DOCUMENT RESUME

ED 431 066 UD 032 977

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TITLE The Interaction Effect of Transition Grade to High School with Gender and Grade Level upon Dropout Rates.

PUB DATE 1999-04-00

NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (Montreal, Quebec, Canada, April 19-23, 1999).

PUB TYPE Numerical/Quantitative Data (110) -- Reports - Research (143) -- Speeches/Meeting Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS Age Differences; *Dropout Rate; Dropouts; *High School Students; High Schools; *Instructional Program Divisions; Sex Differences; Tables (Data)

ABSTRACT

The purpose of this ex post facto study was to explore the interactive relationship among grade level of transition to high school, gender, and grade level of dropping out of high school as factors associated with high school dropout rates. Fifteen schools at each of the most common high school grade spans were studied, for a total of 45 schools. The findings imply that as the grade level of transition to high school is raised, high school dropout rates increase. Boys have larger high school dropout rates than girls. It appears that as the grade level of transition to high school is raised, the difference between dropout rates for boys and girls increases. The highest dropout rates occur at 11th grade. The dropout rates are particularly large for grade 10-12 high schools with the transition to high school at 10th grade. The dropout rates were lowest for both boys and girls in high schools with grade spans from 7 through 12 in which the transition to high school occurred at seventh grade. (Contains 3 figures, 10 tables, and 9 references.) (Author/SLD)

The Interaction Effect of Transition Grade to High School With Gender and Grade Level Upon Dropout Rates

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AERA 1999

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ABSTRACT: The purpose of this expost facto study was to explore the interactive relationship among grade level of transition to high school, gender and grade level of dropping out of high school as factors associate with high school dropout rates. The findings imply that as the grade level of transition to high school is raised high school dropout rates increase. Boys have larger high school dropout rates than girls. It appears that as the grade level of transition to high school is raised the difference between dropout rates for boys versus girls increases. The highest dropout rates occur at eleventh grade. The dropout rates are particularly large for grade 10-12 high schools with the transition to high school at tenth grade. The dropout rates were lowest for both boys and girls in high schools with 7-12 grade spans in which the transition to high school occurred at seventh grade.

There is a growing concern about high school dropout rates. Most of the research concerning high school dropout rates is concerned with the characteristics of high school dropouts. Rumberger (1987) concluded that socioeconomic status (SES) is a primary factor in high school dropout rates. Researchers have identified clusters of factors such as family background, personal problems, and school related

problems that are associated with dropout rates (Phelan, 1992). There is a need for more research on things schools can do to prevent students from dropping out. In recent years there has been increasing interest on dropout prevention programs. Wehlege (1986) emphasized the need to study school-related factors associated with dropout rates. There has been very little research concerning basic school organization and high school dropout rates.

Alspaugh and Harting (1995) established that there is a decline in student achievement during the transition year from elementary school to an intermediate level school. This achievement loss occurs for all academic subjects and is independent of the transition grade level. Student achievement tends to recover in the school year following the transition year. There is a second achievement loss during the transition year whenever the students encounter the next school-to-school transition (Alspaugh, 1998). As the number of school-to-school transitions increase there is an associated increase in the high school dropout rates (Alspaugh, 1998b). The higher the grade level of the last transition to high school the higher the dropout rate. The transition grade level is the first year within the high school grade span, such as ninth grade in a 9-12 high school. Hence, there is a relationship between high school dropout rates and the grade span of high schools.

Purpose of the Study

The purpose of this ex post facto study was to extend the previous research concerning school-to-school transitions (or high school grade

spans) and explore the interaction effect of the grade level of transition to high school and gender upon dropout rates. A second goal was to study the relationship between the grade level of transition to high school and dropout rates by grade level.

Sample

The primary independent variable for the study grade was the grade level of transition to high school (or high school grade span). Because it was not possible to randomly assign high school grade level organizations to school districts a sample of fifteen schools was selected to represent each of the three most common grade spans for a total sample size of forty five schools. An effort was made to select three matched groups of schools that were comparable in terms of school characteristics identified by Alspaugh (1998a) that are related to dropout rates. The mean background characteristics for the three transition grade level groups of schools are presented in Table 1. There is a tendency for school districts with a large number of students per grade to form short grade span high 10-12 schools with the transition to high school at tenth grade. Whereas, the smaller districts in terms of pupils per grade tend to form longer grade span 7-12 schools with the transition at seventh grade. The grade spans or transition grade levels of the high schools are also related to the other background characteristics of the districts included in Table 1.

Table 1. – Mean School Background Characteristics by Transition Grade Level (N = 45)*

Transition Grade	Enrollment/ Grade	Expenditure/ Pupil	HS Credit	Pupils/ Sq. Mile	% F/R Lunch
7	43.28	3637.40	85.08	.37	38.54
9	194.96	4190.23	141.73	2.15	25.51
10	207.07	3992.24	144.13	1.78	25.57
Total	148.44	3939.96	123.65	1.43	29.88

* Means for transition grades are statistically significantly different from each other on all variables with α =.01.

Because of the lack of randomization the characteristics of the school districts are confounded with the primary independent variable of high school transition grade level or grade span within this expost facto study. These characteristics are related to the organizational decision within each school district when the high school grade spans are established. For example, if the districts with 10-12 high schools were to convert their grade 7-9 junior high schools to high schools they could have two 7-12 high schools with approximately half the number of students per grade.

A correlation matrix containing the correlations among the background characteristics and the high school dropout rates is presented in Table 2. The percent dropout in Table 2 is the average percent of students who dropped out of school in grades 9 through 12 for the schools years 1993-4 through 1996-7. The correlations

are for the combined 45 schools in the three comparison groups and do not represent the correlations for schools in general.

Table 2. – Correlation Matrix for Dropout Rates and Other School Characteristics

Variable	% Drop	Exp/Pupil	Enr/Gr	HS Credit	Density	F/R Lunch
% Drop	1.00	.32*	.34*	.48**	.34*	.04
Exp/Pupil		1.00	.51**	.57**	.50**	-.11
Enr/Gr			1.00	.69**	.75**	-.52**
HS Credit				1.00	.47**	-.28
Density					1.00	-.40**
F/R Lunch						1.00

* $p < .05$ ** $p < .01$

Analysis of the data

The three independent variables in the investigation were the three transition grade levels (high school grade spans), gender, and grade levels 9 through 12. The dependent variable was the four year average percent of students that dropped out of school for the school years 1993-4 through 1996-7 by gender and grade level.

The data were analyzed with a three way analysis of variance where transition grade level was a between subjects factor. Gender and grade level were within subjects factors. The results of the ANOVA are presented in Table 3.

Table 3. – Three Way Analysis of Variance for Dropout Rates Between transition grade levels with Gender and Grade Levels as Repeated Measures

Source	SS	DF	MS	F	p
Between Schools					
Transition Grades	344.15	2	172.08	5.57	.007
Sch / Trans	1297.06	42	30.88		
Within Schools					
Gender	194.45	1	194.45	60.71	.000
Gender x Trans	20.36	2	10.18	3.18	.052
(Gen x Sch) /Trans	134.52	42	3.20		
Grade	899.44	3	299.81	47.59	.000
Grade x Trans	400.02	6	66.67	10.58	.000
(Gr x Sch) / Trans	793.81	126	6.30		
Gender X Grades	17.33	3	5.78	2.02	.114
Trans x Gen x Grades	11.94	6	1.99	.70	.653
(Gen x Gr) / Trans	360.08	126	2.86		

There was a statistically significant difference among the dropout rates for the three transition grade levels. Descriptive statistics for the dropout rates are presented in Table 4. Tukey's contrasts for pairwise comparisons of the three means revealed a pairwise difference between the mean dropout rates of 10-12 high schools and 7-12 high schools at the .01 level. The other pairwise contrasts were not statistically significant. Hence, the dropout rates for the schools with transition to high school at seventh grade are statistically significantly lower than the dropout rates for schools with transitions to high school at ninth or tenth grade.

Table 4. – Percent Dropout Rates by Transition Grade Level (ANOVA p = .007)

Transition Grade	Grade Span	N	Mean	Standard Deviation
7	7-12	15	4.37	1.26
9	9-12	15	6.06	1.66
10	10-12	15	6.68	2.69
Total		45	5.70	2.16

One might be inclined to use the background characteristics of the schools such as students per grade as covariates in the analysis of the between school groups factor. In a multifactor design with both between subjects and within subjects factors the covariates only effect the analysis for the between subjects factors. In this analysis the means for the between subjects factor of transition grade levels would be adjusted, but not the means for the within subjects factors of gender and grade level of dropping out. The background characteristics when considered as covariates will account for some of the variance among the mean dropout rates associated with the transition grade levels. However, the conclusions were the same in that there is a statistically significant difference among the adjusted means in the analysis of covariance. In order to simplify the presentation the findings based upon the ANOVA in Table 3 are presented. The large enrollments per grade is a school district decision that is related to establishing the short grade span 10-12 high schools with the transition at tenth grade. Likewise the expenditure per pupil and units of high school credit are controlled by the school districts.

The F test for the within subject factor of gender in Table 3 is statistically significant. Males have a higher dropout rate than females. Descriptive statistics for dropout rates by gender are presented in Table 5.

Table 5. – Percent Dropout Rates by Gender (ANOVA p = .000)

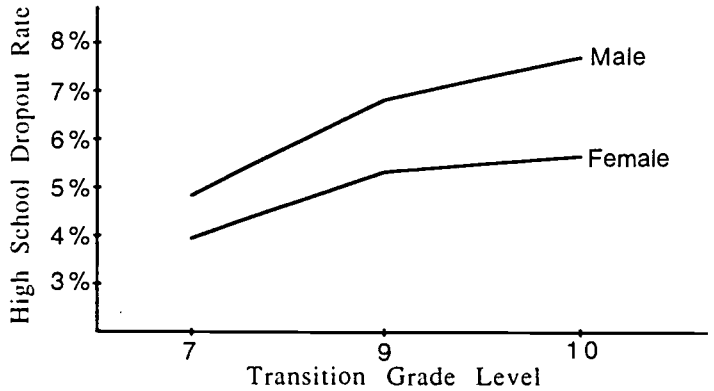
Gender	N	Mean	Standard Deviation
Female	45	4.97	1.84
Male	45	6.44	2.61
Total	90	5.70	2.36

The interaction hypothesis for dropout rates by gender X transition grade level was nearly significant at the .05 level. The cell means for gender by high school grade span are presented in Table 6. From the graph of the interaction in Figure 1 it is apparent that the mean dropout rates for both male and female students increases as the transition grade increased from seventh to tenth grade. Also, as the transition grade level increases from seventh to tenth the difference between the mean male and female dropout rates tends to increase.

Table 6. – Mean Percent Dropout Rates for Interaction of Gender x Transition Grade (ANOVA p = .052)

	Transition Grade Level			
Gender	7	9	10	Total
Female	3.93	5.30	5.66	4.97
Male	4.80	6.81	7.69	6.44
Total	4.37	6.06	6.68	5.70

Figure 1. Interaction between transition grade and gender



The analysis of variance in Table 2 found a statistically significance difference among the mean dropout rates for the within subjects factor of grade levels 9 through 12. Descriptive statistics for the dropout rate at each grade level are presented in Table 7. The relationship between dropout rates and grade level is illustrated in Figure 2. The sharp change in dropout rates between ninth and tenth grade may be associate with the large increase in dropout rates between ninth and tenth grades within the 10-12 schools.

Table 7. – Percent Dropout Rates by Grade Level (ANOVA p = .000)

Grade Level	N	Mean	Standard Deviation
9	45	3.20	1.95
10	45	6.29	3.49
11	45	7.54	3.06
12	45	5.77	2.63
Total	180	5.70	3.23

Tukey's contrasts for pairwise comparison of the dropout rates by grade level are presented in Table 8. The Tukey's contrasts found no

statistically significant difference between the dropout rates for tenth and twelfth grades.

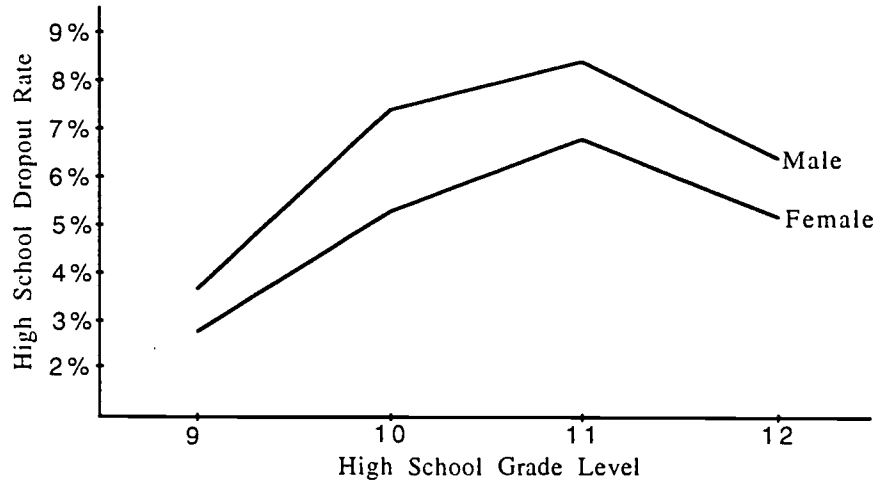
Table 8. – Tukey's Contrasts for Dropout Rates by High School Grade Level

Grade Level	9	10	11	12
9		11.68**	16.40**	9.71**
10			4.72**	1.97
11				6.69**
12				

**p < .01

The p value of .114 in Table 3 reveals a non-statistically significant interaction between grade level and gender. From Figure 2 it is evident that the highest dropout rates occur at eleventh grade for both male and female students. The dropout rate for boys is consistently higher than the dropout rate for girls at all grade levels. The parallel lines in Figure 2 substantiate that the interaction between gender and grade level is not statistically significant. Figure 2 illustrates a quadratic relationship between grade level and dropout rates for both male and female students when all three school groups are combined. F tests for a trend analysis found statistically significant linear and quadratic trends in the relationship between grade levels and dropout rates.

Figure 2. Interaction between grade level and gender

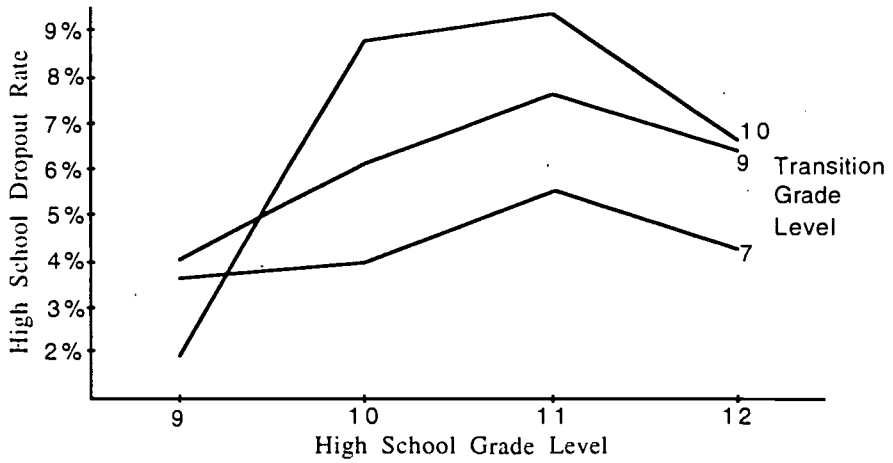


The F test for interaction between high school grade span and grade level at which students dropout of school in Table 2 was statistically significant. The cell means for the interaction are presented in Table 9. The cell means are graphed in Figure 3 to illustrate the relationship between transition grade level and dropout rate by grade.

Table 9. – Mean Percent Dropout Rates for interaction of High School Grade Span x Grade Level (ANOVA p = .000)

Transition Grade	Grade Levels 9	10	11	12	Total
10	1.90	8.76	9.40	6.67	6.68
9	4.07	6.11	7.67	6.38	6.06
7	3.63	4.01	5.56	4.26	4.37
Total	3.20	6.29	7.54	5.77	5.70

Figure 3. Interaction between transition grade level and grade level



From Figure 3 it is apparent that the dropout rates peak at eleventh grade for all three transition grade levels (or high school grade spans). Dropout rates for all schools declined from eleventh to twelfth grade. The lowest dropout rates occurred in ninth grade for the 10-12 high schools. This lowest dropout rate was when this group of students were in their last year of junior high school. However, there was a large increase in the dropout rate within 10-12 high schools during their transition year at tenth grade. This increase in dropout rates in the transition year may be associated with the achievement declines that Alspaugh and Harting (1995) found during transition years. For all three groups of schools the dropout rates increase as the students progress through grades nine, ten and eleven. There is an overall decrease in dropout rates for all three school groups as the students progress from eleventh to twelfth grade.

The grade level at which a student drops out of school is a major concern. For example, if a student drops out of school in the twelfth grade one year of schooling is lost. But, if a student drops out of school at tenth grade, three years of school are lost. Thus, the high tenth grade dropout rate for students in 10-12 schools with the transition in tenth grade is of particular concern. Maybe it would be more appropriate to measure dropout rates in terms of the percent of years of schooling that are lost rather than the percent of students that dropout.

The interaction illustrated in Figure 3 implies that when students make the transition at seventh grade they acclimate to the high school environment before they become old enough to consider dropping out. When students make the transition at tenth grade and encounter difficulty in adjusting to the high school environment they are mostly sixteen years old and are more likely to exercise the option of dropping out of school.

The three way interaction among transition grade level, gender and grade level was not statistically significant. From Table 10 the highest dropout rates occur for male students in tenth and eleventh grade within schools with the transition to high school at tenth grade. The largest gender differences in dropout rates also occur in grades ten and eleven within schools with the transition at tenth grade. The extremely high dropout rates among tenth and eleventh grade boys within the grade span 10-12 schools implies that the boys are having a difficult time adjusting to the school environment. This leads one

to wonder if there are differences in school climate associated with the various grade level configurations as perceived by boys and girls at different grade levels.

Table 10. – Cell Means for Three Way ANOVA(Cell n =15)

Transition Grade	Gender	Grade Level 9	10	11	12	Total
10	F	1.45	7.07	8.29	5.84	5.66
	M	2.34	10.44	10.50	7.49	7.69
	Subtotal	1.90	8.76	9.40	6.67	6.68
9	F	3.38	5.13	6.99	5.71	5.30
	M	4.77	7.08	8.36	7.05	6.81
	Subtotal	4.07	6.11	7.67	6.38	6.06
7	F	3.34	3.51	4.91	3.96	3.93
	M	3.93	4.51	6.21	4.55	4.80
	Subtotal	3.63	4.01	5.56	4.26	4.37
Total		3.20	6.29	7.54	5.77	5.70

Summary and Conclusions

The results of this study support Bryk and Thum's (1989) conclusion that school district organization may be associated with educational outcomes. A raise in the grade level of transition to high school is associated with an increase in dropout rates. Also the gap between dropout rates of male versus female students increases as the grade level of transition to high school increases. The grade level of

transition to high school is related to the grade levels in which students tend to drop out of school.

Lee & Smith (1997) found a relationship between total high school enrollment and student learning. One of their suggestions for improving student learning was to use the schools-within-schools concept to "in effect" reduce school size for increased learning. The findings of this study complement their findings by suggesting that the number of students per grade be reduced by expanding the grade level configuration and lowering the grade level of transition to high school. Alspaugh (1998b) found that the number of school-to-school transitions and the grade level of the last transition had almost as much influence on dropout rates as the enrollment per attendance center within school districts.

The grade level configuration of the attendance centers within a school districts is under district control. The choice of grade level configurations is related to school district characteristics such as population density, enrollment per grade and financial resources. These district characteristics are related to dropout rates, but when used as covariates will not explain the statistically significant differences in dropout rates experienced by the three school groups. The findings imply that school districts should study the grade level organization of their attendance centers as a potential strategy for reducing their high school dropout rates.

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