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The Impact of Early Childhood Education on Disparities in Academic Performance

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Abstract

Many research studies have identified the disparities in academic performance seen between children from different social strata, and an increasing number of empirical studies in Japan in recent years clearly show the existence of disparities in academic performance. However, there has thus far been little discussion concerning the age at which these disparities in academic performance emerge in children. Drawing on the results of a vocabulary survey of young children, this paper suggests that disparities in intellectual capacity already exist at age four. Furthermore, it has also become clear that the lexical ability of children in early childhood relates strongly to the culture of literacy in the home. Recent analyses of academic performance surveys in Japan have indicated that there is a relationship between the reading aloud of stories to children and academic performance, regardless of annual household income. This result suggests reading aloud to small children may play an important role in alleviating disparities in academic performance. Thus far, in the discourse surrounding educational disparities, the period of early childhood has not been addressed, but it is clear that more serious consideration should be given to the role of both the home and childcare in early childhood. Not only should childcare opportunities should be given to disadvantaged children, but it is also necessary to consider the content and quality of that childcare.

***Key words*:** academic performance, early childhood care and education, literacy, inequality in education

1. Introduction

In recent years, educational disparities have come under scrutiny from various angles. Research topics have included the degree to which disparities in educational performance and the inequality of educational opportunities are affected by the parents' annual income, regional disparities in academic performance, the relationship between child poverty and educational environment, and so on. Even the term "disparity" may be looked at from a variety of viewpoints: disparities between social strata, regional disparities, disparities between schools, disparities between public and private schools. This paper considers disparities in academic performance between different social strata.

Using data from Japan, we will first discuss disparities in academic performance that are effects of the home environment,. Following this, an examination of when these disparities in academic performance arise will be presented with an analysis of a vocabulary survey conducted on children in early childhood. Having then analyzed the relationship between the home environment and the child's vocabulary skills, we will argue that, in Japan, the forms of interaction in early childhood may also have an important bearing on overcoming disparities in academic performance. Although up until now, many Japanese researchers have studied educational disparities, very few studies have focused on the period of early childhood. This paper is an attempt to rectify this omission.

2. Family Background and Academic Performance

Many research studies have identified disparities in academic performance between children from different social strata. In Japan, due to privacy considerations, it has been assumed that surveys of annual household income and the academic backgrounds of parents would be too difficult to perform, but in recent years, a definitive, although small, amount of empirical data has accumulated. According to the large-scale survey of academic performance conducted by Ochanomizu University and known as JELS (Japan Education Longitudinal Study), an academic performance disparity (in Grade 6 Mathematics) of approximately 20 points exists between children from homes with an annual household income of four to five million yen and those from homes with an annual household income of 10 to 12

million yen. Furthermore, the national academic performance and learning context survey carried out by the Japanese Ministry of Education, Culture, Sports, Science and Technology studies the impact of economic disparities on academic performance. There is, for example, is a tendency for correct answer rates to be lower in elementary schools that have a higher proportion of children receiving school expense subsidies. In 2007 and 2008, Ochanomizu University conducted a joint survey with Benesse Corporation to examine educational disparities in three regions nationwide (a large metropolitan area, a regional city, and a rural county), using 2,952 fifth graders and 2,744 guardians as subjects (Ochanomizu University and Benesse 2009). In the survey, the fifth graders took academic performance tests in Japanese language and mathematics, and completed a survey on their usual daily life and learning activities, while their guardians were asked to complete a survey concerning the home environment, the relationship with the child, their usual behavior and activities, and so on. Table 1 shows a section of the survey results, which clearly show that higher annual household income results in higher academic performance (measured in correct answer rates for fifth grade Japanese language and mathematics).

In addition to annual household income, the educational background of parents also bears a strong relationship to children's academic performance. There is a strong correlation between the parents' educational background and the cultural environment of the home, and it has become clear that a strong link exists between the cultural environment of the home and children's academic performance. For example, households in which parents "read books (excluding magazines and comic books)," "read picture story books aloud to the child when she/he was small," "take the child to visit museums and art museums," "talk to the child about the news and newspaper articles," and "provide breakfast for the child every day" have a strong relationship to academic performance. Table 2 examines whether differences in home environments can be seen between the top and bottom strata when children are separated into four strata based on academic performance. Looking at the results, it is quite clear that each of these items is closely related to academic performance. Furthermore, it is also apparent that these items are also strongly related to the mother's educational background. In Table 3, for example, we can see that for the proportion of homes in which the subject has replied "very true" to the item "read picture story books aloud to the child when she/he was small" is 18.7% in the case where the mother was a high school graduate, but is 41.7% in the case where she was a university graduate or higher. These results suggest that there is a strong relation between the parents' educational background, the cultural environment of the home, and the child's academic performance. (Tables 2 and 3 are based on the results of the above-mentioned joint research between Ochanomizu University and Benesse Corporation.)

3. Appearance of Disparities in Academic Performance

While a significant amount of educational disparity research has been dedicated to inequalities in educational opportunities and problems in academic performance from the higher grades of elementary school (grades 4, 5, and 6) upwards, there has been little discussion concerning the age at which disparities in academic performance appear. The results of the above surveys show that disparities in academic performance already exist at the stage of the higher grades of elementary school. Thus far, it has not been easy to alleviate these inequalities. If disparities in academic performance do

Table 1. Relation between Annual Household Income and Academic Performance (Correct Answer Rate)

Annual Household Income (before tax)	Japanese Language	Mathematics
Less than 2 million yen	47.5	49.1
Over 2 million but less than 3 million yen	53.1	50.0
Over 3 million but less than 4 million yen	53.3	52.1
Over 4 million but less than 5 million yen	55.3	53.4
Over 5 million but less than 6 million yen	55.3	54.5
Over 6 million but less than 7 million yen	58.1	57.7
Over 7 million but less than 8 million yen	59.0	58.2
Over 8 million but less than 9 million yen	60.8	61.1
Over 9 million but less than 10 million yen	57.9	58.5
Over 10 million but less than 12 million yen	63.7	63.1
Over 12 million yen	65.2	64.2

Note: The Japanese language test consisted of 19 questions and the mathematics test consisted of 18 questions. The figures here represent the correct answer rate (%), not the number of correct answers.

Table 2. Relation between Academic Performance of the Child and Interaction and Typical Behavior between Guardian and Child (%)

	Japanese Language			Mathematics		
	Stratum A (Highest Academic Performance Stratum)	Stratum D (Lowest Academic Performance Stratum)	Difference (A − D)	Stratum A (Highest Academic Performance Stratum)	Stratum D (Lowest Academic Performance Stratum)	Difference (A − D)
Read picture story books aloud to the child when she/he was small	80.9	63.0	17.9	79.1	67.4	11.7
Takes the child to visit museums and art museums	37.9	22.0	15.9	34.4	20.7	13.7
Provides breakfast for the child every day	93.2	82.8	10.4	91.0	81.8	9.2
Talks to the child about the news and newspaper articles	75.6	64.8	10.8	73.3	63.8	9.5
Many books (excluding magazines and comic books) exist in the home	72.6	48.0	24.6	67.0	52.4	14.6
Reads books (excluding magazines and comic books)	70.6	56.9	13.7	69.6	57.6	12.0
Visits art museums and art exhibitions	31.9	17.8	14.1	27.1	17.9	9.2
Guardians are aware that the child should be exposed to English and foreign cultures	57.7	40.2	17.5	55.4	41.6	13.8

Table 3. Relation between the Mother's Educational Background and her Educational Awareness and Behavior (%)

		Mother's Educational Background		
		Junior or Senior High School Graduate	Vocational College, Junior College, and so on	University or Graduate School
Read picture story books aloud to the child when she/he was small	"Very true"	18.8	29.4	41.8
Takes the child to visit museums and art museums	"Very true" + "True to some extent"	21.3	30.6	52.1
Provides breakfast for the child every day	"Very true"	85.8	90.7	92.9
Talks to the child about the news and newspaper articles	"Very true" + "True to some extent"	66.0	73.0	77.9
Many books (excluding magazines and comic books) are in the home	"Very true"	15.8	21.9	42.6
Reads books (excluding magazines and comic books)	"Often"	15.7	24.5	45.8
Visits art museums and art exhibitions	"Often" + "Sometimes"	13.9	26.0	46.0
Parents are aware that children should be exposed to English and foreign cultures	"Very true" + "True to some extent"	40.4	54.5	66.2

occur when children are at a young age, it would seem necessary to implement countermeasures when children are even younger. We have thus chosen to focus on early childhood in this paper. In the Global COE (Centers of Excellence) Program at Ochanomizu University, Professor UCHIDA Nobuko (Developmental Psychology) has played a central role in conducting international comparative research on the acquisition of literacy skills (the ability to read and write) in early childhood. He conducted an investigation to determine if disparities between social strata had already begun to appear during this process and, if so, at what age they were appearing (Uchida, Hamano and Goto 2009).

The survey was conducted in five countries (Japan, South Korea, China, Vietnam, and Mongolia), and although the final results are for the purpose of international comparison, we will introduce only the data for Japan here. The Japanese survey was conducted with the cooperation of 2,734 subjects (828 three year-olds, 956 four year-olds, and 950 five year-olds) in Tokyo using an appropriate Picture Vocabulary Test (PVT) to measure the degree of development of language comprehension, in particular, basic "vocabulary comprehension." (This test is used internationally, and asks children to perform such tasks as choosing the most appropriate picture from a set of four for a word given by the examiner.)

According to the results in Table 4, although the difference in vocabulary scores for three year-olds was only 2.6 points, this difference more than doubled to 5.4 points for four- and five-year-olds. After performing a statistical verification, it was found that there was no significant difference in the results for three-year-olds,

Table 4. Lexical Ability of Children by Annual Household Income

Annual Household Income	3-year-olds	4-year-olds	5-year-olds	Average
(a) Less than 5 million yen	11.8	17.4	27.1	18.8
(b) 5 million yen to 9 million yen	12.7	20.2	28.3	20.5
(c) Over 9 million yen	14.4	22.8	32.5	23.9
(c) - (a)	2.6	5.4	5.4	5.1
Average	13.3	21.2	30.2	21.9

but a significant difference was confirmed for four- and five-year-olds. Despite the fact that these results are limited to a single facet of linguistic ability (lexical ability), past research indicates that an extremely strong correlation exists between lexical ability in early childhood and academic performance during elementary school. The results of this survey suggest that disparities in academic performance (disparities in intellectual capacity) are already occurring at age four.

4. Home Environment and the Lexical Ability of Children in Early Childhood

What sorts of features of the home environment affect children's vocabulary skills? Table 5 examines the relation between the kinds of printed media that are frequently read in households with four year-old children and the lexical ability of those children. Here, the children are separated into three groups based on vocabulary scores, and the types of printed media usually read by parents are indicated for the three groups. Whereas 70% of parents of the high-scoring group replied that they often read newspapers, the figure for the medium-scoring group was 58.2%, and 60.8% for the low-scoring group. In regard to books, little difference was seen between the high-scoring and medium-scoring group, but for the low-scoring group the proportion of parents who replied that they often read books was noticeably lower. Concerning the frequent reading of magazines, the proportion of parents in the medium- and low-scoring groups was higher than that in the high-scoring group. The proportion of parents replying that they often read catalogs and mail order magazines was higher for the low-scoring group than for the high- or medium-scoring groups.

The type of printed media read by parents also bears a strong relationship to the reading habits of the child. Table 6 looks at the printed media that parents frequently read and its relation to children's reading habits. In homes where the child reads books (including picture story books) "every day," 70.4% of parents frequently read newspapers, whereas in homes where the child reads books only "less than once a week," the proportion of parents who frequently read newspapers is

Table 5. Relation between Printed Media Frequently Read by the Parent and the Lexical Ability of the (Four-Year-Old) Child

	Vocabulary Score (High)	Vocabulary Score (Medium)	Vocabulary Score (Low)
	(N=190)	(N=275)	(N=194)
Newspapers	70.0	58.2	60.8
Books	47.9	47.6	37.6
Magazines	39.5	50.2	45.9
Catalogs and Mail Order Magazines	40.5	40.0	52.6

Note: Figures in the table represent the proportion (%) of replies of "frequently read."
Source: Compiled by the author from data in Uchida, Nobuko, Takashi Hamada, et al., An International Comparative Study on the Impacts of Environmental Factors in the Process of Literacy Acquisition in Early Childhood.

Table 6. Relation between Printed Media Frequently Read by the Parent and the Reading Frequency of the (Four-Year-Old) Child

	Frequency of the child's reading books (including picture story books) alone		
	Every day (N=379)	Once every 2 to 3 days (N=213)	Less than once a week (N=64)
Newspapers	70.4	56.3	37.5
Books	48.8	40.4	32.8
Magazines	43.8	49.8	43.8
Catalogs and Mail Order Magazines	44.1	42.3	48.4

Note: Figures in the table represent the proportion (%) of replies of "frequently read."
Source: As for Table 5.

a mere 37.5%. A similar trend is also noted with respect to books, but is more conspicuous with respect to newspapers. No clear trend is seen for magazines, catalogs, or mail order magazines.

These results indicate that the fact that parents are in contact with printed media has some relation to the intellectual development of children who are even at as young as four years of age, and that this relation differs according to the form and content of the media.

5. A Focus on Early Childhood: The International Trend

Why focus our attention on early childhood in the discussion of educational disparities? This is a key question for the trend of international discussion in recent years. We have thus far specialized in the field of international educational development, focusing our attention on approaches to the problem of educational disparities in international organizations, and developing cooperation between countries. It is already becoming accepted on an international level that focusing on early childhood is perfectly natural when considering the problems of educational disparities.

For example, as seen in the OECD (2006) and UNESCO (2006), a "strong" basis for learning is formed in early childhood. Guaranteeing high quality childcare in early childhood creates a foundation for the child's later academic performance, and, especially for socially disadvantaged children, childcare is an effective method for realizing equality.

Studies have also shown that it is economically crucial to focus our attention on early childhood, in particular from the viewpoints of investment efficiency and the welfare state theory (Heckman 2000, 2006, Heckman and Carneiro 2003, Esping-Andersen 2008). James Heckman, the winner of the Nobel Prize for Economics, believes that childcare programs for young disadvantaged children show a high investment efficiency based on scientific findings relating to the development of the brain and the long-term effectiveness of early intervention programs (the Perry Preschool Program) for disadvantaged children. Heckman asserts that while it is unusual for a public policy to promote equality and social justice while simultaneously giving a strong boost to economic and social productivity, investing in disadvantaged young children is precisely this kind of policy (Heckman 2006).

We have shown in the above paragraphs that a strong relation exists between the cultural environment of the home and the educational background of parents, but there is an argument that disparities in the cultural environment of the home can be overcome by enriching preschool education. Esping-Andersen has, for instance, has argued a solution to the problems of educational disparities in early childhood from the point of view of the welfare state. According to him, it has become clear from the research of recent years that the basis for the cognitive faculties of children is largely determined before their entry to elementary school. The cultural environment of the home (including factors such as the number of books in the home) plays a significant role, and public policy measures such as enriching the quality of childcare facilities for children from infancy to elementary school entry are effective in redressing inequalities in children's "cultural capital".

It goes without saying that in order to alleviate educational disparities, policies to alleviate income differentials, such as income redistribution and employment promotion, sufficient budget allocations to school education, including the enhancement of support for school expenses and scholarships, and the political will to drive these policies forward are indispensible. In Japan, however, little light has been shed on the stage early childhood in the consideration of educational disparities.

Especially in their support for poor and socially disadvantaged children, many overseas examples show that early childhood programs can be effective from an early stage. Naturally, overseas research may not be directly applicable to Japan. There has been little progress in this field in Japan, especially in such areas as longitudinal research, and empirical data showing the effectiveness of investment in early childhood is insufficient. The discussions in the above-mentioned UNESCO report (UNESCO 2006), Heckman, and Esping-Anderson are all based on longitudinal research carried out in the United States (the Perry Preschool Program). This longitudinal research follows children who either were or were not given appropriate childcare in early childhood up until the age of 40. It is clear from the results of this long-term study that children who received appropriate childcare had higher rates of high school graduation, higher incomes, lower rates of receiving public assistance, and lower rates of criminal behavior.

6. Making Efforts for Children in Early Childhood to Overcome Disparities in Academic Performance

Empirical research in Japan has shown that efforts made during early childhood can be effective in overcoming disparities in academic performance. We have already shown above that differences in academic performance exist between different social strata in Japan, but we must take care here to note that although it is true that disparities in academic performance occur due to the economic health of the home, it cannot be said that economic health alone is the determining factor. The tendency for something to exist does not necessarily mean that it is a determining factor. Rather than take the

position that academic performance is determined by the economic well-being of the home, we should consider how it might be possible to overcome this inequality.

Efforts made during early childhood are potential starting points for overcoming disparities in academic performance. Table 7 uses the method of multiple linear regression analysis to investigate which home factors play a strong determining role in academic performance (in this case the data shown is for correct answer rates for a test in Mathematics B). Its figures are β coefficients (standard partial regression coefficients), and a larger absolute value indicates a greater relative strength of the relation with academic performance. A negative sign indicates a negative relation to academic performance. Model I looks at the home factors related to academic performance, the efforts of the guardians, their awareness, activities and behavior, the learning environment, and so on (1-10), and measures the strength of the relation with academic performance for each of these variables. Model II, on the other hand, introduces annual household income, and then, controlling for annual household income (by assuming it to be constant), examines how strongly the other variables are related to academic performance (R^2 was 0.102 in Model I, and 0.140 in Model II). One variable, for example, is eating breakfast, which is often said to be an important factor in academic performance. The variable "(parents) provide breakfast for the child every day" has a smaller impact on academic performance in Model II than in Model I (0.061 in Model 1, 0.051 in Model II). This means that when annual income is controlled, the impact of the provision of breakfast is reduced. This is notable in "(parents) visit art galleries and art exhibitions." The value of the β coefficient in Model I is 0.042, whereas it becomes -0.016 in Model II. This displays the fact that because the activity of "visiting art galleries and art exhibitions" is strongly influenced by annual household income, when looked at from the point of view of families with the same annual household income, the relation between the child's academic performance and the activity of visiting art galleries and art exhibitions almost disappears.

What is most notable about this table is that the coefficient associated with the variable "(parents) read picture story books aloud to the child when she/he was small" shows absolutely no change in impact even when controlled for income. This means that reading aloud to children during early childhood is related to academic performance regardless of the annual income of the home, and suggests that reading aloud to children while very small has the potential to play an important role in alleviating disparities in academic performance. It has been argued many times over that the basic routine of "early to bed, early to rise," and eating a healthy breakfast is crucial to one's academic performance. Our analysis suggests that creating a culture of reading aloud to children in the home during early childhood also plays a key role in overcoming disparities in academic performance.

7. Conclusion

No long-term experimental research study like that of Heckman exists in Japan. However, as we can see in the data presented in this paper, disparities in lexical ability have been seen to arise at as early as age four. Up until now, the period of early childhood has almost never entered into the discussion surrounding educational disparities, and it is clear that we should give more serious consideration to the early childhood home environment and childcare. This is not simply a case of providing disadvantaged children with childcare opportunities; it is also necessary to consider the content and quality of that childcare.

Naturally, not all problems will be solved by early childhood childcare alone. In fact, it is not yet clear what

Table 7. Analysis of Determining Factors of Academic Performance in Mathematics (Applied Problems)

		Model I	Model II
1	Read picture story books aloud to the child when she/he was small	0.068	0.068
2	Provides breakfast for the child every day	0.061	0.051
3	Talks to the child about the news and newspaper articles	0.045	0.047
4	The child studies even if the parents do not tell her/him to do so	0.133	0.139
5	Reads sports newspapers and women's weekly magazines	-0.058	-0.046
6	Sends and receives email by personal computer	0.062	0.044
7	Parents are aware that the child should be exposed to English and foreign cultures	0.082	0.056
8	There are many books (excluding magazines and comic books) in the home	0.071	0.055
9	Visits art galleries and art exhibitions	0.042	-0.016
10	The time for watching TV and playing games is restricted	0.033	0.012
11	Annual household income		0.201

Source: Website of the Japanese Ministry of Education, Culture, Sports, Science and Technology

kinds of childcare would be effective for resolving disparities in actual childcare facilities in Japan, and there is very little childcare research currently being conducted in Japan to this end. Since very little light has thus far been shed on childcare in the debate on educational disparities, it is necessary that we take up this topic for discussion. The roots of educational disparities are deep, and while we may place some hope on the role of childcare, it will not be possible to face squarely up to the problem of disparities without mobilizing of the strengths of school and home education. The results of the "effective school" research being conducted in Japan in recent years should be applied. With respect to the home, it is not correct to say that the educational capacity of the home is entirely determined by social stratum. It will be necessary for us to elucidate the features of the "effective family" that may help overcome disparities. It goes without saying that policies to alleviate income differentials (such as income redistribution and employment promotion), sufficient budget allocations to school education, and the political will to drive these forward, are indispensible. This kind of political will and the kind of governance that will enhance implementation are necessary in order to draw out the strengths of schools, families and childcare, and we believe that it will only become possible to overcome educational disparities when the four elements of home, childcare, school, and governance are fully mobilized.

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