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The Relationship between Quality of Home Environment and Mental Scores of Children attending the UPM Laboratory Preschool*

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ABSTRAK

Kajian ini bertujuan untuk menentukan perkaitan di antara kualiti persekitaran rumah yang disediakan oleh ibu bapa untuk anak-anak mereka dan prestasi mental anak-anak. Kajian ditumpukan kepada 64 orang kanak-kanak berumur di antara 5 hingga 6 tahun, yang menghadiri Makmal Prasekolah Universiti Pertanian Malaysia. Hasil kajian menunjukkan secara keseluruhannya kanak-kanak yang terlibat di dalam kajian ini mempunyai keluarga yang menyediakan persekitaran rumah yang menggalakkan. Selaras dengan kajian-kajian yang lalu, kualiti persekitaran rumah responden mempunyai perkaitan dengan latarbelakang keluarga. Kedua-dua pendidikan dan pendapatan ibu bapa mempunyai perkaitan dengan kualiti persekitaran rumah. Kualiti persekitaran rumah juga didapati mempunyai perkaitan yang signifikan dengan prestasi mental kanak-kanak. Kanak-kanak daripada persekitaran rumah yang meransang kognitif memperolehi skor yang lebih tinggi di dalam semua sub-skala Weschler Preschool and Primary Scales of Intelligence daripada kanak-kanak lain dalam kajian.

ABSTRACT

The purpose of this study was to determine the relationship between the quality of home environment that parents provide for their children and the children's mental performance. The study focused on 64 children, aged 5 to 6 years, from the Universiti Pertanian Malaysia Laboratory Preschool. Results of the study show that, generally, most of the children came from a relatively supportive home environment. Consistent with past research, the quality of home environment correlated with family background. Both parents' education and income correlated with the quality of the home environment. The quality of the home environment correlated significantly with the children's mental performance. Children from a cognitively stimulating home environment achieved higher scores on all the subscales of the Weschler Preschool and Primary Scales of Intelligence.

INTRODUCTION

Of the various environmental factors that influence development during early childhood, the family and home environment represents one of the most significant factors in a young child's life. Previous studies have provided evidence that a secure child who has had a harmonious and positive relationship with his parents tends to become a competent, responsible and productive adult (Belsky *et al.* 1984; Maccoby and Martin, 1983). Findings from recent studies also support the association between home environment and a child's level of development during early childhood (Beckwith and Cohen, 1988; Bradley and Caldwell, 1989; Bradley and Casey, 1984; Bradley *et al.*, 1989; Bullock and Pennington, 1988; Ninio and Rinott, 1988; Rozumah and Luster, 1992). These studies revealed that a home with appropriate tools for stimulation and a warm, facilitative relationship between parents and children made up the best combination that would encourage optimal learning in children.

Bee (1985) in her review of past studies summarized that the home environment of children who achieved higher IQ scores had appropriate play materials and parents who were democratic, emotionally and verbally responsive and had realistic goals for their children. A study by Rohani

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et al. (1989) reported similar findings. The mental abilities of the children were associated with the availability of appropriate play materials, variety of stimulation, organization of the physical environment and availability of language and academic stimulation within the home environment. Bradley *et al.* (1989) reported a collaborative study which also provided similar evidence. The study found that measures of specific aspects of the child's home environment such as parental responsitivity and availability of stimulating play materials were more strongly related to children's cognitive development than global measures of environmental quality such as family socio-economic status. The importance of certain aspects of the home environment on children's achievement was also investigated by Rozumah (1992). The study found that children who did well on achievement tests had mothers who provided more cognitively stimulating home environments. Children whose parents had a higher level of education and a higher family income were also found to perform better on the tests.

The effect of the early home environment is not transient. Longitudinal studies have indicated that children who had experienced a stimulating home environment during their childhood years tended to thrive better at schools (Bradley and Caldwell, 1984a; Bradley *et al.*, 1988a; Bradley *et al.*, 1988b). The early home environment is therefore a valuable indicator of the learning environment available to the child early in life and the potential performance of the child when he enters formal schooling.

The present study was designed to determine the relationship between the quality of home environment and the children's level of mental tests performance with three specific objectives in mind: 1) To determine the quality of the home environment available to the preschool child; 2) To determine the relationship between family background and the quality of the children's home environment; and 3) To determine the relationship between the quality of the home environment and the children's mental performance.

METHODOLOGY

Sample

Subjects for the study were 64 children aged 5 to 6 years from the Universiti Pertanian Malaysia Laboratory Preschool. Most (90%) of the children were Malays, and the rest were Indians and Chinese. Fifty-two percent were males, and 48% were females.

Instrument

a. *Home Inventory*

The quality of the children's home environment was assessed using the Preschool Version of the HOME (Home Observation for Measurement of the Environment) Inventory by a trained research assistant. The HOME has been shown to be a highly reliable and valid measure, and a strong predictor of child outcomes (Bradley and Caldwell, 1984a; Gottfried, 1984; Suriani, 1988). Suriani found an alpha coefficient of .89 for the HOME in her study on Malaysian children. The preschool HOME Inventory is an observation/interview technique that assesses the quality of physical, cognitive, social and emotional stimulation available to the child within the home environment.

The Preschool Version of the HOME Inventory (henceforth HOME) is composed of eight subscales. These subscales include: 1) toys, games and reading materials; 2) language stimulation; 3) physical environment; 4) pride, affection and warmth; 5) stimulation of academic behavior, 6) modeling and encouragement of social maturity; 7) variety of experience; and 8) acceptance. Each item of the subscales is scored by giving 1 point for the presence of stimulation or 0 for the absence of stimulation for the child within the home. The total HOME is determined by adding scores of the 8 subscales of HOME. High scores indicate high quality home environment. Caldwell and Bradley (1984) reported an internal consistency of .93 for HOME. HOME was translated into Bahasa Melayu (the national Malaysian Language) and retranslated into English. A ninety-five percent agreement was calculated between the original and the retranslated versions.

b. *Weschler Preschool and Primary Scales of Intelligence* (WPPSI).

The WPPSI, designed to assess the intellectual abilities of preschool children, are divided into 10 major components: 1) information; 2) vocabulary; 3) arithmetic; 4) similarities; 5) comprehension; 6) animal house; 7) picture completion;

8) mazes; 9) geometric design; and 10) block design. Each component of the WPPSI is scored according to specific criterion as described in the manual by Weschsler (1963). Weschsler found a strong correlation between the WPPSI and the Stanford-Binet Intelligence Scale indicating that the WPPSI is a reliable measure of children's mental performance. The first five components (1-5) are calculated to make up the Verbal IQ while the second group of five components (6-10) make up the Performance IQ. The scores of all ten components are combined to calculate the Full IQ. The WPPSI was administered in Bahasa Melayu.

Procedure

The WPPSI test was individually administered to the children in their preschool setting. A home visit was then arranged. The parents were allowed to choose the time at their own convenience. During the home visit, the research assistant conversed with the parents on topics related to the family background, the target child's abilities and how parents usually spend their time with the target child. At the same time the research assistant would mark her checklist on the HOME Inventory, questioning the parents on the items which she could not observe herself. The visit lasted, on an average, about an hour. To determine the relationships between the independent and dependent variables the Pearson Correlation analysis was used.

RESULTS

Family Background

The education level of the respondents' parents ranged from primary education to doctoral degrees in specific fields. Table 1 indicates that 22% of the children's fathers had masters degrees and 24% had the Malaysian Certificate of Education. Twenty-three percent of the mothers had the Malaysian Certificate of Education. In addition, 81% of the mothers involved in the study were employed outside the home.

The parents' monthly income ranged from below RM500 to above RM3000 (Table 2). Most (34%) of the fathers earned between RM500 to RM999 while most of the mothers (37%) earned less than RM500 per month. Almost one quarter of the fathers earned more than RM2000.

TABLE 1
Percentage distribution of parents' educational background

Level of education	Father		Mother	
	N	%	N	%
Primary education	4	6.0	6	9.4
Lower Certificate of Education/SRP	6	10.8	5	7.8
Malaysian Certificate of Education/SPM	16	24.1	15	23.4
Higher School Certificate/STPM	4	4.8	15	23.1
Diploma	2	3.1	4	6.3
Degree	3	4.7	9	14.0
Masters	14	21.8	10	15.6
Ph.D	5	7.8	5	7.8
Not available	10	15.6	8	12.5
	64	100.0	64	100.0

TABLE 2
Percentage distribution of parent's monthly income

Income (RM)	Father		Mother	
	N	%	N	%
Less than RM500	10	15.6	24	37.4
500 - 999	22	34.4	16	25.0
1000 - 1499	10	15.6	5	7.8
1500 - 1999	4	6.3	5	7.8
2000 - 2499	7	10.9	8	12.5
2500 - 2999	3	4.7	1	1.6
Above 3000	5	7.8	4	6.3
Not available	3	4.7	1	1.6
TOTAL	64	100.0	64	100.0

In terms of family size, a majority of the respondents came from a family of four to six members (Table 3). This is a relatively average family size, that is, a family of two to four children. The largest family size among the respondents was 10 persons.

TABLE 3
Percentage distribution of family size

Family size	N	%
Less than 4	1	1.6
4 - 6	56	87.5
Above 7	7	10.9
TOTAL	64	100.0

HOME and Mental Scores

Table 4 presents the results of the assessment of the quality of the children's home environment. In comparison to Caldwell and Bradley's (1984) report on the preschool version of the HOME Inventory, the respondents scored relatively high on three subscales of the HOME: verbal stimulation, academic stimulation and modeling of social maturity. The mean for the rest of the subscales (toys, game and materials; physical environment; warmth and affection; and acceptance) was about the same. However, the respondents scored much lower in the variety of experience subscale when compared to the mean reported by Caldwell and Bradley (1984).

TABLE 4
Mean scores and standard deviations for pre-school home inventory

HOME	Mean	SD
Toys, games and reading	6.02	0.60
Verbal stimulation	7.60	0.55
Physical environment	5.97	0.23
Warmth and affection	6.12	0.80
Academic stimulation	4.66	0.67
Modeling	3.92	0.86
Variety of experiences	6.48	1.12
Acceptance	3.18	0.59
Total HOME (P)	43.95	3.69

The results of the children's scores on the WPSSI test are shown in Table 5. As noted earlier, the WPPSI was used to assess the preschool children's intellectual abilities. The WPPSI results showed that the respondents had lower means for five of the subscales than those reported by Weschler (1967). With reference to Table 5, the respondents in this study had lower means for information, vocabulary, comprehension, animal house and picture completion. Mean scores for arithmetic, similarities, mazes, geometric design and block design did not differ much from those reported by Weschler (1967).

The WPPSI test generated three scores, namely, Verbal IQ, Performance IQ, and Full IQ. A majority of the respondents (72%), obtained above average scores (110-129) on Performance IQ and a large proportion (48%) obtained above average scores on Full IQ (Table 6).

TABLE 5
Mean scores and standard deviations of subscales of WPPSI

Subscales	Mean	SD
Information	10.50	2.44
Vocabulary	9.42	1.86
Arithmetic	11.09	2.47
Similarities	12.95	2.70
Comprehension	9.05	2.25
Animal house	10.64	2.65
Picture completion	12.92	2.31
Mazes	12.58	2.16
Geometric design	12.75	2.63
Block design	14.05	1.78

TABLE 6
Percentage distribution of WPPSI IQ scores

IQ scores	Verbal %	Performance %	Overall %
Below 90 (learning disability)	6.3	4.7	3.1
90 - 109 (average)	68.7	10.9	45.3
110 - 129 (above average)	25.0	71.9	48.4
Above 130 (superior)	0.0	12.5	3.1

Relationship between HOME and Family Background

The results of the study indicated that the total HOME and one subscale of the HOME (toys, games, and materials) were significantly related to four of the family variables: father's education, mother's education, father's income and mother's income. Table 7 shows that toys, games and reading materials were significantly related to all the four variabes, i.e. father's education ($r = .75$, $p < .01$), mother's education ($r = .64$, $p < .01$), father's income ($r = .64$, $p < .01$), mother's income ($r = .50$, $p < .01$). The total HOME was related significantly to all the four family variables: Father's education ($r = .68$, $p < .01$), mother's education ($r = .59$, $p < .01$), father's income ($r = .57$, $p < .01$) and mother's income ($r = .46$, $p < .01$). Variety of experience was significantly related to father's education ($r = .40$, $p < .01$) and acceptance was significantly related to mother's income ($r = .33$, $p < .01$). Other subscales of the HOME were also related to the family background variables;

TABLE 7
Correlations between selected family background and preschool HOME

	family background			
HOME	Father's education	Mother's education	Father's income	Mother's income
Toys, games and materials	.75*	.64*	.64*	.50*
Verbal stimulation	.14	.11	−.03	−.20
Physical environment	.09	.09	.07	.12
Warmth and affection	.12	.20	.21	.28
Academic stimulation	.16	.27	.17	.16
Modeling	.28	.24	.26	.30
Variety of experiences	.40*	.25	.32	.11
Acceptance	.27	.29	.15	.33*
Total HOME (P)	.68*	.59*	.57*	.46*

* $p < .01$

however, the relationships were not significant at the .05 level.

Relationship between Mental Scores and Family Background

Correlational analyses computed between the children's WPPSI scores and family background produced several significant findings. The subscales of WPPSI tended to correlate significantly with mother's education, father's income and mother's income (Table 8). Mother's education correlated significantly with vocabulary ($r = .35$, $p < .01$) and verbal ($r = .33$, $p < .01$). Mother's income was found to correlate significantly with information ($r = .37$, $p < .01$), vocabulary ($r = .47$, $p < .01$), animal house ($r = .35$, $p < .01$) and Verbal IQ ($r = .40$, $p < .01$). Father's income correlated significantly with information ($r = .34$, $p < .01$), block design ($r = .36$, $p < .01$), and Verbal IQ ($r = .38$, $p < .01$). These findings suggest that the more educated the parents are, the more likely they will structure their home environment in ways that encourage children's intellectual development. In addition, parents with higher income may be more able financially to provide educational resources that promote positive development in children.

TABLE 8
Correlation between selected family background factors and selected subscales of WPPSI

	family background		
WPPSI	Mother's education	Father's income	Mother's income
Information	.28	.34*	.37*
Vocabulary	.35*	.36*	.47*
Animal house	.16	.22	.35
Block design	.31	.36*	.28
Verbal IQ	.33*	.38*	.40*

* $p < .01$

Relationship between HOME and Children's Mental Performance

Correlational analyses to determine the relationships between the quality of the children's home environment and their performance on the WPPSI showed that three HOME subscales correlated significantly with WPPSI subscales. Table 9 shows that toys, games and materials correlated significantly with information ($r = .45$, $p < .01$), similarities ($r = .36$, $p < .01$), block design ($r = .33$, $p < .01$), Verbal IQ ($r = .42$, $p < .01$) and Full IQ ($r = .43$, $p < .01$). Warmth and affection correlated

TABLE 9
Correlations between selected subscales of WPPSI and Preschool HOME

	HOME			
WPPSI	toys, games and materials	warmth and affection	academic stimulation	Total HOME
Information	.45*	.04	.21	.32
Vocabulary	.20	.47*	.22	.28
Similarities	.36*	.18	.04	.29
Comprehension	.31	.36*	.34*	.35*
Picture completion	.15	.34*	–.01	.08
Block design	.33*	.01	.11	.25
Verbal IQ	.42*	.39*	.23	.38*
Full IQ	.43*	.34*	.17	.30

*p < . 01

significantly with vocabulary (r =.47, p < .01), comprehension (r =.36, p < .01), picture completion (r =.34, p < .01), Verbal IQ (r =.39, p < .01) and Full IQ (r =.34, p < .01). Significant correlations were found between stimulation of academic behaviour and comprehension (r =.34, p < .01), while the Total HOME correlated significantly with comprehension (r =.35, p < .01) and Verbal IQ (r =.38, p < .01).

DISCUSSION

The findings of this study show that on the whole, the respondents do well on both measures of the HOME inventory and the WPPSI mental tests. These results indicate that the children in this study are from families that provide a cognitively stimulating home environment. Consistent with the findings from other studies (Gottfried, 1984; Rozumah, 1992), children who experience a qualitatively supportive home environment tend to perform well on the WPSSI scales.

As was seen earlier, the respondents in this study came from a varied family background. Certain aspects of the HOME Inventory and mental test tended to associate significantly with the children's family background. Toys, games and reading materials were related to both parent's education and parents' income. The same family variables also related closely to the total home environment of a preschool child. Items observed in subscale of toys, games and reading materials included toys or games that taught colours, size, shape and numbers, puzzle, music, toys that permitted free experience and creativity, toys that necessitated refined movements, children's books and family reading materials. The results suggest that parents with a higher education and a higher income have a greater awareness of the importance of stimulating materials; and having the means to purchase these materials, they were more likely to invest in these items.

The results of this study indicated that vocabulary and Verbal IQ of WPPSI were associated with mother's education. This results supported findings of Appleton *et al.* (1975), Clarke-Stewart and Friedman (1977) and Yarrow *et al.* (1975) which showed that better educated mothers were more likely to provide verbal stimulation and were more responsive to children's verbal expressions than less educated parents. Their children, therefore, had more opportunities to develop verbal skills.

Verbal and Full IQ of WPPSI correlated with toys, games and reading materials, warmth and acceptance and the total HOME environment of the preschoolers. Our findings support results reported by Yarrow *et al.* (1975) which indicated that the variety of objects available to the children at home were closely associated with their scores on intelligence tests. Other studies have also suggested that young children's mental abilities are stimulated when they play with a variety of interesting things; when they are allowed to explore their surroundings; and when parents participate in their children's games and activities (Bradley *et al.*1977; Bradley and

Caldwell, 1984b; Price *et al.* 1981). Toys and play objects are only a part of the stimulation provided by parents. These objects become more meaningful and have a greater potential to facilitate optimal learning if parents participate in the games; for example, by showing the child how to build a skyscaper out of the blocks, how to complete puzzles or to build a tractor out of the lasy parts.

Any home environment could be rich with "toys" that children can use to explore, experiment and learn, even if parents cannot buy specific toys for their children. For example, three to six year olds may enjoy helping parents sweep the floor, fold clothes, or even play with pots and pans in the kitchen. Parents can teach their children colours, shapes, sizes, numbers and words by using practically anything and everything that is available within the home environment.

It can be concluded that family background, the quality of the home environment that the parents provide for their children, and the children's mental performance are highly related to one another. Future studies could be directed to further exploration of the relationships between the HOME and WPPSI subscales, specifically those that were found to be non-significant in this study. Given that the family is a major setting for children's development, future researchers could also examine the influence of other family background variables such as number of children in the family, child birth order, and family structure on the quality of the home environment and children's mental performance.

REFERENCES

APPLETON, T., R. CLIFTON and S. GOLDBERG. 1975. The development of behavioral competence in infancy. In *Review of Child Development Research.* ed. F.D. Horowitz. Volume 4. Chicago: University of Chicago Press.

BECKWITH, L. and S.E. COHEN. 1984. Home environment and cognitive competence in preterm children during the first tive years. In *Home Environment and Early Cognitive Development: Longitudinal Research.* ed. A.W. Gottfried. New York: Academic Press.

BEE, H. 1985. *The Developing Child.* New York: Harper and Row.

BELSKY, J., R. LERNER, and G. SPANIER. 1984. *The child in the family.* Reading, MA: Addison-Wesley.

BRADLEY, R.H. and B.M. CALDWELL. 1984a. The relation of infant's home environments to achievement test performance in first grade: A follow-up study. *Child Dev.* **9(55)**: 803-809.

BRADLEY, R.H. and B.M. CALDWELL. 1984b. 174 children: A study of the relationship between home environment and cognitive development during the first five years. In *Home Environment, Social Status, and Early Cognitive Development,* ed. A.W. Gottfried, San Francisco: Academic Press.

BRADLEY. B.M. and B.M. CALDWELL and R. ELARDO. 1977. Home environment, social status, and mental test performance. *J. Educ. Psyc.* **69**:697-701.

BRADLEY, R.H., B.M. CALDWELL, and S.L. ROCK. 1988a. Home environment and school performance: A ten year follow-up and examination of three models of environment action. *Child Dev.* **59**:852-867.

BRADLEY, R.H., B.M. CALDWELL, S.L. ROCK, H.M. HAMRICK, and P. HARRIS. 1988b. Home observation for measurement of the environment: Development of a Home Inventory for use with families having children 6 to 10 years old. *Cont. Ed. Psy.* **13**:58-71.

BRADLEY, R.H., B.M. CALDWELL, S.L. ROCK, K.E. BERNARD, C. GARY, M.A. HAMMOND, S. MITCHELL, L. SIEGEL, C.T. RAMEY, A.W. GOTTFRIED, and D.L. JOHNSON. 1989. Home environment and cognitive development in the first three years of life: A collaborative study involving six sites and three ethnic groups in North America. *Devel. Psych.*: **25**:217-235.

BRADLEY, R.H. and P.M. CASEY. 1984. Home environment of low SES non-organic failure-to-thrive infants. *Child Dev.*: **59**:852-867.

BULLOCK, J.R. and D. RENNINGTON. 1988. The relationship between parental perceptions of the family environment and children's perceived competence. *Child St. J.* **18**:17-31.

CALDWELL, B.M. and R.H. BRADLEY. 1984. *Administration Manual (Revised Edition). Home Observation for Measurement of the Environment.* Little Rock, Arkansas: University of Arkansas.

CLARKE-STEWART, A. and S. FRIEDMAN. 1987. *Child Development: Infancy Through Adolescence.* New York: Wiley.

GOTTFRIED, A. W. (Ed.). 1984. *Home Environment and Early Cognitive Development: Longitudinal Research.* London: Academic Press.

MACCOBY, E. E., and J. A. MARTIN. 1983. Socialization in the context of the family: Parent-Child interaction. In *Handbook of Child Psychology.* (4th ed.) Vol. 4. ed. P. Mussen. New York: Wiley.

NINIO, A, and N. RINOTT. 1988. Fathers involvement in the care of their infants and their attributions of cognitive competence to infants. *Child Dev.*: **59**:652-663.

PEDERSEN, F.A., R. CAIN, M. ZASLOW, and B. ANDERSON. 1983. Variation in infant experience associated with alternative family role organization. In *Families as Learning Environments for Children.* Eds. L. Larse and I. Siegel. New York: Plenum.

PRICE, G.G., R.D. HESS, and W.P. DICKSON, 1981. Processes by which verbal-educational abilities are affected when mothers encourage preschool children to verbalize. *Devl. Psych.* **17**:554-564.

ROHANI A., B. ROZUMAH and S. B. YEW. 1989. Relationship between Home Environment and Children's Mental Development. Paper presented at *The Symposium of Children in Distress.* Bangkok, Feb. 2-10.

ROZUMAH B. 1992. Predictors of Maternal Behavior and their Effects on the Achievement of Children: Data from the Longitudinal Study of Youth. Ph.D. Dissertation. Michigan State University, East Lansing, Michigan.

ROZUMAH B. and TOM LUSTER. 1992. Factors Related to the Quality of the Home Environment and Children's Achievement. Paper presented at the *National Council on Family Relations 54th Conference.* Orlando, Florida, 4-11 November.

SURIANI M. H. 1989. Penglibatan Ibubapa, Persekitaran Rumah dan Perkembangan Kognitif Kanak-Kanak. *Laporan Projek Penyelidikan Pelajar Tahun Akhir,* Jabatan Pembangunan Manusia, Universiti Pertanian Malaysia, Serdang.

WESCHLER, D. 1967. *Manual for The Weschler Preschool and Primary Scale of Intelligence.* (2nd ed.). Cleveland, Ohio: The Psychological Corporation.

YARROW, L.J., J.L. RUBENSTEIN and F.A. PEDERSEN. 1975. *Infant and Environment: Early Cognitive and Motivation Development.* Washington D.C.: Hemisphere.

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