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ABSTRACT

Extensive research has been conducted on numerous factors influencing the academic achievement of school children. While many studies have emphasized individual factors to explain differences in social behavior and academic achievement, others have examined macro-level factors, including those addressing the role of parental socioeconomic status. The cumulative influences of structural factors on academic achievement, however, have not been adequately explored. Studies linking community, school, and family factors to academic achievement are particularly relevant in light of research stressing the importance of structural factors on adolescent development and the national movement to reform public schools. Using data derived from the Virginia Department of Education's Outcome Accountability Project, the present study addressed the influences of community, school, and family structural factors on academic achievement of eighth-grade students as measured by composite scores on the Iowa Test of Basic Skills (ITBS). Using hierarchical linear regression to model indicators of these structural factors, a total of 65 percent of the variance was accounted for in adolescent academic achievement at the school district level. Socioeconomic status demonstrated the strongest relationship with the outcome variable of the ITBS composite score. The results of this study warrant further investigation. (Author/HTH)

Running head: STRUCTURAL EFFECTS AND ACADEMIC ACHIEVEMENT

Structural effects on academic achievement of adolescents

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Abstract

Extensive research has been conducted on numerous factors influencing the academic achievement of school children. While many studies have emphasized individual factors to explain differences in social behavior and academic achievement, others have examined macro-level factors, including those addressing the role of parental socioeconomic status. The cumulative influences of structural factors on academic achievement, however, have not been adequately explored. Studies linking community, school, and family factors to academic achievement are particularly relevant in light of research stressing the importance of structural factors on adolescent development and the national movement to reform public schools. Using data derived from the Virginia Department of Education's Outcome Accountability Project, the present study addressed the influences of community, school, and family structural factors on the academic achievement of 8th grade students as measured by composite scores on the Iowa Test of Basic Skills. Using hierarchical linear regression to model indicators of these structural factors, a total of 65% of the variance was accounted for in adolescent academic achievement at the school district level. The results of this study warrant further investigation.

Structural effects on academic achievement of adolescents

The academic achievement of adolescents within the public education system has generated numerous arguments and has remained the subject of extensive debate. Discussions surrounding this issue have focused on the impact of both individual factors as well as those relating to a child's environment. In an effort to further understand the linkage between educational opportunity and child development, many researchers have pointed toward the structural factors that may impact social policy and decision-making. Although several studies have examined environmental factors (e.g., Gould, 1981, and Mounts & Steinberg, 1995) as predictors of academic achievement among adolescents, little attention has been given to the cumulative influences of these factors, particularly where discussions placing socioeconomic status within a community context are concerned. The present study examined the academic achievement of Virginia 8th grade students by investigating indicators of community, school, and family structural factors such as concentration of poverty, family economic risk, family structure, and neighborhood school risk in an effort to explain differences in educational outcomes.

Throughout the literature of different disciplines (sociology, psychology, and education), there are indicators linking adolescent development and adolescent academic achievement. From a sociological standpoint, adolescent academic achievement and development can also be explained within the context of social stratification and social disorganization. Structural neighborhood factors such as low economic status, ethnic heterogeneity and residential mobility are likely to be related to academic achievement, affecting such factors as school grades and other outcomes—especially economic outcome (McLoyd, 1997; see also Wilson, 1987, 1997). Coll et al. (1996) argued that the

interplay of social position, racism and segregation within the educational system creates the conditions faced in adolescent development. In a similar vein, Lovaglia and Lucas (1997) found support for a theoretical model that reviewed characteristics of social status and their impact on adolescent academic achievement. Trojanowicz and Morash (1992) extended aspects of social disorganization to explain juvenile crime and its impact on academic achievement within specific communities, whereby the community was identified as a causal factor in predicting crime. Many have argued that perspectives such as these provide the foundation to predict not only the development of adolescents, but their academic outcome as well. This is particularly evident in the studies that have addressed the specific dimensions of well being of children and youth including physical health, cognitive ability, and school achievement as measured by years of schooling and high school completion (e.g., see Brooks-Gunn & Duncan, 1997; Gonzales, Cauce, Friedman & Mason, 1996).

Many researchers have argued that educational attainment is a significant predictor of experiences in later life. Studies of the relationship between parental income and school attainment have also noted that while poverty limits school achievement, the effect of income on years of school completed is also significant. In particular, these studies have emphasized important factors such as parental education, family structure, and neighborhood characteristics (Gonzales et al., 1996). With regard to race, Banks, McQuarter, & Sonne (1995) investigated the general issue of developmental patterns in achievement judgements (motivation) among African-American and European-American children. They found that certain activities and their related stimulus contexts were associated with the experience of an individual with certain important reinforcers,

particularly those of parental approval and the general support of a reference community. Banks et al. (1995) emphasized both family and community contextual effects upon children's academic outcomes. Banks et al. (1995) critical question concerned the manner in which the immediate social context of students was conducive to the transmission of new values and interests and the ability to sustain their efforts.

Other studies have pointed toward the beneficial impact of increased family income on such factors as lower levels of delinquency and substances use, lower levels of school misconduct, peer conformity for boys, and greater psychosocial competence and lower levels of psychological stress among girls (Fletcher, Darling, Steinberg, & Dornbusch, 1995). Studies have also shown that higher grade point averages and reduced drug use have a positive effect on African-American youth development in predominately white, affluent communities as well as in more disadvantaged, ethnically mixed neighborhoods with reduced family incomes (Lamborn, Dornbusch, & Steinberg, 1996). Similarly, Hill, Soriano, Chen & LaFromboise (1994) determined that sociocultural factors within the family and community had a significant effect on the level of violence among minority youth. Kazdin (1994) identified many of the structural factors as linkages to antisocial behaviors, conduct problems, and aggressiveness as well as to academic deficiencies such as low achievement level, repeating grades, early termination from school, and problems in specific learning skills. Others have persuasively argued that these same factors impact academic achievement, interpersonal relationships, social skills, and peer rejection.

These structural factors within the community context as defined by several researchers may be a more appropriate grouping for measuring academic outcome (e.g.,

see Lamborn et al., 1996; Polinard, Wrinkle, & Meier, 1995; Kozol, 1991, 1995). Also, aggregate analysis methods within the community context appears justifiable since many studies of academic achievement at the national level employ this method. Using these aggregated analyses, advocates of both individual and environmental views played a major role in shaping educational reforms at the national and state policy levels. Educational reform has had a profound influence on initiatives relating to the reorganization of schools, curriculum enhancement, the establishment of performance standards, and changes in traditional instructional methods to increase academic achievement (Educational Testing Services (ETS), 1996). Further, specific attention has been placed on issues relating to qualifications of teachers, deterioration of school facilities, and student experiences, all of which have had a significant impact on student development.

At the sociological structural level, indicators of social stratification, status characteristics, and social disorganization can be found within environmental factors that impact academic achievement. The focus on environmental factors affecting academic achievement addresses several topics, including socioeconomic status (Commission on Behavior and Social Sciences and Education, 1993; Bowey, 1995), parental education levels (National Center for Education Statistics (NCES), 1996; ETS, 1996), community contextual effects (Kozol, 1991, 1995; Etaugh & Rathus, 1995; Zajonc and Mullay, 1997), and cultural impact (Harris, 1995; NCES, 1995; Willie, 1995; Wilson, 1995). Thus, the present study investigated the influences of community, school, and family structural factors on the academic achievement of Virginia 8th grade students. Indicators of community status (i.e., community education level), school status (i.e., absenteeism,

average number of students, and dropout rate), and family status (i.e., family poverty level, student's socioeconomic status, and median family income) have been identified as contributing to differences in achievement levels among socially and economically disadvantaged youth. While previous studies have focused solely on parental income and education levels to determine academic achievement among youth, the present study also investigated the relationship between community, school, and family structural factors and academic achievement among 8th grade students within the Commonwealth of Virginia. Results of standardized test scores were examined in an effort to address educational policies and challenges for the Virginia public school system (Virginia Commission on the Future of Public Education, 1997). Studies have suggested that indicators of socioeconomic status among adolescents can affect the level of educational achievement, particularly in relation to results of standardized tests. Further, factors addressing both community education and income levels have been found to correlate significantly with academic achievement among students. It was hypothesized that the cumulative influence of structural factors among 8th grade students in Virginia has a statistically significant relationship with their performance on standardized tests.

Method

Sample Population

Eighth-grade students within public school districts (community context) of the Commonwealth of Virginia during the 1994-95 school year. This group was selected on the basis of the transition into adolescence to demonstrate the impact on academic achievement.

Similar to Polinard et al. (1995), the school district was used as the unit of analysis. Polinard et al. (1995) reported "by examining one state, we eliminate the problems of intraregional and ethnic group differences..." (p. 467). These districts formed already established groups. The average age of the student was 14.88. The study also relied on measurements of neighborhood context and academic achievement similar to those utilized by Gonzales et al. (1996) including indicators of median family income and poverty levels indicative of both the proportion of single-parent households and the absence of middle class professionals. This was drawn from the body of research that suggests that environmental factors within communities may also serve as moderators of development.

Instrumentation

The Iowa Test of Basic Skills (ITBS), Multilevel, Form H, was used by the Virginia State Department of Education to measure academic achievement across school districts in Virginia. Riverside Publications (Riverside Publishing Company, 1994) reported that reliability varies with each test and grade. Internal consistency reliability coefficients for the five main area scores range from .84 to .96; composite reliability is .98 for all grades. The 248 skills objectives represented in the test were determined through a systematic consideration of courses of study, statements of authority in method, and recommendations of national curriculum groups. The item selection process involved a combination of empirical and judgmental procedures, including evaluation by representative professionals from diverse cultural groups. The ITBS was standardized in conjunction with the Cognitive Abilities Test and the TAP (Riverside Publications, 1994).

Design and Procedures

Data were derived and collected from the Virginia Department of Education (VDOE) Outcome Accountability Project (1996) and the Superintendent's Annual Report for Virginia (VDOE, 1995). These data are collected annually at the school building level, aggregated at the school district, and reported to the VDOE. There are 134 school districts but complete information was available for only 129. Within Virginia, 4,681 8th grade students completed the ITBS, which was 93% of the eligible students. Indicators were:

1) Family poverty level in the community - Percentage of families in district below the federal poverty level as reported by the 1990 U.S. Census
2) Educational level of the community - Percentage of adults in district who are high school graduates as reported by the 1990 U.S. Census
3) Dropout rate - Percentage of students in grades 7-12 who dropped out of school
4) Over Age 8th Grade Students - Percentage of 8th grade students who were 15 or more years of age
5) Family median income - 1993 Median Adjusted Gross Income in district as reported by the Virginia Department of Taxation
6) Students' socioeconomic status - Percentage of students in district with approved applications for free or reduced lunch during the 1994-95 school year as reported by the School Food Service, Virginia Department of Education
7) Attendance - Percentage of students in grades 6-8 who were absent 10 days or less from school

ITBS composite scores for 8th grade students were gathered from the Superintendent's Annual Report for Virginia (VDOE, 1995). Human participants were not used, and all other ethical considerations were complied with. This study was conducted using unobtrusive research by analyzing existing statistics and data with previously formed groups.

A hierarchical linear regression analysis was conducted to determine strengths of relationships and model building. Community status factor (community education level) formed the first model. The second model added the school status factor (students' absenteeism, overage students and dropout rate) data, while the third model added the family status factor (family poverty level, student's socioeconomic status and family median income). These analyses provided the independent variables that best predict at $p < .05$ the outcome variable, composite scores on the ITBS.

Analysis of Results

Results

Means and standard deviations for all measures are presented in Table 1. Throughout the table, a wide variability as indicated by the standard deviation was noted among school districts. The mean composite score on the ITBS was above the national median of the 50th percentile ($M = 53.66$, $SD = 10.61$). VDOE (1996) reported that 58% of the 8th grade standardized test scores were above the 50th percentile and 32% above the 75th percentile. The family poverty level ($M = 9.86$, $SD = 5.04$) exceeded the average 8% reported for Virginia (VDOE, 1996). The student's SES continued this noted large variability ($M = 36.21$, $SD = 15.64$) with VDOE (1996) reporting an overall 31% of students with approved applications for free or reduced price lunch. The community

education level (M = 65.99, SD = 10.73) was lower than the 75% of adults in the state who were high school graduates. The mean community median income was $20,919 and ranged from a low of $13,297 and a high of $38,115.

Table 2 presents the intercorrelation matrix of all measures used in the study. Composite scores were related to all measures of socioeconomic status, including those examining family, community and school indicators of academic achievement. Also noteworthy was the negative relationship of community family poverty level with median income, r = -. 746, $p < .001$, and that of both student's SES, r = .626, $p < .001$, and community education level, r = -.757, $p < .001$. This pattern is consistent with other studies that have examined the impact of neighborhood and community status on low-income families (Lamborn et al., 1996, Polinard et al., 1995, and Zajonc & Mullay, 1997). When composite scores were correlated with predictors, significant relationships were found for family poverty level, r = -.562, $p < .001$, students' SES, r = -.677, $p < .001$, community education level, r = .638, $p < .001$, percent absent 10 days or less, r = .487, $p < .001$, students over 15 years of age, r = -.502, $p < .001$, median income, r = .538, $p < .001$, and dropout rate, r = -.297, $p < .001$.

Analysis of Main Effects

Ordinary least squares regressions were conducted to examine the main effects of variables on composite scores. Composite scores were regressed on the predictors hierarchically following entry of community, school, and family status variables. As displayed in Table 3, when all variables were included in a full regression model, 65% (F (7, 121) = 31.60, $p < .001$) of the variance was accounted for. Tests of significance indicated that community education level and students' socioeconomic status were the

strongest predictors of composite scores. Support was also found for additional factors including the percentage of students absent 10 days or less, the number of students over 15 years of age, and the dropout rate of students—all indicators of school status. The percentage of students absent 10 days or less demonstrated an expected positive relationship with the increased ITBS composite scores. This positive relationship reflect the fact that the higher percentage of students not missing school for more that 10 days, the higher the students scored on the ITBS. In contrast, the slopes of the regression lines for family poverty level and median income were not statistically significantly different from zero, $t = 1.58$ and -1.64, respectively. The family poverty level and median income possibly did not indicate additional variance in the dependent variable, ITBS composite scores, beyond that accounted for by the students' socioeconomic status.

Discussion

The results of this study were consistent with the findings of several other studies that viewed several of these variables separately. The findings strongly support the hypothesis that the cumulative influence of structural factors has a statistically significant relationship with adolescent academic achievement. Students' socioeconomic status, as measured by the percentage of students receiving free or reduced lunches, demonstrated the strongest relationship with the outcome variable of the ITBS composite score. This was consistent with the Disparity Report findings (Governor's Commission on Educational Opportunity for all Virginians, 1991) and the findings of The Challenge of Location and Poverty (NCES, 1996). In addition, the percentage of families below the federal poverty level within the school district showed significant relationships with most other variables and specifically the community education level variable.

Each of these variables shares some portion of the overall socioeconomic status of the community. Model building was used to minimize linear dependency between predictor variables. Community, school and family status variables provide a more precise view of academic achievement. Yet, previously the cumulative effects of these variables on academic achievement were not viewed. As demonstrated in this study, these cumulative effects identified 65% of the variance. In order to optimize the educational opportunities for economically disadvantaged youth, programs must be developed to address more than parental education levels and student's socioeconomic status. The findings of this study are indicative of a more holistic approach to adequately address these complex variables.

Several studies (Coll et al., 1996, Lovaglia and Lucas, 1997, and NCES, 1996) have identified the need to conduct research using an integrative approach with complex variables in determining impact on academic achievement. The findings of this study extends the literature by demonstrating that cumulative effects of community, school and family status variables are statistically significant when used to explain academic achievement of adolescents. In addition, the results indicated a strong relationship between students' socioeconomic status and all other variables reviewed.

Barnett (1995) identified several integrated approaches of early childhood programs to enhance academic achievement. Among these studies were High/Scope Perry Preschool Project, 1962 – 1967, Philadelphia Project, 1963 – 1964, and Verbal Interaction Project, 1967 – 1972. Each of these projects demonstrated some success in increasing academic achievement. Stagner and Duran (1997) reviewed these comprehensive community initiatives that were designed to improve the lives of children

and families in neighborhoods characterized by concentrations of poverty. They reported that for these programs to succeed they should possess a new collaborative organization within the community, a delicate balance of long-term and short-term goals and flexible funding. These integrated approaches tailored to the needs of the individual school district may address the complex variables involved in academic achievement.

The results of this study must be viewed with some caution. This study used an aggregate analysis method to review the data that cannot be generalized to a specific school or an individual student. This study used only existing statistics as reported by the Commonwealth of Virginia and investigated correlational relationships. Replication of this study is required to substantiate its findings.

Conclusion

Although the controversy surrounding academic achievement will not be resolved soon, it is clear that state and federal policies must address issues to optimize the educational opportunities for youth. National and state economic policies and support programs can have a significant effect on the number of children and adolescents living in poverty. The existence of poverty and its subsequent impact on youth development suggests that additional efforts must be made to eradicate the problems faced by youth, particularly during the early years (e.g., see McLoyd, 1997). Research continues to indicate that policies designed to improve the socioeconomic status and well being of poor families will enhance child development, including cognitive functioning and educational achievement (Brooks-Gunn & Duncan, 1997). Persistent cutbacks in welfare assistance and support programs can only result in increased poverty among many

families and their children. As a result, academic, economic, and other outcomes will be drastically affected.

The results of this study further suggest that strategies are necessary to increase the levels of academic achievement among economically disadvantaged youth. Interventions that would include instructing teachers about the behaviors of disadvantaged youth seem equally important given the linkage between teacher' expectations and responses among poor children.

Finally, additional research is necessary to examine the importance of social status indicators and their impact on children of color, particularly developmental outcomes. As McLoyd (1997) argued, the effect of social position is often mediated through additional structural factors, including racism, prejudice, and discrimination. The intersection of these and other indicators of stratification can severely impact the cognitive, social, and academic development of economically disadvantaged children, particularly in terms of the transition from childhood to adolescence. Thus, integrative approaches to increase academic achievement and other outcomes seem most appropriate to answer complex questions involved in the study of socioeconomic background and educational outcomes.

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Table 1

Means and Standard Deviations (SD) of Measures

Variable	Mean	SD
ITBS Composite Score	53.66	10.61
Family Poverty Level	9.86	5.04
Students' SES	36.21	15.64
Community Education Level	65.99	10.73
Percent Absent 10 Days or Less	68.82	8.21
Students Over 15 Years of Age	8.18	6.33
Median Income	$20,919	$4,726
Dropout Rate	3.2	1.64

Table 2

Intercorrelations Matrix of Variables

	1	2	3	4	5	6	7	8
1. Composite Scores ITBS		-.562***	-.677***	.638***	.487***	-.502***	.538***	-.297***
2. Family Poverty Level			.667***	-.753***	-.403***	.439***	-.746***	.170*
3. Students' SES				-.533***	-.428***	.491***	-.626***	.238**
4. Community Education Level					.363***	-.341***	.757***	-.089
5. Percent Absent 10 Days or Less						-.310***	.424***	-.362***
6. Students Over 15 Years of Age							-.348***	.119
7. Median Income								-.204
8. Dropout Rate								

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3

Hierarchical Regression of ITBS Average Composite Scores

On Community, School and Family Status Variables (N = 129)

Variables in Equation	Model 1 beta	Model 2 beta	Model 3 beta
Community Education Level	.638***	.468***	.526***
Percent Absent 10 Days or Less		.177**	.142*
Students Over 15 Years of Age		-.268***	-.180**
Dropout Rate		-.159**	-.136*
Family Poverty Level			.155
Students' Socioeconomic Status			-.417***
Median Income			-.156
Total R^2	.41	.57	.65
Total F	87.13***	40.489**	31.595***

Standardized beta coefficients are reported in table.
* $p < .05$
** $p < .01$
*** $p < .001$

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