observed power = .96. The pattern of means (Table 1) suggests that connected mothers demonstrated slightly higher sensitivity to cues, response to distress, social–emotional growth fostering, and cognitive growth fostering than did marginally connected mothers, who, in turn, demonstrated slightly higher levels of these characteristics than poorly connected mothers. The same pattern was apparent for children's scores on the clarity of cues and responsiveness to caregiver subscales.

ANOVAs were conducted for each of the dependent subscales as follow-up to the MANOVA, using the Bonferroni method ($p = .025$). Twelve-month mutuality classifications significantly differed on scores of social–emotional growth fostering, cognitive growth fostering, and responsiveness to caregiver, $\eta^2 = .17$ (observed power = .82), $\eta^2 = .08$ (observed power = .99), and $\eta^2 = .08$ (observed power = .78), respectively. However, Levene's test of equality of error variances revealed significant deviations among mutuality rating groups for social–emotional growth fostering, $F(2, 113) = 4.44$, $p < .05$ and cognitive growth fostering, $F(2, 113) = 14.29$, $p < .001$; these results must be interpreted with some caution.

Post hoc analyses (not included in Table 1) consisted of pairwise comparisons between mutuality rating groups to determine which mutuality classifications significantly differentiated the subscale scores. Each pairwise comparison was tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. Dyads classified as connected had significantly higher scores on maternal social–emotional growth fostering, maternal cognitive growth fostering, and child responsiveness to caregiver than did those dyads classified as poor in mutuality. Dyads classified as marginal in mutuality also scored significantly higher on maternal social–emotional growth fostering than did dyads classified as poor in mutuality. There were no significant differences between dyads considered connected versus marginal. An ANOVA revealed significant differences between 12-month TSS mutuality classifications in relation to the NCAFS dyadic score, $F(2, 113) = 9.98$, $p < .001$ (see Table 2). Post hoc analyses (not shown in Table 1) revealed that dyads rated as connected and those rated as marginal did not significantly differ from each other, but both had significantly higher NCAFS dyadic scores than did those rated as poor in mutuality. The

ANOVA revealed significant differences between 12-month TSS mutuality classifications and NCAFS dyad contingency scores as well, $F(2, 113) = 3.45, p < .05$, but post hoc analyses only revealed a trend for dyads classified as connected and as marginal to have higher NCAFS contingency scores than dyads classified as poor in mutuality ($p = 0.07$ for connected > poor; marginal > poor); again, connected and marginal dyads did not differ.

24-Month Dyadic Assessment

At 24 months, the assumption of homogeneity of variance–covariance matrices was not violated (Box's $M = 55.93, F(42, 21169) = 1.22, p > .05$), and sample cell sizes were sufficient to use Wilks's Λ to evaluate multivariate significance. Significant differences were found between the three 24-month mutuality rating classifications on the interactional variables, Wilks's $\Lambda = .82, F(12, 216) = 1.90, p < .05$. The multivariate η^2 based on Wilks's Λ was modest at .10 (observed power = .90). As at 12 months, the pattern of means at 24 months (Table 1) suggested that connected mothers had higher scores on social–emotional growth fostering than marginally connected mothers, who, in turn, had higher scores than poorly connected mothers. In a departure from the pattern of means at 12 months, marginally connected mothers had slightly higher mean scores on the response to distress and cognitive growth fostering subscales than connected mothers. Connected mothers had higher scores on these characteristics than did mothers in dyads rated as poor in mutuality. As at 12 months, connected mothers had the highest scores on sensitivity to cues whereas, unlike 12 months, poorly connected mothers had slightly higher scores than marginally connected mothers. The pattern of means also suggested that connected children demonstrated higher mean scores on responsiveness to caregiver than marginally connected children, who, in turn, demonstrated higher scores on this characteristic than poorly connected children. However, the pattern of means—contrary to 12 months—also suggested that marginally connected children had the highest scores on clarity of cues, and connected children had the lowest scores on this characteristic.

ANOVAs were conducted for each subscale as follow-up to the MANOVA, using the Bonferroni method ($p = .025$). Twenty-four-month mutuality classifications significantly differed on scores of sensitivity to cues and social–emotional growth fostering, $\eta^2 = .08$ (observed power = .78) and $\eta^2 = .10$ (observed power = .88), respectively. Post hoc analyses consisted of pairwise comparisons between rating groups to determine which mutuality ratings significantly differentiated the subscale scores (data not shown). Each pair-wise comparison was tested at the $p = .05$ level after Bonferroni correction for multiple comparisons. Those dyads rated as connected had significantly higher scores on maternal sensitivity to cues than did those classified as marginal in mutuality. In contrast with 12-month findings, there were no significant differences between dyads rated as connected or poor in mutuality. This is an unexpected finding in light of significant differences between dyads considered connected or marginally connected; however, at 24 months, mothers in dyads with poor mutuality had higher average sensitivity to cues scores than mothers in dyads with marginal mutuality. Those dyads classified as connected and those classified as marginal had significantly higher scores on maternal social–emotional growth fostering than did those classified as poor, although there were no significant differences between connected and marginal dyads.

With 24-month TSS mutuality classifications serving as the grouping variable, an ANOVA revealed differences in 24-month NCAFS dyadic scores (see Table 2). Post hoc analyses (not included in Table 2) revealed that dyads rated as connected had significantly higher quality of feeding interaction as assessed by NCAFS dyadic scores than did those rated as poor in mutuality. This was not true of dyads classified as marginal in mutuality compared with those classified as poor, in contrast to the finding at 12 months. Those dyads rated as connected and marginal were not significantly different from one another, nor were those classified as marginal compared with those poor in mutuality. There were no significant differences between 24-month TSS mutuality classifications and NCAFS dyad contingency scores.

36-Month Dyadic Assessment

Pillai's criterion was used to evaluate multivariate significance at 36 months, as the assumption of homogeneity of variance–covariance matrices was violated (Box's $M = 100.46$, $F(21, 10733) = 4.35$, $p < .001$; Olson, 1979). Significant differences were found between the mutuality classifications on the interactional variables, Pillai's $V = .28$, $F(12, 218) = 2.94$, $p = .001$. The multivariate η^2 based on Pillai's V was modest at .14 (observed power = .99). The pattern of means at 36 months (Table 1) suggests that connected mothers had slightly higher sensitivity to cues, response to distress, social–emotional growth fostering, and cognitive growth fostering than did marginally connected mothers who, in turn, demonstrated slightly higher levels of these characteristics than poorly connected mothers. The same pattern was apparent for children in terms of clarity of cues and responsiveness to caregiver. This pattern of means is identical to that observed at 12 months.

Again, as a follow-up to the MANOVA, ANOVAs were conducted separately for each of the subscales using the Bonferroni method ($p = .025$). Thirty-six-month mutuality classifications significantly differed on sensitivity to cues, $\eta^2 = .08$ (observed power = .81), social–emotional growth fostering, $\eta^2 = .09$ (observed power = .83), cognitive growth fostering, $\eta^2 = .09$ (observed power = .83), and responsiveness to caregiver, $\eta^2 = .09$ (observed power = .86). These results must be interpreted with some caution; Levene's test of equality of error variances revealed significant deviations among classifications for social–emotional, $F(2, 113) = 3.18$, $p < .05$, and cognitive $F(2, 113) = 27.87$, $p < .001$, growth fostering.

According to post hoc analyses, those dyads classified as connected had significantly higher scores on maternal sensitivity to cues, social–emotional and cognitive growth fostering, and child responsiveness to caregiver than did those classified as poor in mutuality. Marginal dyads also scored significantly higher on the maternal sensitivity to cues and social–emotional and cognitive growth fostering subscales than did dyads poor in mutuality, but did not differ from those classified as connected. The findings for social–emotional growth fostering were consistent with those at 12 and 24 months, as were the differences between connected and poor dyads on maternal cognitive growth fostering and child responsiveness to caregiver.

The ANOVA revealed significant differences between 36-month TSS mutuality classifications on NCAFS dyadic scores, $F(2, 113) = 15.72$, $p < .001$ (Table 2). Post hoc analyses (not included in Table 2) demonstrated that dyads classified as connected had

significantly higher quality of feeding interaction as assessed by NCAFS dyadic scores than did those classified as poor in mutuality. The same was true of dyads classified as marginal in mutuality compared with those classified as poor, but there were no differences between those dyads classified as connected and marginal. At all three time periods, connected dyads had significantly higher quality of feeding interaction than dyads poor in mutuality. The ANOVA for 36-month TSS mutuality ratings and NCAFS dyadic contingency scores was not statistically significant.

Summary of the Examination of Convergent Validity

Significant differences were found between the TSS mutuality classifications on the NCAFS subscales at 12, 24, and 36 months. The pattern of mean scores followed expected directions at 12 and 36 months, but only two of the six subscales (social–emotional growth fostering and responsiveness to caregiver) maintained this pattern at 24 months. Social–emotional growth fostering most consistently differentiated ratings over time. Significant differences were also found between TSS mutuality classifications on the NCAFS dyadic score at each age, with connected dyads consistently scoring higher than those classified as poor in mutuality. Dyads considered marginal in mutuality also had significantly higher dyadic scores than those classified as poor at 12 and 36 months, but not at 24 months. There were no significant differences between connected and marginal dyads on the NCAFS dyadic score.

Discussion

Across dyadic assessments, the TSS differentiated dyads in ways that the NCAFS could not capture. Patterns at 12 and 36 months mirrored one another whereas expected patterns of NCAFS subscale means for the TSS mutuality classifications at 24 months were maintained only for social–emotional growth fostering and responsiveness to caregiver. Reasons for this departure at 24 months are considered below.

At 12 and 36 months, patterns were as one would theoretically expect in the feeding/eating context, with connected dyads having the highest levels of maternal and child behaviors important to interaction quality on the NCAFS. Recall that connected dyads are those in which agendas are shared, negotiated, and followed and interactions are balanced (Houck & Spegman, 1999). Marginally connected dyads followed connected dyads in maternal and child behaviors indicative of interactional quality, an expected finding given that marginally connected dyads had more moderate levels of cooperation, less negotiation of agendas, and more imbalanced responsiveness than connected dyads (Houck & Spegman). Poorly connected dyads consistently had the lowest levels of behaviors that contribute to feeding interaction quality as measured by the NCAFS. Recall that dyads poor in mutuality demonstrated little awareness of the partner's agenda, with minimal negotiation, shared goals, and emotional/social connectedness (Houck & Spegman). This indicates that the NCAFS and the TSS converge in theoretically expected ways in regard to feeding interaction quality at 12 and 36 months.

The most salient behavioral subscales in regard to differentiation of the TSS mutuality classifications were responsiveness to caregiver and social–emotional and cognitive growth

fostering at 12 months, with the addition of sensitivity to cues at 36 months. Further analyses found consistently significant differences between connected and poorly connected dyads for these subscales. Mothers in marginally connected dyads also had significantly higher levels of social–emotional growth fostering than poorly connected dyads at 12 and 36 months. Marginally connected mothers also had significantly higher levels of sensitivity to cues and cognitive growth fostering at 36 months. However, NCAFS scores did not differentiate connected and marginally connected dyads. This same pattern was seen in differences between the TSS mutuality classifications on overall feeding interaction quality as measured by the NCAFS. At 12 and 36 months, the NCAFS dyadic scores differed between those who were poorly connected and those who were not, but not between connected and marginally connected dyads.

At 24 months, the theoretically expected matches between patterns of NCAFS subscale means and TSS mutuality rating classifications held only for maternal social–emotional growth fostering and child responsiveness to caregiver. This was a departure from the greater degree of convergence between the NCAFS and the TSS seen at 12 months. The most important NCAFS behavioral subscales, when differentiated by the TSS mutuality classifications, were maternal sensitivity to child cues and social–emotional growth fostering. The patterns for social–emotional growth fostering were consistent across toddlerhood. Thus, maternal social–emotional growth fostering remained an important indicator of mutuality in feeding interaction quality with clear distinctions between those poor in mutuality and at least marginally connected, but no clear distinction between those considered connected and marginally connected.

Mothers in connected dyads at 24 months were significantly more sensitive to cues than mothers in marginally connected dyads, but there were no differences between connected and poorly connected mothers or poorly connected and marginally connected mothers. Theoretically this should not have been the case; this finding underscores a departure from convergence between the two scales. The importance of child behaviors differentiated by dyadic mutuality ratings disappeared at 24 months. This may be due to the diminished capacity for child behavioral items on the NCAFS to differentiate toddlers at 24 months. From a developmental perspective, the period between 18 and 36 months often involves a child's active and intentional efforts to disrupt interactions with caregivers that previously had been facilitative and synchronized. Thus, this may represent a time of transition that leads to less stability in the overall quality of dyadic interaction during feeding. The only significant difference among 24-month mutuality classifications on overall feeding interaction quality was between connected and poorly connected dyads. Those dyads considered marginal in mutuality did not differ as a separate group on the NCAFS subscales.

Attention to synchronization of the goals of one partner with the ongoing goals of another is considered particularly important when one's goal is to characterize dyadic relationships (Hinde, 1976). Some judgments about the quality of this synchronization depend on the patterning of interactions, which includes the relative and absolute frequency of partners' behaviors in relation to one another (Hinde, 1976). As noted earlier, the binary format of the NCAFS limits its ability to attend to issues of frequency and, subsequently, patterning. The TSS mutuality classifications, on the other hand, were specifically designed to capture

qualities of feeding interaction. Both relative and absolute frequencies of maternal and toddler behaviors influence the ratings used to differentially classify the patterns of interaction as connected, marginal, or poor in mutuality. This difference in the scales could certainly account for the inability of the NCAFS to differentiate between connected and marginally connected dyads. The clinical meaning of this finer level of distinction by the TSS is unknown because it has not been used in studies of dyads with known feeding problems.

In addition, in our earlier reliability study of the NCAFS at 12, 24, and 36 months, the NCAFS had attrition of approximately one third of its items because of zero variance at each age; a majority of its items had very little variance (Hodges et al., 2007). This effectively decreased the ability of the NCAFS to distinguish between subjects. Remember that the NCAFS was constructed to assess feeding quality in dyads with infants up to 12 months of age. In light of this, it is interesting to note that the NCAFS and the TSS demonstrated the greatest convergent validity at 12 months. A revision of the NCAFS observational checklist for toddlerhood may have a greater capacity for differentiation of interactional quality. The clinical importance of the finer distinctions by the TSS in comparison to the NCAFS is uncertain. Future research may seek to assess this through longitudinal assessments of a mixed sample of dyads that consist of children with and without feeding problems using the TSS and a revised NCAFS. Such studies may be particularly interested in associations between quality of early feeding interactions and changes in children's weight; anthropometric data were not included in the current study.

Finally, the NCAFS also does not appear to capture control–autonomy balance in feeding interactions as well as the TSS. Control–autonomy balance is thought to be important as dyads transition from the relative dependence of infancy to the independence of toddlerhood in relation to feeding. If we were able to capture this balance well during this transition, we would be in a better position to examine the long-term consequences of early feeding interactions on child weight status. Given the extensive use of the NCAFS clinically and in research, future analysis of how it can be improved in capturing this balance between control and autonomy during feeding interactions would be beneficial.

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Table 1Means and Standard Deviations for NCAFS Subscale Scores and TSS Mutuality Classifications ($N = 116$)

Classification	12 Months		24 Months		36 Months	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Sensitivity to cues						
Connected	11.74	1.19	11.88	1.40	11.28	1.37
Marginal	11.43	1.52	10.73	1.46	11.27	1.08
Poor	10.86	1.66	10.94	1.91	10.46	1.20
Response to distress						
Connected	8.26	0.81	8.12	0.86	8.44	0.65
Marginal	8.21	1.36	8.13	0.92	8.32	1.04
Poor	8.00	1.28	8.00	0.87	7.82	0.94
Social-emotional growth fostering						
Connected	12.63	0.68	12.35	0.94	12.12	1.33
Marginal	11.94	1.05	11.89	1.21	11.94	0.98
Poor	11.10	1.45	11.20	1.62	11.21	1.23
Cognitive growth fostering						
Connected	8.89	0.32	8.88	0.33	9.00	0.00
Marginal	8.65	0.54	8.89	0.31	8.97	0.18
Poor	8.41	0.63	8.77	0.43	8.71	0.71
Clarity of cues						
Connected	12.42	1.17	12.23	1.39	12.48	1.08
Marginal	12.03	1.49	12.42	1.30	12.05	1.43
Poor	11.86	1.57	12.34	1.11	11.86	1.41
Responsiveness to caregiver						
Connected	7.53	1.22	7.31	1.12	7.72	0.84
Marginal	7.04	0.98	7.25	1.02	7.21	0.99
Poor	6.52	1.21	6.91	1.22	6.82	1.02

Note: NCAFS = Nursing Child Assessment of Feeding Scale; TSS = Toddlers Snack Scale.

Table 2

Means and Standard Deviations for Nursing Child Assessment of Feeding Scale Caregiver–Child Total Scores and Snack Scale Mutuality Classifications ($N = 116$)

Classification	12 Months			24 Months			36 Months		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Connected	19	61.37	3.04	26	60.77	3.55	25	61.04	3.12
Marginal	68	59.13	3.98	55	59.31	3.16	63	59.75	2.45
Poor	29	56.55	3.54	35	58.17	3.85	28	56.89	3.30