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Original Article

Socioeconomic Difference in Development Among Preschool Children

C **Leung**, S **Leung**, F **Lee**, SK **Lo**

Abstract ***Introduction:*** This study examined socioeconomic difference in development among Hong Kong preschool children. ***Methods:*** This was a cross-sectional survey of 911 children recruited using multi-stage sampling. Child developmental outcome was measured using the Hong Kong Comprehensive Assessment Scale for Preschool Children. Socioeconomic data was collected through parent report of family income and parental education. ***Results:*** Using principal component analysis, a socioeconomic status composite was formed out of family income and parental education. Logistic regression and analysis of variance/covariance results indicated significant associations between socioeconomic status and developmental outcome. The relationship between socioeconomic status and child development was similar to a dose-response model, at population level. ***Conclusions:*** Our study, using a large sample drawn territory-wide, found an association between socioeconomic status and early childhood development, consistent with international and local studies. Scaling up evidence-based early intervention programmes at a population level could help address social inequality.

Key words Children; Development; Socioeconomic status

Introduction

Overseas studies indicate that socioeconomic difference in developmental outcomes is evident as early as the age of three. For example, welfare status was associated with less desirable parenting behaviour and poorer child outcome at the age of three[1] while low parent education level and poverty were associated with weaker mathematical reasoning and reading at kindergarten entry and at follow-up four years later.[2] Another study found that the association between socioeconomic status and reading at kindergarten entry was mediated by family characteristics such as home literacy environment.[3] In a longitudinal study, socioeconomic difference in developmental outcome was found at 22 months and there was no evidence that school entry could reverse the disadvantage for the less advantaged group.[4]

In Hong Kong, using the Chinese Early Development Instrument, a population level measure of child development, where teachers were requested to rate their students' development in various domains, it was found that among families with monthly income less than HK$8,000, around 45% of children were vulnerable in at least one domain of development. Among children from families with monthly income higher than HK$80,000, the corresponding figure was only 10%, though the association between family monthly income and vulnerability became

Department of Applied Social Sciences, The Hong Kong Polytechnic University, Hong Kong SAR, China

C **Leung** (梁敏) *PhD*
S **Leung** (梁士莉) *FHKAM(Paed), FFPH(UK)*

Child Assessment Service, Department of Health, Hong Kong SAR, China

F **Lee** (李敏尤) *MRCP(UK), FHKAM(Paed)*

School of Graduate Studies, The Education University of Hong Kong, Hong Kong SAR, China

SK **Lo** (盧成皆) *PhD*

Correspondence to: Dr C **Leung**
Email: ssleung@polyu.edu.hk

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insignificant after controlling for child sex. Furthermore, the lowest mean scores were found among children whose mothers had lower secondary education or below, and the highest mean scores were found among children whose mothers had completed tertiary education.[5] In another study using the Hong Kong Early Child Development Scale as an individual measure of child development, there was a significant difference in performance by family background, with children coming from middle class families performing better than those from working class families in all areas tested.[6] In both studies, the higher proportion of girls from families with higher income and maternal education and the significant gender effect in developmental outcomes favouring girls might have confounded the association between family income and child developmental outcomes.

Furthermore, it was found that the socioeconomic gap in pre-academic learning and cognitive development was narrower for children in higher preschool grades and the authors suggested that preschools could be considered "the great equaliser".[6] However, as this was only a cross-sectional study, with the sample drawn from two socioeconomically discrepant districts in Hong Kong, it was not possible to draw conclusions on preschool education as a compensatory factor.

In terms of possible mechanisms mediating socioeconomic status and child outcomes, overseas studies indicated that parental involvement mediated between family income and maternal education and child academic achievement.[7] Locally, three cross-sectional studies involving children from the same two socioeconomically discrepant districts attempted to elucidate the possible mechanisms. One study found parental involvement mediated the effect of socioeconomic status on child school readiness.[8] Another found that children from lower socioeconomic status families had shorter sleep duration and sleep deprivation was associated with lower school readiness scores.[9] Furthermore, placement of electronic device in bedroom was associated with lower school readiness scores and this effect was more prominent among low socioeconomic status families.[10] These studies demonstrated the effect of family socioeconomic status on child development but the studies were cross-sectional studies involving only children from two districts in Hong Kong, and the generalisability of the findings to children in less affluent or deprived areas is unknown.

The present study aimed to examine the association between family socioeconomic status and child developmental outcome. We made use of a large sample recruited for the norming study of the Hong Kong Comprehensive Assessment Scale for Preschool Children (HKCAS-P), which was randomly selected from all districts of Hong Kong, covering a range of socioeconomic status.

Methods

Participants and Sampling

The inclusion criteria were (i) the children and at least one of their parents were residents of Hong Kong and normally residing in Hong Kong; (ii) the children and their parents were Cantonese-speaking (Cantonese being the usual dialect for 89.5% of the population in Hong Kong) ;[11] and (iii) the children were currently attending preschools. Children with severe physical impairment, severe hearing or visual impairment or Autism Spectrum Disorder were excluded.

A multi-stage sampling method was used. The Education Bureau (EDB) district preschool list was used as the sampling frame. In each of the 18 administrative districts, preschools were selected randomly, using a random number generator. The number of preschools chosen was proportional to the number of enrolled preschool children in the district (based on EDB statistics) which ranged from three to 12. In each selected preschool, the number of children randomly selected depended on the school size, using the class list as the sampling frame. In addition, among the 34 special childcare centres (SCCCs) in Hong Kong, one from each of the four geographical areas (Hong Kong, Kowloon, New Territories East and New Territories West) was selected by convenience sampling through contacts of the researchers. All children in SCCCs have been diagnosed as having developmental delay of at least two standard deviations below the mean by paediatricians or psychologists.

In the norming study, sample size calculation was based on the confidence interval (CI) approach for norming. In local intelligence tests such as Wechsler Intelligence Scale for Children - fourth edition (Hong Kong), the length of the shorter side of the asymmetrical 95% CI of the Full Scale IQ scores vary from 4 to 7 units. To allow for a CI as narrow as 3 units on the shorter side, the number of participants needed for each of the six age groups was approximately 96. The six age groups were 3 years 4 months - 3 years 9 months, 3 years 10 months - 4 years 3 months, 4 years 4 months - 4 years 9 months, 4 years 10

months - 5 years 3 months, 5 years 4 months - 5 years 9 months, and 5 years 10 months - 6 years 3 months. The final sample required was 576.

Measures

The Hong Kong Comprehensive Assessment Scales for Preschool Children (HKCAS-P) is a locally developed assessment tool for individual administration to Hong Kong preschool children aged 3 years 4 months to 6 years 3 months. It consists of six Scales, namely, Cognition, Language, Social Cognition, Visual Perception, Gross Motor and Fine Motor. For each of the six age groups, age standardised scores could be obtained for each Scale with a mean of 10, and standard deviation of 3. The age standardised scores of the four former Scales could be summed to form a Mental Composite, while those of the latter two summed to form a Motor Composite. A Full Scale Composite could be obtained by summing up the age standardised scores of the six Scales. For the Composite scores, the mean is 100 and standard deviation is 15.

The Cognition Scale measures acquisition of basic concepts, from concrete and immediate, to abstract and conceptual. There are 40 items on basic preschool concepts such as colours, shapes, body parts, quantity, similarity, differences, categorisation, reasoning, and comprehension. Children are presented picture stimuli and they are required to point to the correct answer, or to provide verbal responses.

The Language Scale evaluates core language domains in Cantonese in both expressive and receptive modalities. It consists of 68 items on receptive and expressive vocabulary, receptive and expressive grammar, narrative comprehension and production. Children are presented picture stimuli and they are required to point to the correct answer, or to provide verbal responses.

The Social Cognition Scale provides direct assessment of children's empathy, social relationships, perspective-taking ability, and understanding of social norms and rules. It consists of 29 items on social relationship with adults and peers, understanding of social norms and rules, as well as empathy and perspective taking. Children are presented picture stimuli and are required to point to the correct answer, or to provide verbal responses.

The Visual Perception Scale consists of 41 items. There are 23 items measuring abilities in form discrimination (from concrete shapes to abstract figures) and figure-ground discrimination (from daily objects to geometric forms) where children are presented with visual stimuli and required to point to the correct answer. Ten items measure spatial relationship and spatial orientation by having children copy designs with cubes and make patterns with magnetic strips. The remaining eight items measure visual motor integration by having children copy figures that consist of a combination of vertical, horizontal and oblique lines.

The Fine Motor Scale consists of 11 items on a variety of basic and complex hand skills. Children are required to perform tasks including threading beads, pasting stickers, tracing straight lines and curve lines, rotating pegs, cutting curve lines and straight lines, folding paper to form triangle, isolating fingers to form a gun, isolating three fingers, and opposing fingers sequentially.

The Gross Motor Scale consists of 15 items measuring children's competence in locomotion, balance and co-ordination/ball handling. Children have to demonstrate their competence in single-leg standing, walking along a straight line, tandem walk, jumping, hopping, skipping, hitting target with a ball, and bouncing and catching a ball.

Demographic information - parents of the participating children were requested to provide information such as family status, family income, and education attainment. Family income was reported in four levels: monthly income of less than HK$10,000; HK$10,000 - 19,999; HK$20,000 - 29,999; and HK$30,000 or above. The median household income in the 2011 census was HK$20,500.[11] Parental education was reported in six levels: no formal education, primary, lower secondary, upper secondary, diploma, university or above.

Procedures

Research assistants (psychology graduates) contacted the selected preschools and SCCCs. Upon securing their consent to participate, students were chosen using a random number generator. Consent letters and questionnaire on demographic information were then sent to parents of the selected children. With parents' written consent, research assistants administered the HKCAS-P individually to the selected children in preschools or SCCCs.

This study was approved by the ethics committee of the Department of Health, Hong Kong SAR Government.

Data Analysis

Analyses were conducted with age standardised Scale scores/Composite scores as well as developmental status as dependent variables. Children were classified into two

categories of developmental status according to their Full Scale, Mental and Motor Composite scores. Those with standard scores ≤85 were classified as having developmental delay, and those with scores >85 were without delay. A composite score on socioeconomic status (SES) was formed by using principal component analysis with family income, maternal education and paternal education.[12]

Results

The Sample

A total of 104 out of the 352 schools contacted consented to participate (response rate: 29.5%). The number of preschools recruited in each district was according to plan. There were 897 children (478 boys and 419 girls) recruited from the 104 consenting preschools, with a response rate of 80.8%. Another 14 children (9 boys and 5 girls) were recruited from the SCCCs; constituting 1.5% of the total sample. The final sample consisted of 911 children (487 boys and 424 girls).

The social demographic details of the sample are shown in Table 1. There was no significant difference in social demographic characteristics across the class levels (K1 to K3).

Sex Difference in Developmental Outcome

Independent t tests were used to examine the difference in HKCAS-P scores by sex. Results indicated a significant sex difference in Full Scale Composite score, Mental Composite score, Motor Composite score, and all age standardised Scale scores except Gross Motor Scale scores. In all cases, girls achieved higher scores than boys. The results are shown in Table 2.

Logistic regression was used to investigate the association between sex and developmental status (Composite score ≤85 versus >85). Results indicated a significant sex difference for the Full Scale Composite (*OR* = 0.39, 95%CI: 0.25, 0.59), Mental Composite (*OR* = 0.48, 95%CI: 0.31, 0.74), and Motor Composite (*OR* = 0.43, 95%CI: 0.29, 0.64), with a higher percentage of boys in the developmental delay category.

Difference in Developmental Outcome by Socioeconomic Status

To derive a SES composite out of family income, paternal and maternal education, principal component analysis was used. As the variables were not standardised, correlation matrix was used. The KMO statistics was 0.71 indicating sampling adequacy. Using the scree plot and eigen value above 1 as criteria,[12] one factor resulted which accounted for 73.9% of the variance. The factor loadings of family income, paternal and maternal education on this factor were all above 0.80. The resulting factor score was used as the SES composite, with mean = 0 and standard deviation = 1. This composite was recoded into three categories, < -1 (low SES group), between -1 and 1 (middle SES group), and >1 (high SES group).

ANOVA results indicated a significant association between the SES composite and Cognition, Language, Social Cognition and Visual Perception Scales, as well as the Mental and Full Scale Composite scores. Post hoc test (Scheffe) indicated significant differences among all SES groups for Cognition, Language and Social Cognition Scales, as well as the Mental Composite scores. For the Visual Perception Scale and Full Scale Composite scores, the high SES group differed from the middle and low SES groups. The results are in Table 3.

Logistic regression was used to examine the association between the SES composite and developmental status (Composite score ≤85 versus >85). The results indicated a significant SES difference for the Full Scale Composite. The odds of having a child with developmental delay for the low SES group was 5.00 (95%CI: 2.22, 11.27) times more than the high SES group. The odds of having a child with developmental delay for the middle SES group was 2.60 (95%CI: 1.26, 5.36) times more than the high SES group. The results also indicated a significant SES difference for the Mental Composite. The odds of having a child with developmental delay for the low SES group was 5.79 (95%CI: 2.37, 14.12) times more than the high SES group. The odds of having a child with developmental delay for the middle SES group was 3.10 (95%CI: 1.38, 6.94) times more than the high SES group. The results were not significant for the Motor Composite.

Difference in Developmental Outcome by Socioeconomic Status Controlling for Child Sex

As there was a significant association between child sex and HKCAS-P scores and developmental status, analysis of covariance (ANCOVA) and logistic regression were conducted to examine the impact of SES controlling for child sex.

HKCAS-P Scores

After controlling for child sex, SES was significantly associated with the Mental Composite score, F (2, 730) =

Table 1 Social demographic characteristics of participants[a]

	K1(n = 286)	K2(n = 307)	K3(n = 287)	Total (N = 880)
		Number (percentage)		
Male sex	146 (51.0%)	171 (55.7%)	154 (53.7%)	471 (53.5%)
Normal birth condition	265 (93.6%)	283 (94.6%)	266 (94.3%)	814 (94.2%)
Cantonese spoken at home	279 (97.9%)	292 (95.7%)	282 (98.6%)	853 (97.4%)
Family status				
Nuclear	174 (62.8%)	208 (68.2%)	190 (67.4%)	572 (66.2%)
Extended	89 (32.1%)	91 (29.8%)	86 (30.5%)	266 (30.8%)
Reconstituted	3 (1.1%)	4 (1.3%)	0 (0%)	7 (0.8%)
Others	11 (4.0%)	2 (0.7%)	6 (2.1%)	19 (2.2%)
Marital status - married	259 (91.5%)	280 (93.6%)	260 (92.2%)	799 (92.5%)
Mother education				
Lower secondary or below	93 (33.6%)	81 (27.5%)	96 (33.6%)	270 (31.5%)
Upper secondary	113 (40.8%)	123 (41.7%)	112 (39.2%)	348 (40.6%)
Post-secondary or above	71 (25.6%)	91 (30.8%)	78 (27.3%)	240 (28.0%)
Father education				
Lower secondary or below	102 (37.5%)	83 (28.6%)	92 (32.9%)	277 (32.9%)
Upper secondary	91 (33.5%)	109 (37.6%)	92 (32.9%)	292 (34.7%)
Post-secondary or above	79 (29.0%)	98 (33.8%)	96 (34.3%)	273 (32.4%)
Family income				
< HK$10,000	52 (20.0%)	39 (13.6%)	48 (17.8%)	139 (17.0%)
HK$10,000 - 19,999	85 (32.7%)	91 (31.8%)	81 (30.0%)	257 (31.5%)
HK$20,000 - 29,999	29 (11.2%)	42 (14.7%)	42 (15.6%)	113 (13.8%)
HK$30,000 or above	94 (36.2%)	114 (39.9%)	99 (36.7%)	307 (37.6%)
Mother from Mainland having lived in Hong Kong for less than 7 years	75 (28.5%)	64 (22.6%)	66 (26.0%)	205 (25.6%)
Father from Mainland having lived in Hong Kong for less than 7 years	29 (11.8%)	18 (6.6%)	24 (10.0%)	71 (9.4%)
Socioeconomic status composite[b]				
Low	34 (15.5%)	26 (10.1%)	39 (16.5%)	99 (13.9%)
Middle	146 (66.7%)	166 (64.6%)	144 (61.0%)	456 (64.0%)
High	39 (17.8%)	65 (25.3%)	53 (22.5%)	157 (22.1%)
		Mean (95% CI)		
Child age (in months)	49.53 (48.84, 50.22)	57.36 (56.86, 57.86)	68.60 (68.07, 69.13)	58.48 (57.87, 59.09)
Child's length of residence in Hong Kong (in years)	3.54 (3.42, 3.67)	4.21 (4.10, 4.32)	5.18 (5.05, 5.31)	4.31 (4.23, 4.39)
Mother's length of residence in Hong Kong (in years)	20.71 (18.92, 22.51)	22.96 (21.27, 24.64)	20.90 (19.04, 22.76)	21.57 (20.54, 22.59)
Father's length of residence in Hong Kong (in years)	30.58 (28.82, 32.35)	32.57 (31.14, 34.00)	32.65 (30.78, 34.52)	31.95 (30.98, 32.92)

[a]31 participants did not provide information on kindergarten grade level

[b]Based on 712 children with complete data on family income and parental education and kindergarten grade level

18.07, $p<0.001$, and the Total Composite score, F (2, 730) = 11.57, $p<0.001$. For individual Scales, SES was associated with Cognition, F (2, 730) = 23.67, $p<0.001$, Language, F (2, 730) = 15.41, $p<.001$, Social Cognition, F (2, 730) = 8.03, $p<.001$, and Visual Perception age standardised scores, F (2, 730) = 6.27, $p = 0.002$. For the Mental Composite, Cognition, and Language Scales, all SES groups differed significantly from one another. For the Full Scale Composite, Social Cognition and Visual Perception Scales, the high SES group differed significantly from the middle and low SES groups.

Developmental Status

After controlling for child sex, SES was associated with developmental status as defined by the Full Scale Composite. The odds of having a child with developmental delay for the low SES group was 4.51 (95%CI: 1.99, 10.24) times more than the high SES group. The odds of having a child with developmental delay for the middle SES group was 2.63 (95%CI: 1.27, 5.46) times more than the high SES group. SES was also associated with developmental status as defined by the Mental Composite. The odds of having a child with developmental delay for the low SES group was 5.31 (95%CI: 2.16, 13.01) times more than the high SES group. The odds of having a child with developmental delay for the middle SES group was 3.11 (95%CI: 1.39, 6.99) times more than the high SES group. SES was not significantly associated with developmental status as defined by the Motor Composite.

Analysis Stratified by Child Class Level

In Hong Kong, there are usually three levels in kindergartens: K1 (3- to 4-year-olds); K2 (4- to 5-year-old); and K3 (5- to 6-year-old). A series of ANCOVAs

Table 2 HKCAS-P scale and composite scores (mean and standard deviation) by sex

	Boys (n = 487)	Girls (n = 424)	t test results and significance
Cognition	9.73 (3.05)	10.31 (2.90)	t (909) = 2.97, p=0.003
Language	9.66 (3.03)	10.93 (2.90)	t (909) = 3.70, p<0.001
Social cognition	9.64 (3.02)	10.41 (2.90)	t (909) = 3.90, p<0.001
Visual perception	9.70 (3.11)	10.34 (2.81)	t (909) = 3.24, p=0.001
Fine motor	9.36 (2.98)	10.74 (2.83)	t (909) = 7.15, p<0.001
Gross motor	9.99 (3.12)	10.02 (2.84)	t (909) = 0.16, p=0.873
Mental composite	98.05 (15.41)	102.24 (14.20)	t (909) = 4.24, p<0.001
Motor composite	97.95 (15.52)	102.35 (14.04)	t (909) = 4.46, p<0.001
Full scale	97.74 (15.44)	102.60 (14.06)	t (909) = 4.94, p<0.001

Table 3 HKCAS-P scale and composite scores (mean and standard deviation) by SES composite

Scale / SES Composite	Cognition	Language	Social Cognition	Visual Perception	Fine Motor	Gross Motor	Mental Composite	Motor Composite	Full Scale Composite
Low SES Group (n = 105)	8.67 (3.01)	8.85 (3.08)	9.06 (3.18)	9.66 (3.51)	9.64 (3.06)	10.55 (3.01)	94.22 (16.83)	100.60 (15.27)	95.81 (16.96)
Middle SES Group (n = 468)	9.97 (2.95)	9.93 (2.93)	9.90 (2.97)	9.78 (3.07)	9.95 (3.02)	9.87 (2.92)	99.37 (14.88)	99.41 (15.04)	99.30 (14.94)
High SES Group (n = 161)	11.19 (2.53)	10.93 (2.58)	10.66 (2.95)	10.73 (2.59)	10.41 (2.70)	10.05 (3.17)	105.38 (12.19)	101.45 (14.77)	104.66 (12.70)
F and p values	F (2, 731) =24.99, p<0.001	F (2, 731) =16.85, p<0.001	F (2, 731) =9.16, p<0.001	F (2, 731) =6.51, p=0.002	F (2, 731) =2.41, p=0.091	F (2, 731) =2.29, p=0.102	F (2, 731) =19.48, p<0.001	F (2, 731) =1.19, p=0.305	F (2, 731) =12.71, p<0.001
Post hoc differences*	L≠H, M H≠L, M	L≠H, M H≠L, M	L≠H, M H ≠L, M	H≠L, M	ns	ns	L≠H, M H≠L, M	ns	H ≠L, M

*L = Low SES Group, M = Middle SES Group, H = High SES Group

were conducted with the SES composite (3 levels) as independent variable and child sex as covariate, and aged standardised Scale scores and Composite scores as dependent variables. At K1 and K2 levels, there were significant SES differences for Cognition and Language Scales as well as Mental and Full Scale Composite scores. For K2, there was also a significant SES difference for Social Cognition Scale scores. For K1, there was a significant SES difference for Visual Perception Scale scores. The results are in Table 4.

Logistic regressions were conducted separately for each class level to examine the effect of SES on child developmental status. After controlling for child sex, SES was a significant predictor for developmental status as defined by the Full Scale Composite at K2 level. The odds

Table 4 HKCAS-P scale and composite scores (mean and standard deviation) by SES composite by class level*

Scale / SES composite	Cognition	Language	Social cognition	Visual perception	Fine motor	Gross motor	Mental composite	Motor composite	Full scale composite
K1									
Low SES Group (n = 34)	8.58 (2.38)	8.52 (2.93)	9.02 (3.27)	9.33 (3.75)	9.50 (3.01)	10.22 (2.76)	93.01 (16.18)	99.13 (14.92)	94.33 (16.51)
Middle SES Group (n = 146)	9.95 (2.79)	9.82 (2.80)	9.99 (2.87)	9.48 (2.82)	9.78 (2.94)	9.69 (2.76)	98.83 (13.76)	98.36 (14.16)	98.49 (14.18)
High SES Group (n = 39)	11.03 (2.86)	10.71 (2.76)	10.24 (3.46)	10. 97 (2.89)	10.48 (2.52)	10.18 (2.93)	104.55 (14.12)	102.06 (14.35)	104.25 (13.80)
F and p values	F (2, 215) =5.79, p=0.004	F (2, 215) =4.15, p=0.017	F (2, 215) =0.93, p= 0.395	F (2, 215) =3.74, p=0.025	F (2, 215) =0.74, p=0.479	F (2, 215) =0.90, p=0.409	F (2, 215) =4.51, p=0.012	F (2, 215) =0.98, p=0.376	F (2, 215) =3.19, p=0.043
Post hoc differences	L≠H	L≠H	ns	H≠M	ns	ns	H≠L	ns	ns
K2									
Low SES Group (n = 26)	7.95 (3.03)	8.43 (3.21)	8.83 (2.65)	9.66 (3.23)	9.46 (3.19)	10.27 (2.59)	92.12 (15.41)	99.17 (14.31)	93.67 (14.94)
Middle SES Group (n = 166)	10.20 (2.54)	10.15 (2.72)	9.95 (2.66)	10.23 (2.61)	10.16 (2.81)	10.01 (2.84)	100.82 (12.11)	100.52 (14.28)	100.83 (11.51)
High SES Group (n = 65)	11.32 (2.44)	11.02 (2.65)	10.93 (2.88)	10.65 (2.80)	10.39 (2.79)	9.84 (3.41)	106.02 (12.38)	100.73 (15.70)	104.88 (13.27)
F and p values	F (2, 253) =15.59, p<0.001	F (2, 253) =7.83, p=0.001	F (2, 253) =5.92, p=0.003	F (2, 253) =1.25, p=0.288	F (2, 253) =0.67, p=0.513	F (2, 253) =0.24, p=0.789	F (2, 253) =11.21, p<0.001	F (2, 253) =0.04, p=0.962	F(2, 253) =7.29, p=0.001
Post hoc differences	L≠H, M H≠L, M	L≠H, M	H≠L, M	ns	ns	ns	L≠H, M H≠L, M	ns	H≠L,M
K3									
Low SES Group (n = 39)	9.64 (2.83)	9.81 (2.85)	9.76 (3.03)	10.42 (3.01)	10.27 (2.72)	11.19 (2.47)	99.43 (15.01)	104.53 (11.98)	101.27 (14.37)
Middle SES Group (n = 144)	9.98 (3.04)	10.05 (2.96)	10.07 (2.92)	9.91 (3.05)	10.09 (3.05)	9.97 (3.05)	100.03 (14.96)	100.20 (15.34)	100.10 (15.37)
High SES Group (n = 53)	10.96 (2.44)	10.92 (2.44)	10.46 (2.62)	10.75 (2.12)	10.33 (2.77)	10.21 (3.19)	104.75 (10.73)	101.67 (14.53)	104.26 (11.55)
F and p values	F (2, 232) =2.85, p=0.060	F (2, 232) =2.09, p=0.126	F (2, 232) =0.57, p=0.565	F (2, 232) =1.78, p=0.171	F (2, 232) =0.14, p=0.870	F (2, 232) =2.42, p=0.091	F (2, 232) =2.27, p=0.106	F (2, 232) =1.40, p=0.248	F (2, 232) =1.51, p=0.222
Post hoc differences	ns	ns	ns	ns	ns	ns	ns	ns	ns

*There were 22 children with no information on class level. They were excluded from the analyses above.

of having a child with developmental delay for the low SES group was 6.90 (95%CI: 1.60, 29.79) times more than the high SES group. After controlling for child sex, SES was not significantly associated with developmental status as defined by the Mental and Motor Composite.

Discussion

Results of this study indicated that socioeconomic difference in developmental outcome was evident during the preschool stage, as early as the age of three. The association between socioeconomic status and developmental outcome in terms of the odds of having a child with developmental delay was similar to a dose-response relationship, at the population level. Our results are largely consistent with the overseas and local literature on socioeconomic difference in early child development.[1-6] However, the two local studies were based on a small sample selected from two districts at both extremes of socioeconomic status, and there was a much smaller proportion of boys (15%) in the high socioeconomic group. The present study was based on a large sample drawn from all districts of Hong Kong by stratified random sampling, yielding even proportions of boys and girls, and covered a range of socioeconomic status. The assessment scale has been validated against appropriate instruments in the relevant domains.[13,14] These allow us to generalise our results to a wide range of socioeconomic status, instead of only groups at two extreme ends.

Our study found a greater magnitude of socioeconomic difference in developmental outcome in children of K1 and K2, compared with those of K3. These results are similar to the earlier study.[6] which indicated that the association between family background and child development outcome was not statistically significant in the older age groups. However, both are cross-sectional studies where age group patterns could be explained by sampling variations. Though the "equaliser" effect of preschool education is an attractive hypothesis, no conclusion could be drawn from these studies. A longitudinal study will throw more light on the equaliser effect.

Limitations

Though the sample was recruited using stratified random sampling from all districts in Hong Kong, the very modest response rate of participating preschools (29.5%) may limit its representativeness. Second, this is a cross-sectional study which does not enable conclusions to be drawn about the "equaliser" effect of preschool education. Third, as the main purpose of the original study was for the standardisation of the HKCAS-P, we did not collect data on variables related to child development such as parental employment, number of family members, parental involvement, parenting skills, home learning environment and parent-child interaction measures. Furthermore, income and education ranges instead of exact numbers were collected, as parents might consider such information too sensitive. Fourth, as the HKCAS-P was developed for Cantonese-speaking children, we only included Cantonese speakers in the study. Our results may not be generalisable to non-Cantonese-speaking groups.

Implication for Practice and Future Research

Studies indicate a robust relation between early stimulation/parental involvement and child developmental outcome[2,3,8] while supportive home environment and positive parent-child interactions are important for children's development.[15] However, socially disadvantaged families are less able to provide favourable parenting and home learning environment,[1,3] and these parents are less involved in their children's learning at home.[7,8] Early intervention programmes such as the Abercederian project and Perry Street programme have demonstrated effectiveness in improving the school readiness and long-term outcomes of children from disadvantaged backgrounds.[16-18] Locally, programmes such as the Healthy Start Home Visit Programme[19] and Parent and Child Enhancement Programme[20] target preschool children from disadvantaged families such as low income families, new immigrant families and lone parent families, with the former catering for those in kindergartens and the latter 2-year-old. Both programmes incorporate parenting and child learning, and parents are taught strategies to support their children's learning at home. Both programmes have produced positive learning and behaviour outcomes, albeit for the short-term. Scaling up these programmes at a population level could be a step towards addressing social inequality.

In terms of research, a longitudinal study of the impact of socioeconomic status and associated family environmental factors on child developmental outcomes involving a representative sample would enable conclusions to be drawn about the developmental trajectories of children from different socioeconomic backgrounds. It could also provide stronger evidence on the mediating effects of family environment and the "equaliser" effect of preschool education.

Conclusion

Based on a large sample drawn territory wide representing a range of socioeconomic status, we found that differences in developmental outcome across the socioeconomic range was evident during the preschool stage, as early as the age of three. Our findings are consistent with international and local studies. To tackle social inequality in developmental outcomes, early intervention programmes developed and validated locally[19,20] should be made accessible to families with a range of disadvantages.

Conflict of Interest

We declare that we have no conflict of interest.

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