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ABSTRACT
                Mother-infant interaction creates a context for
socioemotional, behavioral, and cognitive development. This study used the
Nursing Child Assessment Feeding Scale (NCAFS) and the Nursing Child
Assessment Teaching Scale (NCATS) to examine mother-infant interaction in
Japanese dyads. Subjects were residing in Hikkaido, Japan, and assessments
were obtained when infants were 13, 18, and 24 months of age. Comparative
cross-sectional data were obtained from the Nursing Child Assessment
Satellite Training database drawn from populations throughout the United
States. Comparative analysis indicated major differences in the two samples,
including age, marital status, education, parity, and ethnicity, with
Japanese samples being more homogeneous. The variables that were predictive
of NCAFS/NCATS scores were different for the two samples. Birth weight was
predictive of Japanese scores, but was unavailable for the American sample.
Mother's education and age, child's gender, and birth weight were important
predictors for the Japanese sample. Changes in scores over time were
demonstrated in the Japanese sample, there were fewer comparable age
differences in the American data. It may be concluded that NCAFS/NCATS scores
reasonably measure the quality of Japanese mother-child interactions, with
further study warranted to assess the impact of different methods of
observation, using larger sample sizes and controlling for demographic and
geographical factors. (KB)

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Comparison of Mother-Infant interactions between Japanese Dyads and American Dyads

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INTRODUCTION

Mother-infant interaction is the first step in infant socialization. It not only creates a context for socioemotional development, but also behavioral and cognitive development as well. Barnard's Model is based on the mother-infant interaction in which an infant has the responsibility to give clear cues to his/her mother and to respond to the mother's behavior (Barnard, 1997). When the interaction produces a fluent circulation between the members of the dyad, the child's optimal socialization and cognitive development can be achieved; Barnard describes it as a "Waltz" (Sumner and Spietz, 1994). With colleagues, she developed the Nursing Child Assessment Satellite Training (NCAST) to measure this interaction; the associated scales have been used in many dyads with various ethnicity to assess interactions between mother and child.

However, NCAST has not assessed Japanese dyads living in Japan. The current study presents preliminary findings of Japanese mother-infant interactions using NCAST. The study's aims were to compare differences in mother-infant interactions between Japanese dyads and American dyads, and to assess the applicability of NCAST to Japanese dyads.

Japanese: Consisted of longitudinal data.

- 44 dyads at 13 months (infant age)
- 39 at 18 months
- 38 at 24 months

The dyads lived in a small city in Hokkaido, northern island in Japan.

American: Consisted of cross-sectional data on subjects drawn from the NCAST database.

- 93 at 12 months
- 70 at 13 months
- 64 at 18 months
- 64 at 24 months

The American dyads were drawn from population throughout the United States; 177(60.83%) of the American dyads were Caucasian, 78(26.80%) were African American, and 36(12.37%) were Hispanic.

METHODS

Instruments:

Nursing Child Assessment Feeding Scale (NCAFS; Sumner & Spietz, 1994)

Assesses quality of mother-infant interactions during a feeding session up to 12 months of age. It has six subscales, 4 for mothers; Sensitivity to Cues, Response to Distress, Social-Emotional Growth, Cognitive growth, and 2 for infants; Clarity of Cues, responsiveness to Caregiver, and 76 items. For the NCAFS, 13-month-old Japanese dyads were compared with 12-month-old American dyads because scores were not available beyond that age.

Nursing Child Assessment Teaching Scale (NCATS ; Sumner & Spietz, 1994)

Assesses mother-infant interactions during a play session up to36 months of age. It also has six subscales between mother and infant, and 73 items.

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Procedures:

After consenting to participate in the study, Japanese dyads were filmed both during a feeding session and a play session at home. One or two research members videotaped feeding and teaching sessions at 13 months, and teaching sessions only at 18 and 24 months. One of the researchers with current NCAFS/NCATS certification coded the videotaped interactions. Intra-agreement was 96.26% calculated with double coding of 12.27% out of all sessions.

American data were from the NCAST database collected as reliability cases by NCAST users, primarily nurses, over the past 15 years. The nurses, who provided these data observed mothers and their children throughout the United States, observed in their homes without filming.

Analysis:

First, demographic differences between the Japanese and American samples were examined.

In addition, certain demographic factors have been shown to have a strong effect on NCAFS/NCATS scores, so exploratory multiple regression analyses were used to assess these effects for Japanese and American dyads.

Then, because the Japanese sample was based on longitudinal data, the score changes over time were examined using one-way repeated-measures ANOVA for the Japanese sample, one-way ANOVA measures between the different age group subsamples of the American samples.

Finally, the subscale scores for the NCAFS and NCATS were compared at each infant age between the Japanese and American groups using t-test.

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Description of the sample

Table 1. Characteristics of the sample

Variables	Japanese(N=44)				American(N=291)			
	N	Range	Mean or %	SD	N	Range	Mean or %	SD
Mother's Age (by Data Collection Group Based on Child's age)								
12Months					93	17-40	27.16	4.62
13Months	44	20-39	30.45**	4.52	70	18-37	26.33	4.65
18Months	39	20-39	30.82**	4.43	64	17-40	28.34	4.80
24Months	38	21-40	31.58**	4.43	64	18-40	26.92	4.90
Mother's Education	42	12-16	13.24	1.23	291	6-20	13.79*	2.75
Marital Status								
Not married	0		.00		40		13.79	
Married	44		100.00		250		86.21	
Parity								
Primip	23[1]		52.27		130		44.98	
Multip	21[1]	1-5	47.73		159		55.02	
Child's Gender								
Male	18		40.91		135		46.4	
Female	26		59.09		156		53.6	
Birth Weight(g)	44	2360-3678	3074.18	314.86				

Note : 1)data at 13Month   (t-test, * p<.05,   **p<.01)

Japanese mothers' mean ages were significantly higher than American mothers, but education level was significantly lower. All the Japanese mothers were married, but 13.79% of American mothers were not married.   52.27% of Japanese mothers were primiparous, while only 44.98% of American were primiparous. There were fewer male infants than female infants in each sample.   Birth weight was not available for the American data.

Relationships between dyads' characteristics etc.

Exploratory multiple regression analyses was used to predict NCAFS/NCATS scores, using a forced entry procedure. Mother's education was entered first, followed by child's gender, and mother's age. In Japanese data, the three predicted only teaching response to distress at 13 months ($R^2 = .12$, $p < .05$). Then, the first predictor variable mother's education was changed with birth weight because birth weight seemed to be important variable in Japanese. A forced entry procedure was also used in Japanese data. Birth weight was entered first, followed by mother's education and child's gender. Table 2 shows that the three predictor variables significantly related to teaching clarity of cues at 18 months and teaching child total score at 24 months in Japanese dyads. Table 3 shows that the three variables, mother's education, child's gender, and mother's age, significantly related to teaching mother total score at 18 and 24 months in American dyads.

Table 2. Japanese NCATS Scores at 18 and 24 Months: Multiple Regression Results

Predictor Variables	Dependent Variable Clarity of Cues at 18 Months				Dependent Variable Child Total Score at 24 Months			
	β	Adjusted R^2	F(df)	p	β	Adjusted R^2	F(df)	p
		.20	4.12(3,35)	.01		.16	3.35(3,34)	.03
Birth Weight	.38				.26			
Mother's Education	-.07				.33			
Child's Sex (M=1, F=2)	-.28				-.17			

Table 3. American NCATS Scores at 18 and 24 Months: Multiple Regression Results

Predictor Variables	Dependent Variable Mother Total Score at 18 Months				Dependent Variable Mother Total Score at 24 Months			
	β	Adjusted R^2	F(df)	p	β	Adjusted R^2	F(df)	p
		.14	4.47(3,60)	.01		.22	7.05(3,60)	.00
Mother's Education	.01				.23			
Child's Sex (M=1, F=2)	-.32				-.20			
Mother's Age	.30				.33			

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NCATS score changes by age

Table 4. shows NCATS subscales in Japanese dyads, which had significant changes in their scores by age. Table 5 shows NCATS subscales in American dyads, which had significant changes in their scores by age.

Table 4. Repeated-Measures ANOVA for NCATS subscales by Age (Japanese, N=36)

Variables	13 Months M(SD)	18 Months M(SD)	24 Months M(SD)	df	F	p
Social-Emotional Growth	8.78(.96)	8.36 (.99)	7.83 (.97)	2	8.66	.00
Cognitive Growth	13.67(2.93)	14.17(1.46)	14.89(1.30)	2	6.15	.00
Response to Distress	10.08(.69)	9.69 (.92)	8.58(1.32)	2	26.46	.00

In Japanese dyads, mean scores of social-emotional growth fostering and response to distress decreased as age increased, however cognitive growth fostering score increased as age increased.

Table 5. ANOVA for NCATS subscale by Age (American, N=208)

Variables	13 Months (N=70) M(SD)	18 Months (N=64) M(SD)	24 Months (N=64) M(SD)	df	F	p
Clarity of cues	8.49(1.26)	8.34 (1.26)	7.95(1.39)	2	2.96	.05

In American dyads, only one subscale score had a significant difference among three ages. The score decreased as age increased.

Table 6 . Comparison of Japanese dyads at 12 months with American Dyads at 13 months Using NCAFS

	Japanese at 13 Months (N=42)		American at 12 Months (N=93)	
	M	SD	M	SD
Mother				
Sensitivity to Cues	12.12	1.04	13.12**	1.67
Response to Distress	9.60	.89	9.65	1.83
Social-Emotional Growth	12.33	.85	12.04	1.89
Cognitive Growth	7.93	.81	7.75	1.42
Mother Total Score	41.98	1.87	42.56	5.02
Child				
Clarity of Cues	13.55	1.45	13.39	1.64
Responsiveness to Caregiver	8.12	1.29	8.33	1.73
Child Total Score	21.67	2.25	21.72	2.79
Total Feeding Score	63.64	3.02	64.28	6.44
Mother Contingency	12.43	1.02	12.82	2.05
Child Contingency	2.07	.41	1.92	.78

(t-test, **$p<.01$)

In feeding session, there was no significant difference between Japanese and American dyads in each subscale of NCAFS except sensitivity to cues. However, standard deviations (SD) of American mother scores tended to be greater than the SDs of Japanese mother scores. SDs of both infant groups was similar.

Table 7. Comparison of Japanese Dyads with American Dyads at 13 Months Using NCATS

	Japanese (N=44)		American (N=70)	
	M	SD	M	SD
Mother				
Sensitivity to Cues	8.82	1.17	9.43*	1.48
Response to Distress	10.16	.71	9.83	1.99
Social-Emotional Growth	8.77	.94	9.21	1.93
Cognitive Growth	13.61	1.87	13.04	2.93
Mother Total Score	41.32	3.37	41.51	6.89
Child				
Clarity of Cues	9.43**	.66	8.49	1.26
Responsiveness to Caregiver	9.55**	2.27	8.20	3.16
Child Total Score	18.98**	2.61	16.69	3.94
Total Teaching Score	60.30	4.24	58.20	8.45
Mother Contingency	15.82	2.33	16.79	3.77
Child Contingency	8.84**	1.98	7.47	2.97

(t-test, * $p<.05$, ** $p<.01$)

T-tests found the scores for all four child subscales were significantly higher among Japanese infants than American infants, while scores for sensitivity to cues were higher among American mothers than among Japanese mothers. SDs of NCATS scores at 13 months had the same pattern as NCAFS scores, i.e., the difference between the two mother groups was greater than the two infant groups.

Table 8. Comparison of Japanese Dyads with American Dyads at 18 Months Using NCATS

	Japanese at 18 Months (N=39)		American at 18 Months (N=64)	
	M	SD	M	SD
Mother				
Sensitivity to Cues	8.97	.96	9.80**	1.10
Response to Distress	9.67	.90	10.17*	1.54
Social-Emotional Growth	8.31	1.00	9.42**	1.54
Cognitive Growth	14.05	1.54	13.77	2.93
Mother Total Score	41.00	3.18	43.16**	5.29
Child				
Clarity of Cues	9.74**	.44	8.34	1.26
Responsiveness to Caregiver	9.87**	1.24	8.11	3.14
Child Total Score	19.62**	1.35	16.45	3.99
Total Teaching Score	60.62	3.49	59.61	7.82
Mother Contingency	16.10	2.14	17.56**	2.63
Child Contingency	8.97**	1.06	7.39	2.95

(t-test, * p<.05, ** p<.01)

Again, scores for all four of the child subscales were significantly higher among Japanese children than American children, but subscale scores of American mothers were significantly higher than for Japanese mothers in 5 out of 6 subscales and the 4 total scores.

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Table 9. Comparison of Japanese Dyads with American Dyads at 24 Months Using NCATS

	Japanese at 24 Months (N=38)		American at 24 Months (N=64)	
	M	SD	M	SD
Mother				
Sensitivity to Cues	9.29	.98	9.48	1.55
Response to Distress	8.58	1.29	10.33**	1.63
Social-Emotional Growth	7.87	.96	9.02**	1.57
Cognitive Growth	14.82*	1.31	14.00	2.65
Mother Total Score	40.55	2.58	42.83**	5.80
Child				
Clarity of Cues	9.74**	.50	7.95	1.39
Responsiveness to Caregiver	9.97**	1.75	7.91	2.79
Child Total Score	19.71**	1.90	15.86	3.87
Total Teaching Score	60.26	3.04	58.69	7.97
Mother Contingency	15.26	2.19	17.28**	3.05
Child Contingency	9.18**	1.50	7.22	2.58

(t-test, * p<.05, ** p<.01)

The findings repeated at 18 and 24 months: Japanese children scored higher than their counterparts on all 4 subscales, while American mothers scored higher than Japanese mothers on 5 of the 6 subscales. Japanese mothers had only one subscales score, cognitive growth fostering, significantly higher than American mothers. SDs of American mothers also tended to be greater at 18 and 24 months, SDs for child scores remained similar.

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DISCUSSION

There are a number of limitations to the study that may have influenced the findings. First, there were major differences in the Japanese and American samples, including age, marital status, education level, parity and ethnicity. The Japanese sample was a more homogeneous sample, as demonstrated by the narrower standards deviations, which may have influenced the results.

Second, the variables that were predictive of NCAFS/NCATS scores were different for both samples. Birth weight, which was predictive for Japanese scores, was unavailable for the American samples. In addition, there was greater variation in American mother's age and education levels than among Japanese mothers. According to the results, mother's education, child's gender, mother's age and infant birth weight are important variables to consider in assessing mother-infant interactions in Japanese dyads.

Third, changes in scores over time were demonstrated in the Japanese sample, which was longitudinal; the lack of change in scores by infant age in American sample could be directly attributed to the cross-sectional nature of the data.

Fourth, there was a difference in mode of observation. American mother-infant interactions were merely observed in the home, while Japanese dyads were videotaped, so the mothers may have hesitated to behave as they did in their daily life. In response to cultural norms, they may have exhibited fewer emotions, gestures, and verbal behaviors in front of a camera and an observer. A prior study in which both Japanese and American samples were videotaped found Japanese mothers scored higher on response to distress, mother contingency, and mother total score compared to American mothers, and Japanese infants scored higher on response to caregiver and child contingency (Hirose and Foss, 1998). Those findings suggest that if the observation method had been equivalent, the Japanese mother scores might have been higher than American mother scores.

Barnard (1997) mentioned risk factors predictive of low NCAFS/NCATS scores. Mothers with less than high school education is one of them. None of Japanese mothers had less than high school education but some of American mothers did. She also said that less educated older mothers had lower scores as low as adolescent mothers. Japanese mothers' mean education year was significantly less than

American mothers' and their mean age were significantly older than American. Based upon Barnard's findings, the reason of lower Japanese mothers' scores might be related to less education of Japanese mothers. However, Japanese children's scores were significantly higher than American children. The two inconsistent results need to be explained more. It seems that mother's education level does not have so much effect on their interactions as it does on American interactions. American Mothers in the study of Hirose and Foss (1998) had higher education but half scores of all NCAFS scores were significantly higher in Japanese than Americans.

In conclusion, it seems that NCAFS/NCATS scores reasonably measured the quality of Japanese mother-child interactions. However, further study is warranted to assess the differences in response to being observed or videotaped, using larger sample sizes, and controlling for demographic and geographical factors. We felt that NCAST works well for assess Japanese mother-child interactions and that we can use the scale for Japanese nursing.

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