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THE RELATIONSHIP BETWEEN STUDENT-TEACHER RATIO AND ACADEMIC READINESS IN WEST VIRGINIA PRESCHOOL PROGRAMS

Michael A. Smith

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Michael A. Smith

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ABSTRACT

THE RELATIONSHIP BETWEEN STUDENT TEACHER RATIO AND ACADEMIC READINESS IN WEST VIRGINIA PRESCHOOL PROGRAMS

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The current study investigated the relationship between student-teacher ratio and academic readiness in West Virginia preschool programs. Data from 47 preschoolers enrolled in 14 Educare programs in West Virginia was examined. Scores from the School Readiness Composite (SRC) of the Bracken Basic Concepts Scale-Revised (BBCS-R) were compared with observed student-teacher ratios. Data analysis yielded a statistically insignificant correlation coefficient of -.061. However, due to limitations inherent in the data set and the abundance of research contradicting these findings, it is unlikely that the data presented here offers an accurate picture of the general relationship between academic readiness and student-teacher ratio.

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CHAPTER I

Introduction/Literature Review

The Benefits of Preschool

Early childhood research has demonstrated the developmental significance of the first few years of life (Flavell, 1992). During these years neural connections are forming rapidly and abilities are being developed or lost forever. These important changes begin before children reach school age and are an important factor behind the development of preschool programs (Trostle & Merrill, 1986). In general, "The quality of a child's early experiences sets the stage for future learning and development" (Governor's Cabinet on Children and Families, 2001, p.2). Research on quality preschool programs, such as Head Start, public preschool programs, pre-kindergarten and licensed child-care, indicate significant and lasting benefits for individual children and the greater society (Governor's Cabinet on Children and Families, 2001).

Research on comprehensive child development programs for underprivileged children in the United States began in 1965 with Lyndon Johnson's Head Start program (Camelot, 2000). The Head Start program stimulated early childhood research, producing data that has dramatically changed the way we view early childhood education. Economically, the research strongly indicates quality preschool educational programs can result in significant financial savings for the public. Societal benefits include, but are not limited to, reduced school failure, a lower rate of dropouts, and a reduction in later delinquency and crime (Trostle & Merrill, 1986). A summary of research supporting the benefits of early childhood education follows.

The Abecedarian Project and the Perry Preschool Project both produced significant data supporting the efficacy of preschool education. The Abecedarian Project was a randomized trial of early childhood educational intervention. The study provided five years of full-time child care beginning in infancy to 111 children from low income families (Campbell & Pungello, 2000). The control group received free formula for 15 months and free disposable diapers. Long-term outcome analysis for 105 of the original 111 participants at age 21 indicated that the preschool treatment group received higher scores on cognitive tests than the control group (Campbell & Pungello, 2000). The preschool treatment group was also more likely to be in school at age 21, to go to college and earned higher math scores on the Woodcock-Johnson Psychoeducational Battery-Revised. The preschool treatment group was also older than the control group by about a year when their first child was born. The findings of this study supported the trend of extending preschool programs downward into infancy (Campbell & Pungello, 2000).

In addition, an age 21 follow up study to the Abecedarian Project examined long-term outcome analysis for 100 of the original 109 biological mothers; 51 were mothers of treated children and 49 were mothers of control participants. The study found nearly twice as many teen mothers of treated children received post-high school education. This data led to the conclusion quality childcare can have enduring benefits not only for the children themselves but for teen mothers as well (Pungello, Campbell & Miller-Johnson, 2000).

Another important study showing long term benefits from exposure to quality preschool programs is the Perry Preschool Project. The findings of this longitudinal study supported the belief that the positive effects of quality preschooling would last

beyond the second or third grade. (Williams & Williams, 1997) An age-27 cost –benefit analysis of the Perry Preschool Project found that the program cost $12,356 per subject to operate. This initial investment was found to produce an average return of $88,433 per participant. The significant return on the initial investment is attributed to lower schooling costs, higher taxes paid on greater earnings, lower welfare costs, lower justice system costs, and lower crime victim costs (Barnett, 1996).

The Concept of Readiness

It is clear that participation in a quality preschool program enhances an individual's likelihood of succeeding in school and society. However, the specific characteristics responsible for the individual and societal benefits obtained through preschool participation are a matter of much debate. At the center of this debate is the concept of readiness and its relationship to the characteristics of a quality preschool program.

In 1990, the President of the United States and the National Governors' Association stated that by the year 2000, "all children will start school ready to learn", thereby establishing readiness as a national education goal (Katz, 1991). This declaration has fueled the debate over what readiness is and what is necessary to create a state of readiness within the children and/or the school (Katz, 1991).

The placement of readiness on top of the list of national education goals represents a reaction to two significant educational concerns. First is the data indicating increasing numbers of children are living in poverty, have poor health care, are poorly nourished, have limited English proficiency and are influenced by parental drug abuse (Katz, 1991). The second area of concern includes increased retention in early

elementary grades and kindergarten, delayed school entry and segregated transition classes (Katz, 1991).

Proposed objectives addressing these concerns focus on enhancement of prenatal health care, parental training and involvement in their children's education and increased access for disadvantaged and disabled students to developmentally appropriate preschool programs. These objectives reflect the belief that what, how and how much a child learns is strongly linked to the child's cognitive and emotional relationship with his/her caregivers and his/her physical well-being (Katz, 1991).

Research contributing to the establishment of readiness as a national educational goal included analysis of effective and ineffective preschool programs. This analysis led to the isolation of common characteristics that were likely to have contributed to the gains made by the preschoolers. These characteristics include: starting early in the child's life, extending services to parents, involving parents in the child's instruction, applying an established curriculum, staff training, program assessment and low student-teacher ratios (Trostle & Merrill, 1986). Student-teacher ratios and the closely related class size variable will be discussed in more detail.

Student-Teacher Ratio

The student-teacher ratio is a measure of the number of students per teacher. Student-teacher ratio is a good indicator of teacher workload and teacher availability to students. As the student-teacher ratio is lowered, the availability of teachers to provide services to students increases. The student-teacher ratio affects both the quality and cost of education (Organization for Economic Cooperation and Development, 1996). Besides increasing teacher availability, smaller classes have been shown to enhance the

opportunity for student evaluation and allow for greater instructional flexibility. (Ellis, 1984).

Research has demonstrated many variables play a role in the relationship between class size and effectiveness of instruction. Among these variables are student age, subject matter taught, and instructional techniques being employed (Ellis, 1984).

Glass and Smith's 1979 meta-analysis (as cited in Ellis, 1984) of 80 studies relating to class size developed over 700 comparisons of smaller and larger classes to student achievement, classroom processes and teacher and student attitudes. They concluded students and teachers in smaller classes were more likely to have positive attitudes, utilize a wider range of classroom processes and produce higher student achievement (Ellis, 1984).

Research in the area of student-teacher ratio and class size has focused on elementary and secondary school populations. In general, research indicates that smaller classes and lower student teacher ratios improve student acquisition of basic skills and understanding of subject matter (Hertling, Leonard, Limsden, & Smith, 2000). Smaller classes have a greater chance of benefiting younger students, disadvantaged students and exceptional students (Ellis, 1984). Ellis' research demonstrated that smaller classes improve student achievement in the elementary school years particularly in reading and mathematics. At the secondary level, class size has been shown to be related to only minimal differences in student achievement (Ellis, 1984).

Similarly, a positive correlation between sixth grade student achievement and low student-teacher ratio was noted in Alspaugh's 1994 study of sixty small schools. The same study found tenth grade student achievement was not improved by low student-

teacher ratios (Alspaugh, 1994). Alspaugh further generalized that variability in student-teacher ratio may be different for elementary verses secondary students (Alspaugh, 1994).

Research on infants conducted by Burchinal, Roberts, Riggins, Zeisel, Neebe, & Bryant in 1996 concluded infants who were cared for by preschools with a smaller child to teacher ratio received better ratings on receptive and expressive language skills. In addition, infants placed in classes with low ratios scored higher on the Bayley Scales of Infant Development (Burchinal et.al., 1996). Similar research conducted by Vandell and Wolfe (2000) concluded that children who were placed in preschools with low child to adult ratios showed greater gains in receptive language, general knowledge, cooperation and verbal imitations. Children in low child-adult ratio settings also exhibited less hostility (Vandell & Wolfe, 2000).

Findings of this type of research are evident in national educational standards (NAEYC, 2001). For example, the National Association for the Education of Young Children (NAEYC) operates on the assumption the younger the child, the more individualized attention the child will need (NAEYC, 2001). The NAEYC requires all groups to include at least two teachers and recommends infants be placed in groups of 6 to 8, 2-3 year olds be placed in groups of 10-14, and 4-5 year olds should be limited to 16-20 in a group (NAEYC, 2001).

Hypothesis

The research discussed so far suggests variability in student-teacher ratio affects the ability of preschoolers to acquire basic skills and concepts. Gains made by infants and preschoolers have been shown to be linked to child-caregiver ratios (Burchinal, et.al.

1996; Vandell & Wolfe, 2000). Furthermore, both Alspaugh's and Thomas' studies suggest that the younger the children, the greater the effects of student-teacher ratio on academic success. Given this trend, this study examined the relationship between student-teacher ratio and school readiness in West Virginia preschool programs. It was hypothesized that as student-teacher ratio decreased, SRC scores would increase.

The data used in this study represents a small portion of the information collected by West Virginia's Educare Initiative Evaluation Plan. The Educare initiative establishes childcare standards and provides early childhood care facilities with needed financial resources (Governor's Cabinet on Children and Families, 2001). The data collected by the Educare Initiative Evaluation Plan includes individual assessment, environmental and classroom evaluations and child observations. The data used in this study was taken from the individually administered Bracken Basic Concepts Scale and the demographic portion of Early Childhood Environmental Rating Scale.

CHAPTER II

Methods

Subjects

A total of forty-seven subjects, 20 females and 27 males, between the ages of two years six months and five years seven months were randomly selected from 20 classrooms in 14 childcare programs participating in West Virginia's Educare Initiative Evaluation Plan. The programs are geographically widely distributed throughout West Virginia and comprise a mixture of urban, rural and suburban settings (West Virginia's Prevention Resource Center, 2001).

Instruments

The subjects were assessed with the School Readiness Composite (SRC) of the Bracken Basic Concepts Scale-Revised (BBCS-R). Data reflecting the number of children present in the class and the number of staff present in the subject's classrooms was observed by a trained graduate student and recorded on the demographic portion of the Early Childhood Environmental Rating Scale.

Bracken Basic Concepts Scale-Revised (BBCS-R).

The first six of the eleven subtests on the Bracken Basic Concepts Scale-Revised (BBCS-R) compose the School Readiness Composite or SRC. The SRC measures children's understanding of colors, letters, numbers/counting, sizes, comparisons and shapes (Bracken, 1998). What the BBCS-R labels "school readiness" is, for the purposes of this study and in recognition of the multifaceted nature of the concept of school

readiness, referred to as “academic readiness”. The term academic readiness reflects the School Readiness Composites focus on cognitive/academic preparedness linked to mastery of the basic concepts the SRC measures.

The BBCS-R is a standardized, norm referenced instrument appropriate for children ages 2 years 6 months through 7 years 11 months (Bracken, 1998). The standardization sample of the BBCS-R represented the United States population based on the 1995 U.S. Census. A total of 1,100 subjects were tested. The sample group took into consideration age, race, gender, religion and parent education level (Bracken, 1998).

The BBCS-R has been proven to be a reliable and valid instrument (Bracken, 1998). The mean split-half reliability coefficient across ages 2-7 was .91 for the SRC and .98 for the total test (Bracken, 1998). An evaluation of test-retest reliability examined the scores of 114 children in the standardization sample. The test-retest reliability for the BBCS-R total test was .94 and .88 for the SRC.

Concurrent validity studies indicate no significant difference in overall mean scores between the BBCS-R and it predecessor, the Bracken Basic Concepts Scale (Bracken, 1998). Intercorrelations of the BBCS-R subtests and total test standard scores range from .26 to .92. The intercorrelations are low enough to suggest that the measures are not identical and high enough to suggest they all measure a common construct (Bracken, 1998).

Several convergent validity studies have demonstrated the consistency of SRC scores with scores from other instruments measuring similar concepts. A study of thirty 5 year old children comparing scores from the BBCS-R and the Wechsler Preschool and Primary Scale of Intelligence-Revised or WPPSI-R produced positive results. The

correlation between the composite standard score means and the standard deviations of the WPPSI-R full scale IQ score and the BBCS-R SRC was .88 (Bracken, 1998). Similarly, a convergent validity study of the BBCS-R and The Bohem Test of Basic Concepts-Revised (Bohem-R) produced a .73 correlation between the SRC and the total test Bohem-R (Bracken, 1998).

A study of 71 kindergarten children assessed the ability of BBCS-R, WPPSI-R Geometric Design subtest, and Parent Form of the Social Skills Rating System (SSRS) to predict certain outcomes (Panter, 1998). The SRC of the BBCS-R predicted which children were likely to be retained with 82 to 94 percent accuracy. The SRC also significantly predicted Metropolitan Readiness Test-Sixth Edition scores and teacher ratings of students on both the SSRS and readiness for first grade. Overall, the SRC was determined to be the best predictor of school success (Panter, 1998)

Procedures

Selection and testing of subjects was carried out from April through October of 2001. The data was collected according to the guidelines stated in the Educare Study Protocol (Boyles, 2001). The subjects were administered the Peabody Picture Vocabulary Test Third Edition (PPVT-III) and the entire BBCS-R. Each subject's classroom was rated with the Early Childhood Environmental Rating Scale Revised (ECERS-R)

Statistical Procedures

Statistical analysis was conducted using SPSS version 10.0 for Windows. Descriptive statistics and frequency tables were computed for both student-teacher ratio and SRC standard scores. A probability plot was produced to examine the normalcy of the data. Consequently, statistical analysis of the relationship between student-teacher

ratio and SRC standard scores using a Spearman bivariate correlation was conducted and a scatter plot of the data points was produced.

CHAPTER III

Results

The probability plot indicated the data did not meet assumptions of normality. Consequently, a one-tailed Spearman bivariate correlation was conducted. Analysis yielded a correlation coefficient of -.061 and a statistically insignificant significance level of .342. The absence of a linear relationship among the data points on the scatter plot (See Figure 1) echoed the insignificant correlation between the variables. For descriptive statistics on student-teacher ratio and SRC standard scores, see Table 1. For student-teacher ratio frequency information, see Table 2. For SRC standard score frequency information, see Table 3.

CHAPTER IV

Discussion and Conclusions

The present data is incongruent with previous research on the relationship between student-teacher ratios and academic gains in the classroom (Alspaugh, 1994; Burchinal, et.al. 1996; Ellis, 1984; Hertling, Leonard, Limsden, & Smith, 2000; Vandell & Wolfe, 2000). The results also fail to support the hypothesis, which predicted as student-teacher ratio decreased, SRC scores would increase. In fact, there was no

statistically significant correlation between student-teacher ratio and SRC scores among the participants in this study.

The results of this study suggest student-teacher ratio does not influence academic achievement. However, several limitations of the study should be considered when evaluating these results. The competitive nature of the Educare site selection process may have resulted in a data set comprised primarily of high quality preschool and childcare programs. This possibility is supported by the disproportionate representation of data from the lower end of the SRC range. As Table 3 indicates, 93.6 percent of the SRC standard scores were 90 or above. The high percentage of scores greater than 90 suggests data needed to accurately describe the relationship between SRC scores lower than 90 and student-teacher ratio is not adequately represented in this data set.

Furthermore, high dropout and replacement rates of subjects originally selected to participate in the study could have skewed the data. The dropout/replacement rate may have resulted in a data set that disproportionaly represented higher functioning children from stable home environments. As children from less stable environments dropped out of the study, it is reasonable to assume they were frequently replaced by children from more stable environments.

In addition, variability in testing environments may have affected the scores. Administration of the SRC was conducted in the most distraction free environment available at each of the sites. However, inconsistencies in the testing environment could have affected the scores. Moreover, although the student teacher ratios were obtained during observations made on typical days of program operation, the data collected

reflects only one day of observation. An average of many observations would have produced a more reliable measure of student-teacher ratio.

Additionally, the length of time subjects have attended their current preschool program prior to testing and the number of days per week they attended were unknown. Children exposed to a high quality preschool environment on a full time basis may have scored higher than those children enrolled on a part time basis despite similar student-teacher ratios. Similarly, if subjects had recently moved form environments with higher or lower student-teacher ratios, their SRC scores would not be an accurate reflection of their current environment.

In conclusion, the absence of a significant correlation between academic readiness and student-teacher ratio fails to support the hypothesis and the existing body of knowledge on student-teacher ratio. Given the serious limitations inherent in the data set and the abundance of previous research on the topic, it is unlikely that the data presented here offers a true picture of the relationship between academic readiness and student-teacher ratio. In order to achieve a clearer picture of the relationship between academic readiness and student-teacher ratio, future research should avoid the limiting factors mentioned above.

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Appendix

TABLE 1

DESCRIPTIVE STATISTICS

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Student-Teacher Ratio	47	6.50	2.50	9.00	5.0064	1.8033
SRC Standard Score	47	74	60	134	105.30	14.85

TABLE 2

FREQUENCY OF STUDENT-TEACHER RATIOS (ST RATIOS)

ST Ratios	Frequency	Percent	Valid Percent	Cumulative Percent
2.50	1	2.1	2.1	2.1
3.00	4	8.5	8.5	10.6
3.30	1	2.1	2.1	12.8
3.50	4	8.5	8.5	21.3
4.00	11	23.4	23.4	44.7
4.20	5	10.6	10.6	55.3
4.50	3	6.4	6.4	61.7
5.50	2	4.3	4.3	66.0
6.00	8	17.0	17.0	83.0
7.00	3	6.4	6.4	89.4
9.00	5	10.6	10.6	100.0
Total	47	100.0	100.0	

TABLE 3

FREQUENCY OF SRC STANDARD SCORES

SRC Score	Frequency	Percent	Valid Percent	Cumulative Percent
60	1	2.1	2.1	2.1
73	1	2.1	2.1	4.3
85	1	2.1	2.1	6.4
90	2	4.3	4.3	10.6
91	3	6.4	6.4	17.0
93	1	2.1	2.1	19.1
94	1	2.1	2.1	21.3
96	2	4.3	4.3	25.5
98	2	4.3	4.3	29.8
99	3	6.4	6.4	36.2
100	1	2.1	2.1	38.3
102	3	6.4	6.4	44.7
103	2	4.3	4.3	48.9
105	3	6.4	6.4	55.3
106	1	2.1	2.1	57.4
107	1	2.1	2.1	59.6
108	1	2.1	2.1	61.7
109	1	2.1	2.1	63.8
111	1	2.1	2.1	66.0
112	2	4.3	4.3	70.2
113	2	4.3	4.3	74.5

116	1	2.1	2.1	76.6
117	1	2.1	2.1	78.7
119	1	2.1	2.1	80.9
120	1	2.1	2.1	83.0
121	1	2.1	2.1	85.1
123	1	2.1	2.1	87.2
125	1	2.1	2.1	89.4
126	1	2.1	2.1	91.5
129	3	6.4	6.4	97.9
134	1	2.1	2.1	100.0
Total	47	100.0	100.0	

FIGURE 1 SCATTER PLOT OF STUDENT-TEACHER RATIOS AND SRC STANDARD SCORES