어머니의 임신 전 교육수준에 의한 학령기 아동의 학업성적 예측도 : 세대간 전이에 대한 함의

Predicting Child School Performance by Mother's Pre-childbearing Level of Education : Implications for an Intergenerational Cycle

이 경 혜*

Lee, Kyung Hye

Abstract

This study was based on theories of the culture of poverty and the causes and consequences of poverty. The strong relationship of family income to mother's education presents the possibility of an intergenerational education cycle. Using a longitudinal approach, parental poverty status was measured by family income, welfare assistance, single parent, and occupation when children were 2 years of age; children's school performance was measured by teacher reports of their reading, mathematics, writing, and overall ability at grade 1. Data were analyzed by structure equation modeling. Results showed that mother's pre-childbearing level of education predicted child school performance in grade 1, confirming an intergenerational cycle. In addition, the results indicated that parental poverty acts as a mediator between the cycle.

Key words : 어머니의 임신 전 교육수준(mother's pre-childbearing level of education), 양육빈곤 (parental poverty), 학업성적(school performance), 종단적 연구(longitudinal study).

Introduction

Sociological theories of "culture-of-poverty" (Auletta, 1982; Harrington, 1962; Kilson, 1981; Wilson, 1987) have emphasized that offspring of poor family are likely to learn or inherit parent's self-defeating characteristics, poor educational and occupational attainment. Furthermore, the theory underlies the assumption that children of poor parents have worse schooling outcomes because of the impoverished environment. More important thing that should be considered is that poverty experienced during the first five years of a child's life has a more serious impact on later school life than does poverty during middle childhood and adolescence (Conger, Conger, & Elder Jr., 1997; McLoyd, 1998).

The influence of poverty on children's academic achievement is not a recent issue. Especially, the relationship between low parental socio-economic status (SES) and children's academic achieve-ment has received much attention (e.g., White, 1982, for a meta-analysis). With regard to early school-age children in longitudinal studies, low-SES children scored significantly lower on a measure of school readiness administered prior to first-grade entry compared to middle-SES children. These low-SES children also scored significantly lower on reading and mathematics achievement tests administered during the first two school years (Entwisle & Alexander, 1992; Norman & Breznitz, 1992). In an Israeli study, family SES at 2 years old predicted school achievement at the end of Grade 2 (Ninio, 1990).

Taken together, findings indicate that parent's

SES factors (education, job, and family income) during the preschool years can have a significant impact on later school performance. What causes parental poverty and predicts child school performance? Since family income is strongly related to mother's education (Garbarino, 1992; Simons, Whitbeck, Conger, & Chyi-In, 1991), I speculated that the level of mother's education predicts poverty. If it does, can we speculate a step ahead that the prenatal factor, the level of mother's education, already predicts later children's school performance? If the level of mother education does have detrimental effects on later children's performance at school, research designed to identify intervention factors is of critical importance for children whose mother has a lower level education. Although a number of studies have suggested the possibilities of inter-generational poverty, no attention has been paid to the possibility of intergenerational education cycle between mother and child. Figure 1 implies the pathways of poverty effect on the causes and consequences.

In light of those issues, I sought to expand the study of prediction on children's performance at school by addressing two major questions : (a) Does the level of mother education at prenatal predict child school performance at grade 1? (b) Which factors can have a mediating effect on the intergenerational education effects between mother and child; that is, does dealing with parental poverty status buffer negative education cycle?
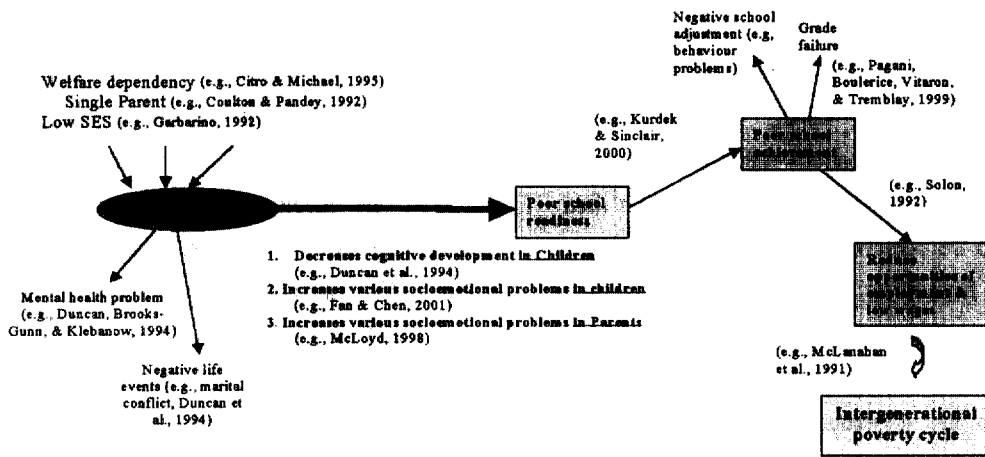
Figure 1. A simplified illustration of the causes and consequences of poverty in the causal linkages over the life cycle.

Method

Participants and procedure

Participants included the Person Most Knowl-edgeable (PMK) about child, usually the mother, and teacher who were part of a longitudinal project focused on the development of socio-emotional competencies and the contributions of family relationships. They represent an urban Canadian population of two-parent families with diverse SES characteristics : 30.9% of the children were living in a single-parent family. Forty-six percent of the children were firstborn, 35% second-born, and 19% third or later.

To examine the long-term impacts of mother education on child school performance, the sample was restricted to children who were age 2 to measure parental poverty. This sample was measured again when the children were in grade 1 to measure child school performance (see Table 1).

Instruments and procedures

Prenatal

Mother education-years of school : It was derived based on items years of elementary and high school and highest level of education attained beyond high school. The subjects were responded; 0.4% for 1 to 5 years, 0.4% for 6 years, 1% for 7 years, 2.5% for 8 years, 4.1% for 9 years, 7.5% for 10 years, 14.6% for 11 years, 57.3% for 12 years, and 12.3% for 13 or more years.

Age 2

(1) Occupational Prestige : Modified version of a scale developed by Pineo, Porter, and Mc-Roberts(1977) was used. The classification system groups occupations described in Statistics Canada's 1980 Standard Occupational Classification into 16 somewhat homogeneous categories, ordered from 1 to 16, where code 1 represents the highest level of occupation and code 16 the lowest. By assuming that the underlying latent construct has a particular distribution, one can assign intervals to the various categories. Mosteller and Tukey(1977) propose a logit transformation to re-express ordinal data on an interval scale. To do this, the percentage of individuals in each occupation group is considered a piece of the logistic distribution. The code assigned to each occupation is the center of its piece on the logistic distribution. This transforma-tion was employed to scale the 16 occupations.

(2) Family Income. Income was coded in $1,000s of dollars, and a few outliers with incomes greater than $150,000 were recorded to $150,000.

(3) Welfare Assistance. Use of the federal poverty threshold as a unit of measurement is advantageous because it enables us to link child outcomes to the poverty gap, to more readily generalize the findings to officially poor individuals, and to contribute to policy discussions (McLoyd, 1998). About total household income, parents were asked if their household had received any income (provincial or municipal social assistance or welfare) in the past 12 months. The subjects were responded; 14.2% for yes (1) and 64.6% for no (2).

(4) Single Parent : Considering the contribution of single parent on poverty, parents were asked if the children were living with two parents (1), single parent (2), or does not live with a parent (3). The subjects were responded; 68.1% for two parents, 11.1% for single parents, and 1% for none.

At Grade 1

School performance. Teachers completed based on their knowledge of his/her schoolwork, including his/her report cards, how is reading, mathematics, and written work such as composition at school during the year. One of five categories of a Likert scale anchored by 1 = "near the bottom of the class", 3 = "in the middle of the class", and 5 = "near the top of the class". Using the same scale, they were then asked : "How is he/she doing overall?"

Result

Testing the Model

Zero-order correlations among all of the measures are reported in Table 1.

Structural equation modeling analysis was used to test the intergenerational education cycle. To compute maximum likelihood estimation of the model, Amos 4.01

Table 1. Zero-order correlations, Means, and Standard Deviations for all measures at grade 1.

|	1	2	3	4	5	6	7	8	M	SD	N
Mother Education (Prenatal) :	--								8.50	1.29	2136
Parental Poverty (age 4) :											
2. Single mother	-229**	--							1.14	.35	1849
3. Welfare assistance	.308**	-.576**	--						1.82	.38	1839
4. Family income	.159**	-.075**	.141**	--					43	16	1849
5. Job	-.235**	.764**	-.592**	-.107**	--				20.71	38.59	1849
School Readiness (grade 1)											
6. Overall ability	-211**	.188**	-.229**	-.095*	.140**	--			2.57	1.22	737
7. Reading ability	-.206**	.154**	-.201**	-.087*	.122**	.909**	--		2.51	1.32	730
8. Mathematics ability	-.175**	.143**	-.207**	-.050	.102*	.850**	.775**	--	3.39	1.19	738
9.Writing ability	-.198**	.161**	-.194**	-.084*	.102*	.903**	.894**	.788**	2.70	1.30	732

*p <.05, **p <.001.

Software was used (Arbuckle & Wothke, 1999). Amos modeling procedure was specifically chosen because it allows us to approach full-information ML model estimation with missing data, and the likelihood can be computed for the observed portion of each case's data and then accumulated and maximized. The standardized regression weights show that the level of mother's education (ME) was significantly related to child school performance (CSP) at grade 1 (parameter estimate = .24). All parameter estimates in the structure model were significant at the .001 level (see model 1 in figure 1).

As a next step, since the relationship between ME and CSP was significant parental poverty (PP : family income, assistance from welfare, occupa - tion, and single parent) was intervened between ME and CSP. The structural model consisted of exogenous factor and endogenous factors. That is, ME is unobserved exogenous variable, and PP and CPS are unobserved endogenous variable. A path model was constructed from the covariance

matrix of the study variables. The hypothesized causal paths between exogenous and endogenous variables were estimated as path coefficients.

The results of the structural equation model analyses on child school performance along with the standardized estimates for each path are presented in Figure 2. The standardized regression weights show that ME was significantly related to PP (parameter estimate = -. 59) and CSP (param - eter estimate = -. 49); however, there was no significant direct relationship between ME and CSP (parameter estimate = .06, p = .64). When completely eliminate the relation between the independent (ME) and the dependent variables (CSP), ME and PP (parameter estimate = -. 57) and PP and CSP (parameter estimate = -. 43) remain still significant. Thus, as we expected, the role of PP as a mediator in the relationship between ME and CSP is fully supported (Baron & Kenny, 1986). An increase in mothers' education showed an indirect relationship to an increase in child school performance at grade 1,

X2 (2) =. 675 (p = .714)
CFI=1.00
TLI =1.00
RMSEA=. 00
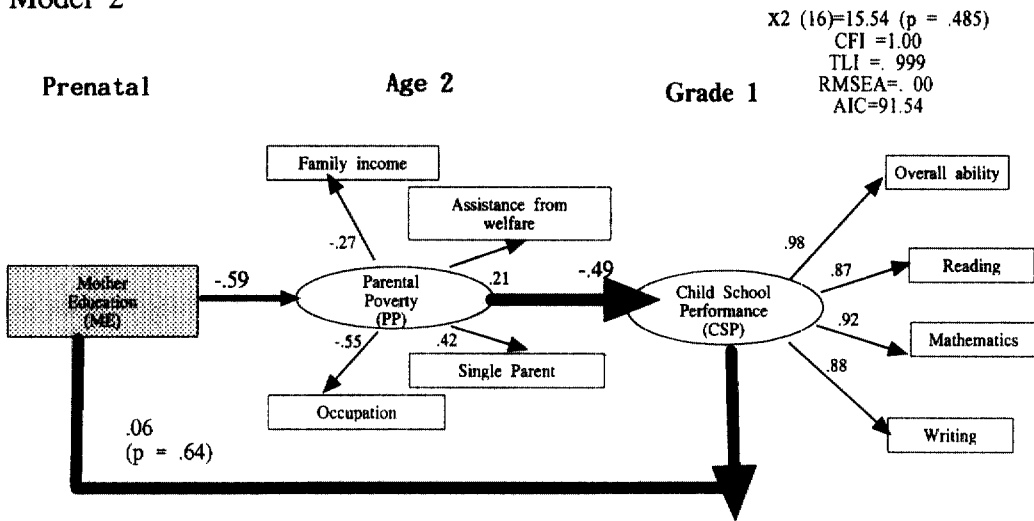AIC=36.68
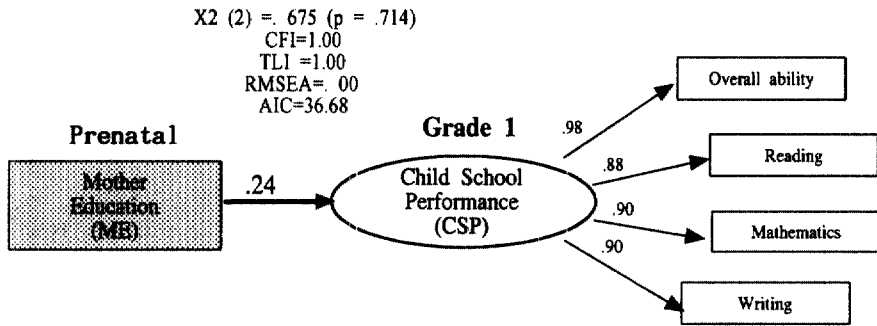
Model 2

Figure 2. Results of analyzing a structural equation analysis model. The relation of parental poverty (PP) and parenting behaviour (PB) in predicting child school performance (CSP). Standardized path coefficients (directional paths) appear on single-headed straight arrows. All of the path coefficient are significant beyond the p < .001 level.

througha decline in parental poverty status.

Adequacy of model fit was determined by the chi-square test and other fit indexes. The structural components of a path analytic model based on the child school performance were tested for goodness of fit. The goodness of fit index (GFI) indicated a very good fit for the model. A summary of the fit indices for these analyses are : Chi-square = 15.54, df = 16, p = .485; Tucker-Lewis Index (TLI) = .99; compara-tive fit index (CFI) = 1.00; root-mean-square error of approximation (RMSEA) = .00; and Akaike's information criterion (AIC) = 91.54.

Discussion

The purpose of the study was to develop and test a model of influences of mother education and parental poverty on first-grade children's outcomes. More specifically, this study examined the hypothesis on intergenerational education cycle and whether or not parental poverty is a mediator that could statistically explain the association between mother education and child school performance. The results confirmed that the mother's education level predicts child school performance at first grade, stressing the urgent need for early intervention for children whose mothers have a limited education career. Additionally, our finding of parental poverty as an intervention factor provided an opportunity to document one of the assumptions underlining the "culture of poverty", which is that children of poor parents have worse schooling outcomes because of an impoverished environment.

With regard to the methodological approach, it could be argued that the variables I used to define parental poverty (family income, assistance from welfare, occupation, and single parent) were not adequate. However, I defined parental poverty in terms of major social address variables that are associated with increased risk for child maladjust- ment : low socioeconomic status and being raised in a single-parent household (Bronfenbrenner & Grouter, 1983). In addition, I approached the use of the official poverty (assistance from welfare) because it enables me to more readily generalize the findings to officially poor individuals, and to contribute to economic analyses and policy

discussions (McLoyd, 1998). Furthermore, in this study, the data set permitted a prospective exam - ination of a large representative sample of economically diverse Canadian families and diverse nationalities across a time span of several years that included toddlerhood.

The results of this study, however, brought forth new-questions to understand more child development processes. If parental poverty occurred when the child was after 2 years old or in grade 1, would there still be an effect of parental poverty on child school performance skills? In the absence of results on the timing of poverty, it was impossible to know whether poverty that occurs in early life is more damaging than one that occurs later (i.e., poverty during the toddlerhood vs. preschool years or the school entry) as well as the effect of durative poverty and temporary poverty. Such studies could be helpful to create a time sensitive model, which will help investigators to fully understand child development. Furthermore, with revision of our model, it could be interesting to look at the father's effect on child school performance. Even though a number of studies have shown strong mother effects on child academic development more than father effects, one cannot exclude father effects on child development. It remains an open possibility that children's poor school performance skills could be more related to the level of father education.

In this study, it suggested the possibility of intergenerational education cycle between mother

and child. However, this study clearly revealed a possibility of breaking the devastating impact of the low level of mother's education on child academic development, showing a different aspect of childhood development through a transmission gap. These findings are important for the study of prevention at both the individual and societal levels. Fewer mothers who have low level of education will mean that more children avoid poverty, entering school ready to learn, fewer school dropouts, and less stress on the juvenile justice system.

Reference

Arbuckle J. L, & Wothke W. (1999). *Amos 4.0 user's guide.* Chicago : Smallwaters Corp.

Baydar, N., Brooks-Gunn, J., & Furstenberg, F. F. J. (1993). Antecedents of literacy in disadvantaged youth. *Child Development, 64,* 815-829.

Auletta, K. (1982). *The underclass.* New Yourk : Random House.

Baron, K., & Kenny, G. (1986). The moderator-mediator variable distinction in social psycholog - ical research : Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51(6);* 1173-1182.

Bronfenbrenner, U., & Crouter, A. C. (1983). The evolution of environmental models in develop - mental research. In W. Kessen (Ed.), P. H. Mussen (Series Ed.), *Handbook of child psycholo -gy : Vol. 1. History, theory, and methods* (pp. 357-414). New York : Wiley.

Citro, C. F., & Michael, R. T. (1995). *Measuring poverty : A new approach.* Washington, DC : National Academy Press.

Conger, R. D., Conger, K. J., & Elder, J. G. H. (1997). Family economic hardship and adolescent adjustment : Mediating and moderating processes. *In G. J. Duncan & J. Brooks-Gunn (Eds.), Consequences of growing up poor* (pp. 288-310). New York : Russell Sage Foundation.

Coulton, C. J., & Pandey, S. (1992). Geographic concentration of poverty and risk to children in urban neighbourhoods. *American Behavioral Scientist, 35,* 238-257.

Duncan, G. J., Brooks-Gunn, J., & Klebanow, P. K. (1994). Economic deprivation and early child - hood development. *Child Development, 65,* 296-318.

Entwisle, D. R., & Alexander, K. L. (1992). Summer setback : Race, poverty, school composition, and mathematics achievement in the first two years of school. *American Psychological Review, 57,* 72-84.

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement : A meta-analysis. *Educational Psychology Review, 13(1),* 1-22.

Garbarino, J. (1992). The meaning of poverty in the world of children. *American Behavior Scientist, 34,* 431-439.

Harrington, M. (1962). *The other America : Poverty in the United States.* Baltimore : Penguin.

Kilson, M. (1981). Black social classes and intergen - erational poverty. *Public Interest, 64,* 58-78.

Kurdek, L. A., & Sinclair, R. J. (2000). Psychological, family, and peer predictors of academic outcomes in first- through fifth-grade children. *Journal of Educational Psychology, 92(3),* 449-457.

McLanahan, S. S., Astone, N. M., & Marks, N. F. (1991). The role of mother-only families in reproducing poverty. *In A. C. Huston (Eds.), Children in poverty : Child development and public policy* (pp. 51-78). Cambridge University Press.

McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist, 53(2)*, 185-204.

Ninio, A. (1990). Early environment experiences and school achievement in the second grade : An Israeli study. *International Journal of Behavioral Development, 13*, 1-22.

Norman, G., & Breznitz, Z. (1992). Differences in the ability to concentrate in first-grade Israeli pupils of low and high socio-economic status. *The Journal of Genetic Psychology, 153*, 5-17.

Pagani, L. S., Boulerice, B., Vitaron, F., & Tremblay, R. E. (1999). Effects of poverty on academic failure and delinquency in boys : A change and process model approach. *Journal of Child Psychology and Psychiatry, 40(8)*, 1209-1219.

Simons, R. L., Whitbeck, L. B., Conger R. D., & Chyi-In, W. (1991). Intergenerational transmission of harsh parenting. *Developmental Psychology, 27(1)*, 159-171.

Solon, G. (1992). Intergenerational income mobility in the United States. *American Economic Review, 82*, 393-408.

White, K. (1982). The relations between socioeconomic status and academic achievement. *Psychological Bulletin, 91*, 461-481.

Wilson, W. J. (1987). *The truly disadvantaged.* Chicago : University of Chicago Press.

요 약

가족소득은 어머니의 교육수준과 밀접하게 관련되어 있다는 이전의 많은 연구들에 근거하여, 세 대간 교육수준 순환의 가정하에 두 문제점들이 제기되었다 : (a) 어머니의 교육수준이 학령기 아동 의 학업성적을 예측할 수 있는가? (b) 만약 예측되어진다면, 교육수준의 역순환은 부모의 경제적 수준상태에 의하여 이러한 영향을 상쇄시킬 수 있는가? 아동발달에 대한 보다 나은 이해를 추구하 고자 종단적 데이타를 사용하였다. 즉, 아동이 2살일 때 부모의 경제적 수준상태가 측정되어졌으 며, 아동들이 초등학교 1학년이 되었을 때 다시 담임선생에 의한 아동의 학업성적이 측정되어졌다. 이러한 데이타는 Structure equation modelling analyses 통계분석법을 이용하여, 본 연구는 어머니의 교육수준이 아동의 초등학교 1학년 때의 학업성적을 예측한다는 것을 검증하였으며, 이러한 관계 는 부모의 경제적 수준상태에 의하여 상쇄될 수 있다는 것이 밝혀졌다. 그러므로, 이 연구는 어머 니의 저교육수준에 따른 아동의 열등한 학업성적 순환고리는 부모의 경제적 수준의 영향에 의해 깨어질 수 있다는 가능성을 밝혀주었으며, 아동기 발달의 한 경로를 분명히 제시하였다.