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ABSTRACT

The reciprocal relationship between self concept and academic achievement was investigated using a two-wave, two-variable, multiple-indicator design. The Self Observation Scales (SOS) and Stanford Achievement Test (SAT) were used to measure self concept and academic achievement, respectively. A sample of second grade children and their families were studied. Family socioeconomic status (SES) information was collected during semi-structured home interviews. Family environment information was collected in the same manner. LISREL was used for covariance structural analysis. Reading and mathematics achievement scores were positively associated with self concept in the sample population. The relationship was stronger for reading, than for mathematics, achievement. Achievement performance appeared to influence self concept more strongly than self concept affected achievement. Self concept appeared to be connected to parental educational and occupational expectations. Parents influence their child's cognitive development and achievement performance through creation of an intellectually stimulating home environment, as well as through their interactions with, and expectations of, their child. (DWH)

The Relationship Between Self Concept and Achievement: An Investigation of Reciprocal Effects

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Running Head: Self Concept and Achievement

Abstract

This study investigates the reciprocal relationship between self concept and achievement using a two-wave, two-variable, multiple-indicator design. A sample of 147 second grade children and their families were studied. Child self concept and academic achievement were measured during the fall 1979 and spring 1980 using the Self Observation Scales and the Stanford Achievement Test, respectively. Socioeconomic and family variables were collected during the spring 1980. LISREL was used to statistically analyze the date. Findings suggest that self concept was more determined by child achievement and that the home environment mediates the relationship between achievement and self concept measured over time.

The Relationship Between Self Concept and Achievement: An Investigation of Reciprocal Effects

Considerable research has been conducted investigating the relationship between self concept and achievement. Generally, a small to moderate positive relationship has been found between measures of self concept and achievement (Bridgeman & Shipman, 1978; Coopersmith, 1967; Purkey, 1970; Rogers, Smith & Coleman, 1978; Wattenberg & Clifford, 1964). A recent quantitative synthesis of studies investigating this association with academic achievement found an average correlation of .41 for academic self concept and .29 for general self concept (Uguroglu & Walberg, 1979). There correlations are attenuated in the early elementary grades.

Specifying the causal relationship between the two variables is more problematic. Schierer and Kraut (1979), after reviewing the evidence from intervention programs, concluded that the negative evidence for a causal connection between self concept and academic achievement challenges the assumption that enhancing a student's feelings about himself/herself leads to increased achievement performance. Few studies are available which attempt to explicate the exact relationship between self concept and achievement.

A study by Calsyn and Kenny (1977), using cross-lagged panel analysis, found that the correlation of grade point average at time-1 with self concept at time-2 was higher than the correlation of self concept at time-1 and grade point average at time-2 for the females in the sample. This result was not supported by the data on the males in the study. This finding suggests that

higher achievement may lead to more positive self concept. The method of cross-lagged correlation analysis has been criticized for logical and technical reasons (Rogosa, 1980).

Bridgeman and Shipman (1978) found an increase in the variability of self concept scores between preschool and first grade, and between grade one and three. They interpret these results as a reaction to the pattern of achieved successes and failures experienced in school. Kifer (1975) offers a similar conclusion. The relationship between self concept and achievement is most likely reciprocal, not unidirectional.

Certain characteristics of the home environment may influence the child's initial evaluations of efficacy and self concept. Weiss (1969) and Dolan (1978) found that alterable, process dimensions in the home environment were related to self concept during the elementary grades. In another study, Kifer (1975) suggests that rewards for achievement provided within the home are associated with both higher achievement and a more positive self concept. The home environmental influences on self concept appear to diminish as the patterns of achievement grow stronger through school experience.

The purpose of the present study is to investigate the strength and direction of the relationship between self concept and academic achievement with certain background variables present. A structural model involving these variables was developed and empirically tested in which socioeconomic status and the family environment (e.g., intellectual stimulation in the home and parents' reinforcement of educational expectations) act as exogenous variables in the system. Child self concept and achievement at time-1 were related to self concept and achievement at time-2.

Method

Sample. A sample of 147 second grade children and their families from a medium sized city located in the northwest were included in the study. Approximately 57% of the children were males and 43% were females. Eighty percent of the sample was white, with the remaining Oriental, Spanish and Black. All income levels were represented. About 40% of the mothers were high school graduates and 31% either completed or had some college. Thirty-four percent of the fathers were high school graduates and 33% completed college or had some college. The mean Duncan SEI for the sample was 27.5.

Instruments. The self-concept measure was the Self Observation Scales (SOS), Primary Level, Form A (Stenner & Katzenmeyer, 1979), which yields four subtest scores, each purporting to measure a subdimension of self concept: (a) Self Acceptance, (b) Self Maturity, (c) School Affiliation, and (d) Self Security. Test-retest reliability for the SOS ranges from .79 to .91. Spearman-Brown reliability coefficients range from .65 to .85, with a median value of .78. The academic achievement measure was the Stanford Achievement Test, 1973 Edition, Form A, Primary I. The three dimensions: (a) parents' educational expectation, (b) intellectual stimulation in the home, and (c) parents' reinforcement of educational expectations, as measured by the Family Environment Interview Schedule (Revicki, 1981), represented the home environment measures.

Procedure. The SAT and the SOS were administered in small groups in October 1979 and May 1980. For the SOS, each item was read aloud twice by the administrator, and any unfamiliar words were explained. Family SES information was collected during a semi-structured home interview. A composite

family SES score was constructed for each child from the variables: primary provider's occupation, primary provider's education and family income. Occupations were converted to numeric values using the Duncan SEI scale (Duncan, 1961). Information regarding the family environment was collected using a semi-structured home interview administered by trained interviewers. Inter-interviewer reliabilities were greater than .85 in all cases.

Statistical Analysis

The methods of structural equation modeling (Duncan, 1975) and covariance structure analysis (Joreskog, 1978; Bentler & Bonett, 1980) were used to statistically treat the data. LISREL IV (Joreskog & Sorbom, 1978) was used to determine the theoretical model which best fits the covariance structure of the observed data. This was accomplished through the specification and estimation of a measurement model and a structural model. The measurement model specifies observed variables used to estimate the latent constructs, which in turn, were utilized as exongenous and endogenous variables in the structural model. Maximum likelihood estimation procedures were used to estimate all the parameters in the model simultaneously.

Results

The use of LISREL for covariance structure analysis requires the a priori specification of a measurement and structural model. The discussion of results begins with the measurement model, then proceeds to the structural models for reading and mathematics achievement.

Measurement Model

The estimates of the measurement model are contained in Table 1. All estimated parameters were significantly different from zero ($p<.05$). The

latent construct socioeconomic status (SES), was composed of the primary provider's occupational status, the primary provider's educational level and family income. Factor loadings for each observed variable on the latent construct were 1.00, .427 and .555, respectivelv. The metric of the factor was fixed equivalent to that of occupational status.

Insert Table 1 about here

Self Concept-1979 was composed to two SOS subscales, Self Acceptance and School Affiliation. The factor loadings were fixed at 1.0 for Self Acceptance and estimated to be .554 for School Affiliation. Likewise, Self Concept-1980 was composed of Self Acceptance fixed at 1.00 and School Affiliation with an estimated loading of .467.

Reading Achievement Structural Model

The chi-square goodness of fit statistic for the overall model was 59.32 with 53 degrees of freedom ($p = .21$). The chi-square represents a relatively good fit between the specified structural model and the observed data covariance matrix. The results of the structural equation analysis for this model, including standardized structural coefficients are presented in Table 2. Figure 1 contains the path diagram of the model including the paths with significant structural coefficients.

Insert Table 2 and Figure 1 about here

The results suggest that SES was positively related with Reading Achievement-1979 ($p<.05$) and Educational/Occupational Expectations ($p<.05$). Reading Achievement-1979 and Self Concept-1979 were correlated .230. Fall Reading Achievement scores were positively associated with the home environment dimensions, Reinforcement of Expectations ($p<.05$) and Language Stimulations ($p<.05$). The 1979 Self Concept Construct was strongly related to Educational/Occupational Expectations ($p<.05$).

As expected Fall SAT Total Reading scores were strongly related to Spring SAT Total Reading scores with a structural coefficient of .571. The Self Concept Construct measured during the Fall of 1979 was highly related to Self Concept measured in the Spring of 1980 and a structural coefficient of .419. Both coefficients are consistent with test-retest correlations reported in the literature.

The home environment dimension, Reinforcement of Expectations was associated .254 with the Spring Self Concept construct. Educational/Occupational Parental Expectations were positively related to this self concept measure ($p<.05$). Confirming expectations Language Stimulation in the home and Reinforcement of Expectations were related to Reading Achievement .230 and .140, respectively.

The possible reciprocal relationship between Reading Achievement and Self Concept was confirmed. SAT Total Reading scores possessed a direct association of .215 on the Self Concept construct, while Self Concept related .154 to Reading Achievement. Approximately 86% of the variance in Spring Reading Achievement scores was explained by the contribution of the specified variables. Almost 60% of the variance in the Self Concept construct was explained by the specified model.

Mathematics Achievement Structural Model

The chi-square goodness of fit statistic for the overall model was 63.41 with 53 degrees of freedom ($p = .17$). This indicates that the specified structural model represents a good fit with the covariance matrix of the observed data. The results of the structural equation analysis are included in Table 3 and the path diagram in Figure 2.

A similar pattern of relationships were confirmed in the model for Mathematics Achievement and Self Concept as in the previous model. Socio-economic status was related .256 with 1979 SAT Total Mathematics scores and .276 with the Educational/Occupational Expectations dimensions of the family environment. Mathematics Achievement and Self Concept were correlated .169 during the Fall of 1979. Fall Mathematics Achievement scores were significantly associated with Reinforcement of Expectations ($p<.05$) and Language Stimulation in the home ($p<.05$). The 1979 Self Concept construct was highly related to parent Educational/Occupational Expectations ($p<.05$).

Insert Table 3 and Figure 2 about here

Fall Mathematics Achievement was significantly associated with Spring Mathematics Achievement with a structural coefficient of .594. The direct relationship between Fall and Spring Self Concept was estimated at .419. Again, both coefficients are consistent with previously reported literature.

The home environment dimensions Educational/Occupational Expectations and reinforcement of Expectations were associated with Self Concept measured in 1980, .207 and .218, respectively confirming previous expectations Language Stimulation in the home and reinforcement of expectations were related to Mathematics Achievement, .280 and .150, respectively.

The estimated reciprocal relationship between Spring Mathematics Achievement and Self Concept was similar, although less strong than the relationship between Reading Achievement and Self Concept. The structural coefficient linking mathematics directly to Self Concept was .125, while the reciprocal relating Self Concept to Mathematics Achievement was .089. Approximately 72% of the variance in SAT Total Mathematics scores was explained by the model. Fifty-eight percent of the variance in the Self Concept construct was explained by the specified structural model.

Qualifications

Several caveats need to be mentioned regarding the statistical treatment of these data using covariance structure analysis. Bentler and Bonett (1980) comment that "little is known about the relative robustness of the estimators to violations of assumptions or model misspecifications and about their relative small-sample properties" (p. 519). Departures from multinormality within the observed data may have serious consequences for the chi-square values, although problems of this kind need not have any effect on the individual parameter estimates. In particular, the chi-square test statistic is known to be quite sensitive to departures from multinormality making the goodness of fit test problematic.

A second issue relates to the sample size. The statistical analysis procedure used, covariance structure analysis using the LISREL IV program, requires a large sample size to produce unbiased and robust estimates of the structural model parameters. The effect on the analysis when the sample size is small has not been fully investigated at this time. Preliminary Monte Carlo studies by Boomsa (1981) suggest that when the sample size is less than

200, the maximum likelihood estimates of the model parameters may be suspect. More importantly the ratio of the number of variables in the model to the sample size may be more crucial than sample size alone. There are many rules of thumb in the factor analytic statistical literature for deciding the sample size relative to the number of variables in the analysis. Common ratios of ten to twenty subjects per variable are suggested. If these decision rules are generalizable to the covariance structure analysis, then there are barely enough subjects in the present study to achieve the criterion. Some of the parameter estimates may be biased.

Discussion

Reading and mathematics achievement scores were found to be positively associated with self concept in record grade children. The strength of the relationship was considerably stronger for reading achievement. The magnitude of the relationship suggests that achievement performance more strongly influences self concept than self concept influences achievement. Evidence was found for a small, yet positive influence of self concept and achievement. These findings lend support to those of Kifer (1975), Calsyn and Kenny (1977) and Bridgeman and Shipman (1978). Increases in achievement and success in school may increase positive self concept which in turn, further influences achievement performance. Dimensions of the family environment appear to exert a mediating influence between Fall and Spring achievement and self concept measurements.

Fall achievement performance influences reinforcement of parental expectations and language stimulation in the home, both of which relate to Spring achievement performance. This appeared to be true of mathematics and reading

achievement. Self concept appears to be connected to parental educational and occupational expectations in a similar manner. Parents influence their child's cognitive development and achievement performance by creating an intellectually stimulating home environment and through their interactions with and expectations of the child. Since individuals are active participants in their environment, the child almost certainly interacts to increase the cognitive complexity of the home environment (e.g., Bell & Harper, 1977).

In summary, the presence of a reciprocal relationship between achievement performance and self concept was combined. Achievement performance appears to influence self concept much more strongly than self concept effects achievement. Characteristics of the home environment were present as interviewing influences between achievement and self concept measured over time. Undoubtedly, characteristics of the school environment, although unmeasured in this study, exert similar mediating influences which over time supplant some of the influence of the family on the child's continued cognitive and affective development.

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Table 1

Measurement Model

	Unobserved Constructs			
Measured Variables	SES	Self Concept (1979)	Self Concept (1979)	Error
Occupation	1.00*			0*
Income	.555			.692
Education	.427			.818
SOS Self Acceptance (1979)		1.0*		0*
SOS School Affiliation (1979)		.554		.693
SOS Self Acceptance (1980)			1.0*	0*
SOS School Affiliation (1980)			.467	.782

*Identifies fixed parameters in the measurement model

Table 2

Structural Model for Reading

Achievement and Self Concept

(N = 147)

Exogenous Variables	Endogenous Variables: Reading Achievement (Spring 1980)	Endogenous Variables: Self Concept (Spring 1980)
Reinforcement of Expectations	.140*	-
Educational/Occupational Expectations	-	.284*
Language Stimulation	.330*	-
Reading Achievement (Fall 1979)	.671*	-
Self Concept (Fall 1979)	-	.198*
Reading Achievement (Spring 1980)	-	.215*
Self Concept (Spring 1980)	.154*	-
R^2	.859	.599

$\chi^2 = 59.32$ df = 53 p = .21

*p<.05

Table 3

Structural Model for Mathematics

Achievement and Self Concept

(N = 147)

Exogenous Variables	Endogenous Variables: Mathematics Achievement (Spring 1980)	Endogenous Variables: Self Concept (Spring 1980)
Reinforcement of Expectations	.150*	.218*
Educational/Occupational Expectations	-	.207*
Language Stimulation	.280*	-
Mathematics Achievement (Fall 1979)	.594*	-
Self Concept (Fall 1979)	-	.419*
Mathematics Achievement (Spring 1980)	-	.089
Self Concept (Spring 1980)	.125*	-
R^2	.719	.575

$\lambda' = 63.41$ df = 53 p = .17

*p<.05

Figure Caption

Figure 1. Path diagram for reading achievement and self concept.

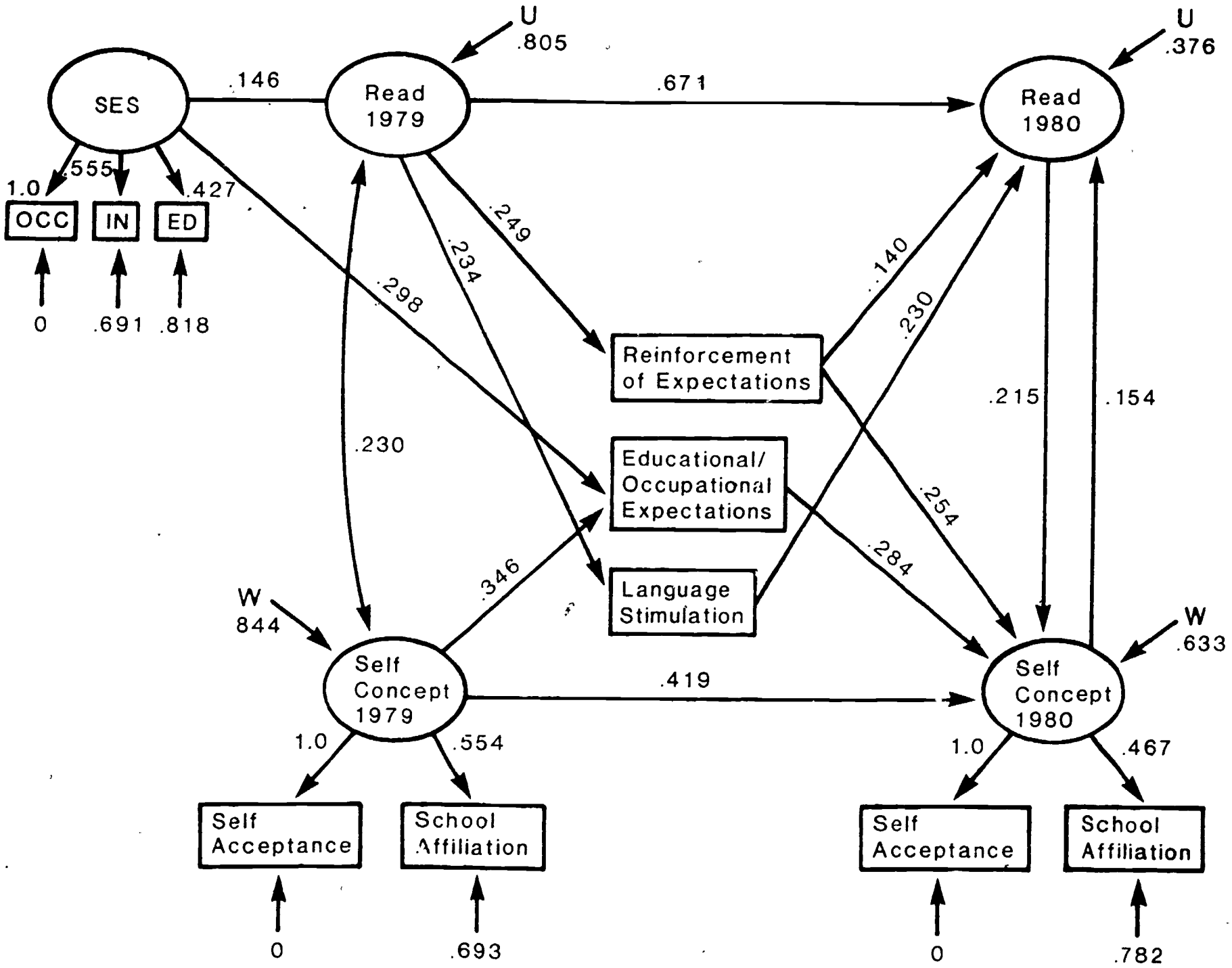
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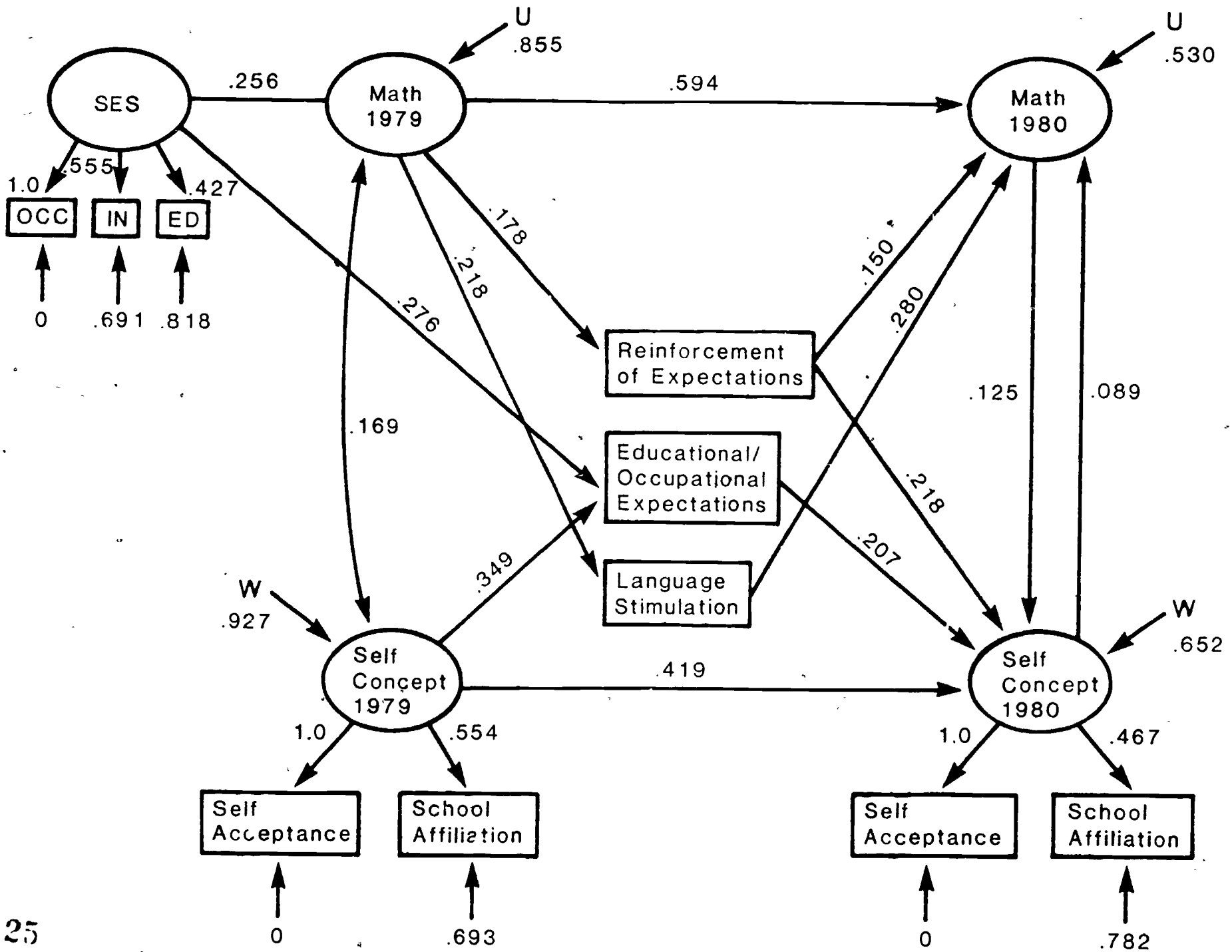
Figure Caption

Figure 2. Path diagram for mathematics achievement and self concept.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