BEHAVIORAL DEVELOPMENT OF YUCHENG CHILDREN AS COMPARED TO THEIR MATCHED CONTROLS

CHEN S.J.[1],**LAI T.J.**[1],**GUO Y.L.**[2]**YU M.L.**[3],**HSU C.C.**[1]

[1]Department of Psychiatry, [2]Department of Industrial Health, and [3]Department of Public Health, National Cheng-Kung University Medical College, 138 Sheng Li Road, Tainan, Taiwan, Republic of China

The objective of this study is to compare the behavioral development in118 Yucheng children with their matched control children.We used revised Chinese versions of Rutter's Behavior Rating Scales for Parents(1) and Werry-Weiss-Peters Activity Check List for Parents(2) to assess children's behaviors. The questionnaires were filled out by a parent with the instruction of an interviewer. Every Yucheng child and his/her matched control were evaluated on the same day.The evaluations were conducted annually since fall 1985. Because the children were born over a seven-year period, they were of different ages in any round of follow-up. We cumulatively combined the scores from all eight follow-up years and analysed the scores by age. Paired t-tests were used to compare the mean of difference between Yucheng and control children in each pair at each age.

We used the Rutter scale from age 3 years on because the percentage of questions not applicable to children 3-4 and 5+ years of age were negligible,i.e. 3% and 0% respectively. At each age level Yucheng children had mean health problem subscores 0.96 to 1.35 points higher than those of controls; all differences were statistically significant except for age 12. Similar findings were observed on the habit and behavior subscores. See table 1.

Table 1:Comparison by scores on Rutter's Scale and by age

Age	Yu-Cheng (X± S.D.)		Control (X± S.D.)		Mean of difference		Paired t-value		P value	
	Health	Habit Behavior	Health	Habit Behavior	Health	Habit Behavior	Health	Habit Behavior	Health	Habit Behavior
3≦ age< 4	5.25±	2.41	3.91±	1.82	1.35		3.69		0.000*	
	8.34±	5.47	7.02±	4.31	1.32		2.56		0.006*	
(N=73)	7.04±	4.71	5.40±	4.02	1.64		4.03		0.000*	
4≦ age< 5	5.03±	2.17	4.07±	1.94	0.96		3.81		0.000*	
	6.00±	4.14	5.50±	4.67	0.51		1.48		0.071	
(N=86)	8.65±	5.18	7.35±	4.40	1.30		2.99		0.002*	
5≦ age< 6	4.42±	2.13	3.48±	1.73	0.94		3.51		0.001*	
	3.88±	2.96	3.42±	2.89	0.46		1.67		0.049*	
(N=92)	9.30±	5.20	8.22±	4.33	1.08		2.29		0.012*	
6≦ age< 7	4.15±	2.59	3.16±	1.80	0.98		3.39		0.001*	
	4.29±	3.74	3.34±	3.07	0.95		3.24		0.001*	
(N=109)	8.60±	5.14	7.30±	4.58	1.31		3.62		0.000*	
7≦ age< 8	3.76±	1.83	2.41±	1.51	1.34		6.38		0.000*	
	3.18±	2.71	2.39±	2.10	0.78		3.71		0.000*	
(N=112)	9.15±	4.95	7.01±	4.37	2.14		4.63		0.000*	
8≦ age< 9	3.59±	2.04	2.46±	1.58	1.14		5.01		0.000*	
	2.75±	2.01	2.20±	1.82	0.55		2.56		0.012*	
(N=118)	8.72±	5.03	6.83±	4.40	1.89		3.83		0.000*	
9≦ age< 10	3.65±	2.41	2.35±	1.38	1.31		4.72		0.000*	
	2.24±	2.22	1.50±	1.55	0.74		3.26		0.002*	
(N=97)	10.28±	4.93	7.42±	4.36	2.86		5.50		0.000*	
10≦ age< 11	3.78±	2.77	2.46±	1.67	1.32		3.84		0.000*	
	2.40±	2.23	1.58±	1.62	0.82		3.25		0.002*	
(N=86)	8.31±	4.28	6.96±	4.23	1.35		2.61		0.011*	
11≦ age< 12	3.27±	2.47	2.30±	2.03	0.96		2.73		0.008*	
	2.22±	1.98	1.79±	1.70	0.43		1.65		0.104	
(N=69)	7.76±	4.48	5.57±	3.93	2.29		3.92		0.000*	
12≦ age< 13	2.77±	2.09	2.44±	1.60	0.33		0.78		0.439	
	1.55±	1.91	1.33±	1.85	0.23		0.55		0.585	
(N=44)	6.63±	5.43	6.18±	4.46	0.44		0.45		0.655	

Table 2 shows that at each age level Yucheng children had activity scores 1.85 to 6.89 points higher than those of controls, and the differences reached statistical significance for ages 4, 7, 8, 9 and 10.

Table 2: Comparison by activity scores and by age

Age	Yu-Cheng (X± S.D.)	Control (X± S.D.)	Mean of difference	Paired t-value	P value
3< age< 4 (N=74)	47.41± 15.42	43.85± 13.38	3.56	1.49	0.070
4≦ age< 5 (N=87)	47.95± 15.33	43.18± 12.99	4.77	2.47	0.008*
5≦ age< 6 (N=94)	42.58± 14.56	40.72± 14.76	1.85	0.93	0.178
6≦ age< 7 (N=110)	40.91± 15.62	38.20± 14.97	2.71	1.11	0.240
7≦ age< 8 (N=111)	40.23± 14.86	36.17± 14.75	4.06	2.34	0.011*
8≦ age< 9 (N=100)	39.76± 15.61	32.87± 14.55	6.89	3.65	0.000*
9≦ age< 10 (N=79)	37.88± 16.38	32.14± 12.91	5.74	2.78	0.004*
10≦ age< 11 (N=71)	34.40± 16.83	28.76± 15.18	5.64	2.52	0.007*
11≦ age< 12 (N=49)	27.54± 13.92	25.28± 13.93	2.27	1.10	0.140

The data show that Yucheng children, 0-8 years after their mothers' exposure to PCBs, had mildly disordered behavior. The effect persisted as the children aged and appeared to be similar in health, habit and behavioral subscores of Rutter's Scale, and possibly in activity scores. Behavior was evaluated in a group of North Carolina children exposed perinatally to background levels of PCBs. No significant relationship between exposure and child's work habit or conduct grades was found(3). Perinatal exposure to PCBs was reported to cause impaired swimming and impaired active avoidance in rats(4,5), and impaired schedule-control behavior in rhesus monkeys(6,7). The results could be due to unknown bias or confounding variables. Some of the mothers and some of the children still have visible physical signs, such as abnormal patterns of pigmentation, and hypoplastic nails. The visible stigma may remind the parents that they were

poisoned and therefore their children are "abnormal", and this perception of the parents may affect their reportings. The results could also be confounded by variables not measured in our study, such as temperament of the mother, child rearing attitudes or behaviors, and family and parental stresses. We have collected data on home environment, including physical and mental environments, for both Yucheng and control families in recent years. We will soon analyse those data and hope the results may shed light on the above-mentioned issues.

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