DOCUMENT RESUME

ED 103 136 RC 008 336

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TITLE	The Dynamic of Achievement Attitudes in the South: An Application of the Heise Path Panel Method.
INSTITUTION	Texas A and M Univ., College Station. Texas Agricultural Experiment Station.
SPONS AGENCY	Cooperative State Research Service (DOA), Washington, D.C.
REPORT NO	USDA-CSRS-S-81
PUB DATE	74
NOTE	38p.; Paper presented at the Annual Meeting of the Southern Sociological Society (Atlanta, Georgia, 1974)
EDRS PRICE	MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS	Academic Aspiration; *Aspiration; Correlation; *Critical Path Method; *Expectation; High School Students; Models; Occupational Aspiration; Research Methodology; *Rural Youth; Southern States; *Statistical Analysis; Tables (Data)
IDENTIFIERS	*Heise Path Panel Method

ABSTRACT

Recent studies have applied causal models to the formation of educational and occupational attitudes. Although some were conceived and conducted for purposes other than the analysis of status attainment processes, a powerful synthesizing perspective would be to treat them as studies of components of incomplete general attainment models. This study focused on the stability of and the mutual dependency between occupational and educational achievement attitudes. Path analytic techniques for two-variable panel analyses developed by Heise (1970) were combined with data collected in a three-wave panel of nonmetropolitan Southern youth over a 6-year period (1966-72). This modeling technique was applied alternately to occupational aspirations and expectations, educational aspirations and expectations, occupational aspiration level, and educational aspiration level. The same variable observed at each wave was treated as hypothetically different variables. Some findings were: (1) mean aspirations measures at each wave were consistently larger than the corresponding expectational measures; (2) from the statistical perspective of simple prediction, prior levels of achievement attitudes yielded a moderate prediction level of subsequent measures; and (3) post-high school projections were considerably more stable than projections observed during high school. (NQ)

THE DYNAMIC OF ACHIEVEMENT ATTITUDES IN THE SOUTH: AN APPLICATION OF THE HEISE PATH PANEL METHOD[1,2]

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[1] Paper submitted for presentation at the Southern Sociological Society meetings, Atlanta, 1974. Development of this paper was sponsored by the Texas Agricultural Experiment Station as a contribution to TAES Project H-2811 and by the Louisiana Agricultural Experiment Station as a contribution to LAES Project 1231. Both projects contribute to USDA (CSRS) Research Project S-81, "Development of Human Resource Potentials of Rural Youth in the South and Their Patterns of Mobility". Information for analysis was obtained by pooling data collected under research grants provided by the Agricultural Experiment Stations of Alabama, Georgia, Louisiana, Mississippi, South Carolina and Texas. Appreciation is expressed to V.A. Boyd, John Dunkelberger, Melvin Knapp, William P. Kuvlesky, Raymond Sollie and Gerald Windham for making the data available and to Linda Dingman, John Womack, Kathy Anders and Leslie Rust for assistance in preparation of the manuscripts. The authors, of course, assume full responsibility for deficiencies in the report.

[2] Technical Article No. _____ of the Texas Agricultural Experiment Station.

THE DYNAMIC OF ACHIEVEMENT ATTITUDES IN THE SOUTH: AN APPLICATION OF THE HEISE PATH PANEL METHOD

Introduction

The emerging area of status attainment research and the associated concern for achievement attitudes has advanced considerably during recent years. Although both topics have long been of interest to sociologists, introduction of path analytic techniques with panel data has both facilitated the integration of much existing knowledge and given considerable impetus to the pursuit of new directions of research. The original studies by Blau and Duncan (1967), Duncan, Featherman, and Duncan (1968), and Elder (1968) have demonstrated not only the utility of path analytic techniques for the analysis of status attainment, but have also set the stage both substantively and methodologically for subsequent studies.

The resultant and now widely accepted strategy has been to treat the process of status attainment within a three-phase causal model where relatively fixed background variables such as parental socioeconomic status and intelligence exert influences on status attainment that are mediated by a set of social psychological variables. The most extensive modeling effort within this general framework has been that by Sewell and his colleagues (Sewell, Haller, and Portes, 1969; Sewell, Haller, and Ohlendorf, 1970; Sewell and Hauser, 1972; Haller and Portes, 1973). This model, which has been referred to as the "Wisconsin model", includes (see Figure 1) in a single path arrangement the influences of parental socioeconomic status, intelligence, academic performance, significant other influences, occupational aspiration, educational aspiration, and educational attainment upon the primary status variable, occupational attainment. Unfortunately, the generality of the Wisconsin model is somewhat problematic because parallel data sets to replicate and extend the analysis are generally lacking.

A theoretically related research development has been the modeling of the formation of achievement attitudes apart from the direct empirical considerations of status attainment. Studies by Duncan, Haller, and Portes (1968), Woelfel and Haller (1971), Gordon (1971), Picou et al. (1972), Carter et al. (1972), and Cosby and Ohlendorf (1973) are among the recent studies that have applied causal models to the formation of educational and occupational attitudes. Although it is apparent that some of these studies were conceived and conducted for purposes other than the analysis of status attainment processes, a powerful synthesizing perspective would be to treat them as studies of components of incomplete general attainment models. This strategy, a submodeling approach, can serve as the basis for extending the analysis of status attainment processes to influences and populations heretofore unanalyzed.[1]

Submodeling the Dynamics of Occupational and Educational Achievement Attitudes

This paper does not have as its problem the complete causal modeling of the status attainment process, rather it has as its focus the elaboration of the relationship between the two intervening influences in status attainment models of educational and occupational achievement attitudes. More specifically, the research is concerned with the stability of and the mutual dependency between occupational and educational achievement attitudes. This restricted problem was approached by combining path analytic techniques for two-variable panel analyses developed by Heise (1970) with a set of three-wave (six-year range) data collected in the Southern Youth Study.

The rationale for selecting this restricted aspect of the general status attainment process was based on several considerations. Achievement attitudes, specifically occupational and educational aspirations, have been found to be important variables in status attainment processes. Both types of aspirations measured during adolescence apparently have direct effects upon subsequent attainment levels. Path coefficients ranging from .10 to .17 are reported in the Wisconsin study between occupational aspirations and later occupational attainment for five different residential groupings (Sewell, Haller, and Ohlendorf, 1970). A similar result (path coefficient of .13) has been reported by Hansen and Haller (1973) for a panel of Costa Rican youth. In assessing the significance of these paths, we should recall the precise path arrangement of the "Wisconsin Model" (see Figure 1). Educational and occupational aspirations are treated as intervening influences between such prior variables as academic performance and subsequent educational and occupational attainment. Thus both variables can be viewed as having critical roles in explaining status attainment and, consequently, status transmission and status mobility.

Within the path arrangement of the "Wisconsin model" there are, at least, two aspects of the posited relationships with regard to educational and occupational aspirations that need additional attention. First, neither educational nor occupational aspirations are treated as having direct influence on each other. That is, the potential patterns of dependency or more interestingly the potential patterns of mutual dependency were unassessed apart from the computations of residual correlations. This is especially troublesome since both types of attitudes are closely bound together. As Woelfel and Haller (1971) have noted in their study of attitude formation.

> ...Without making any specific hypothesis about the resolution of conflicts or other specific results, we here refer to the more general hypothesis that other relevant attitudes which ego already holds exert some influence on the formation or change of an attitude. Thus, in setting his occupational aspirations, ego is very likely influenced by his educational aspirations - he would be unlikely to aspire to be a doctor without aspiring to be a college graduate as well.

The complexity of dealing with the possible reciprocal relationship is further increased when one considers the dimensionality of competing conceptualizations of these phenomena in sociology. At least, three positions can be delineated.

A. Bi-Dimensionality of Both Educational and Occupational Aspirations: This conceptualization, most likely the oldest of the three, can be traced to Ginzberg's (1951) well known distinction between "fantasy" and "realistic" occupational choice. In current usage, this distinction has been elaborated in terms of aspirational and expectational dimensions of status orientations. Kuvlesky and Bealer (1966), for example, define aspirations as ego's wanting and desiring of some goal - in this case an educational or occupational status. Expectations, on the other hand, refers to ego's estimation of the likelihood of attainment of the goal. Advocates of this position stress the orientational difference between aspirations and expectations, in that, aspirations are essentially positive, a desiring or wanting of a goal, whereas expectations may be either positive or negative. Ego may not desire or want his expected level of educational or occupational attainment. This conceptual treatment has been utilized in numerous studies, sometimes implicitly (e.g., Slocum, 1956; Stephenson, 1957; Nunalee and Drabick, 1965; Glick, 1962; Kuvlesky and Ohlendorf, 1968; as well as the set of over fifty annotations by Cosby et al., 1973).

B. Uni-Dimensionality of Educational and Occupational Aspirations: Haller and his colleagues at Wisconsin have recently developed a position that views occupational aspirations (LOA) as "a general dimension composed of idealistic-realistic goal-region aspects and of short- and long-term temporal aspects" (Haller, Otto, Meier, and Ohlendorf, 1974). This conceptualization obviously de-emphasizes the idealistic (aspirational) and the realistic (expectational) distinction in favor of uni-dimensionality. This conclusion resulted from an analysis of LOA scores obtained from application of the "Occupational Aspiration Scale" (Haller and Miller, 1963, 1971) to over thirty-five thousand high school students. This scale includes sets of both idealistic and realistic response items as well as short and long range temporal items. Analysis of the factor structure of these items resulted in a general factor LOA which saturates the idealistic and realistic aspects, and the short and long range aspects of the scale. The extension of this logic to educational aspirations has not yet been empirically assessed; however, uni-dimensional measures of both occupational aspirations (LOA) and educational aspirations (LEA) have been utilized within this framework (Woelfel and Haller, 1971).

C. Ambition as an Unmeasured Factor Producing Educational and Occupational Aspirations: This position is essentially a factor model where the causal significance of educational and occupational aspirations is that both variables are products or consequences of an underlying ambition factor. Within this conceptualization neither educational nor occupational aspirations have causal influences upon other variables but instead are observable manifestations produced by ambition. Modeling under this assumption has been conducted by Duncan, Haller and Portes (1968) and Land (1971) with some success.

When the varying conceptualizations of educational and occupational aspirations are made explicit, two observations about the path arrangement in the Wisconsin Model are in order. First, whether one takes a bi-dimensional, a uni-dimensional or factor model approach, the arrangement within the Wisconsin model does not prove satisfying. The bi-dimensional and the uni-dimensional approaches point to the aforementioned question of mutual dependency, whereas the factor model approach, of course, posits an underlying causal factor - a set of questions not addressed in present status attainment models. The divergence in modeling procedures suggested by the three approaches can be readily seen in the analysis of the Woelfel and Haller study (1971) and the subsequent reanalysis of the same data by Land (1971) and Henry and Hummon (1971). Second, it is unclear as to which of the three approach has the greatest utility for explaining status attainment processes. The strat of this report is to focus on the submodeling of these phenomena under various approaches with consideration here given to the uni-dimensional approach with less attention to the bi-dimensional. Analysis of factor models will be left to further research.

In addition to the issue of potential patterns of mutual dependency and dimensionality, there is also the problem of dynamics or stability of these attitudes. Although there is considerable evidence to indicate that educational and occupational aspirations demonstrate substantial variation both in the static (one-wave) and dynamic (multi-wave) designs with respect to other variables, the stability or dynamics of the attitudes themselves (multi-wave - repeated measurement designs) have been unanalyzed in status attainment modeling. If we assume that educational and occupational aspirations are, in fact, highly dynamic, then improved knowledge of the dynamics within a modeling perspective would appear essential to the construction of more powerful general status attainment models.[2]

OPERATIONALIZATION OF VARIABLES

(1) Occupational Aspirations (X_1, X_3, X_5: Model I) -- operationalized by assigning Duncan's socioeconomic scores (1961) to the responses obtained in each of the three waves to the question:

> If you were completely free to choose any job, what would you desire *most* as a lifetime occupation?

(2) Occupational Expectations (X_2, X_4, X_6: Model I) -- determined in a manner similar to that of occupational aspirations by assigning Duncan's socioeconomic scores to the responses obtained in each of the three waves to the question:

> Sometimes we are not always able to do what we want most. What kind of job do you *really expect* to have most of your life?

(3) Educational Aspirations (X_1, X_3, X_5: Model II) -- was operationalized by responses to the following question:

> If you could have as much education as you desired, which of the following would you do? (circle only one number):

Six fixed-choice responses accompanied this stimulus on the questionnaire, with choices ranging from "Quit school now" to "Complete additional studies after graduation from a college or university". Assigned numerical values ranged from one to six.

(4) Educational Expectations (X_2, X_4, X_6: Model II) -- determined by fixed-choice responses to the following question:

> What do you really expect to do about your education? (circle only one number):

The same fixed responses provided for educational aspirations were again used.

(5) Level of Occupational Aspiration [LOA] (X_1, X_3, X_5: Model III) -- a composite variable thought to yield scores, if standardized, that would roughly approximate those obtained with the Haller and Miller Occupational Aspiration Scale (1963). The scores were determined by a simple average of occupational aspirations and occupational expectations expressed in Duncan's SEI scores:

$$LOA = \frac{\text{Occupational Aspiration (SEI)} + \text{Occupational Expectation (SEI)}}{2}$$

(6) Level of Educational Aspiration [LEA] (X_2, X_4, X_6: Model III) -- a composite variable thought to approximate the level of educational aspiration scale utilized by Woelfel and Haller (1971). LEA values were obtained by a simple average of educational aspirations and educational expectations.

$$LEA = \frac{\text{Educational Aspiration} + \text{Educational Expectation}}{2}$$

Data Collection: Southern Youth Panel

The data set utilized in this research was collected in a three-wave panel of nonmetropolitan Southern youth over a six year period (1966-1972).[3] The male subset of the panel consisted of 495 students who had been high school sophomores in 1966-67 in Alabama, Georgia, South Carolina, and Texas.[4] Group-administered questionnaires were given to all tenth-grade students present the day of the interview in a set of purposively selected schools. Wave II data we. obtained by interviewing the same students during their senior year in high school (1968-69). A third wave contact was conducted in 1972 when most of the panel were four years beyond the expected date of high school graduation. Data were obtained in this last wave by means of personal interviews supplimented with mailed questionnaires and telephone interviews. Panel attrition for the four states approximated 15 percent of the initial panel.

The Development of the 3W-2V Model: An Application of the Heise Approach

The general modeling technique applied alternately to (1) occupational aspirations and expectations, (2) educational aspirations and expectations and (3) level of occupational aspiration (LOA) and level of educational aspiration (LEA) is an adaptation of the path analytic method developed by Heise (1970) for analysis of panel data. Heise designed a path-analytic method to deal with the consistency and cross-lagged effects in a two-wave, two-variable panel design (2W-2V model). [Note: See Pelz and Lew (1970) for an evaluation of the utility of the Heise model using simulated data; Pelz and Andrews (1964) for a discussion of the closely related method of cross-lagged correlations; and Duncan (1972) for an extension of the 2W-2V model to include unmeasured factors.] The main departure in our modeling from that presented by Heise is a simple extension of the technique from a two-wave, two variable (2W-2V) model to a three-wave, two-variable (3W-2V) model.

Closely following the approach developed by Heise, our models treat the same variable observed at each wave as hypothetically different variables. [For a graphic representation of the general approach see Figure II.] Thus, X-odd variables (X_1, X_3, X_5) refer to a single variable, either occupational aspirations, educational aspirations, or level of occupational aspiration (LOA) depending on the model and X-even variables (X_2, X_4, X_6) to occupational expectations, educational expectations, or level of educational aspiration (LEA) again depending on the model [examine Figure II for a clarification of variable specifications]. Using this arrangement, each of the 3W-2V models resulted in a model with six hypothetical variables. It was obvious (and in this case theoretically desirable) that all possible paths in a six variable submodel could not be computed (see Heise, 1969; Heise, 1970). Fortunately, however, the introduction of a set of assumptions, discussed in some detail by Heise, which are isomorphic with the notion of causation in time-ordered data, allowed a theoretically agreeable solution. First, the assumption of temporal asymmetry of effects was made so that later states of a variable could not influence earlier states. Thus, it was assumed that occupational aspiration levels in Wave III (1972) did not effect levels of the variables in either Wave II (1968) or Wave I (1966) and that levels in Wave II (1968) did not effect levels in Wave I (1966). The application of this assumption eliminated the following twelve paths: ($X_6 \rightarrow X_{1,2,3,4}$; $X_5 \rightarrow X_{1,2,3,4}$; $X_4 \rightarrow X_{1,2}$; and $X_3 \rightarrow X_{1,2}$). Second, it was assumed that effects did not occur instantaneously but rather after some finite time period. Therefore, it was assumed that aspirations and expectations measured in the same wave did not effect each other but instead that effects were cross-lagged across waves. The generalization of this assumption resulted in the deletion of six additional paths ($X_1 \rightarrow X_2$; $X_2 \rightarrow X_1$; $X_3 \rightarrow X_4$; $X_4 \rightarrow X_3$; $X_5 \rightarrow X_6$; and $X_6 \rightarrow X_5$). Third, since the study was designed to analyze the wave-by-wave consistency and cross-lagged effects, the four paths that skip Wave II ($X_1 \rightarrow X_{5,6}$ and $X_2 \rightarrow X_{5,6}$) were also deleted.

The application of the aforementioned set of assumptions and the related deletion of paths resulted in the three-wave, two-variable model which appears as Figure I. The paths in this model lead to two types of interpretation. First, one set of paths are interpreted as estimates of the consistency or stability of each type variable between waves. For example, paths from X-odd to X-odd variables for Model I are estimates of the consistency or stability of occupational aspirations and paths from X-even to X-even variables in this same model are estimates of the consistency or stability of occupational expectations. Second, the paths from X-odd to X-even variables and X-even to X-odd variables are interpreted as estimates of the cross-lagged effects of one type of paired variable on the other. Again in Model I, the paths from aspirations to expectations (X-odd to X-even) and from expectations to aspirations (X-even to X-odd) are estimates of various cross-lagged effects between occupational aspirations and expectations. These interpretations of estimates agree with the Heise model (1970) and with the earlier work on cross-lagged correlations by Pelz and Andrews (1964).

Analysis of Model I: Dynamics of Occupational Aspirations and Expectations.

(1) Mean and standard deviation values for Model I are reported in Table 1. Inconsistent directions of aggregate change were observed for occupational projections. The largest mean values for both aspirations ($\overline{X}_3 = 55.95$) and expectations ($\overline{X}_4 = 49.65$) were obtained in the intermediate or Wave II data. Thus, there was not a consistent trend toward an increase or decrease in either type projection within the temporal range of our data. There was, however, a tendency for the difference between aspiration and expectation means at each wave to increase over time (i.e., Wave I: $\overline{X}_1 - \overline{X}_2 = 4.39$; Wave II: $\overline{X}_3 - \overline{X}_4 = 6.30$; and Wave III: $\overline{X}_5 - \overline{X}_6 = 8.70$). These changes represent an average increase in difference of 40 percent between Wave I and Wave II and an increase of 38 percent between Wave II and Wave III. Thus, two patterns in the aggregate data were discernible. The youth had slightly higher level aspirations and expectations during their senior year, and the difference between aspirations and expectations increased over time. Although these patterns obviously suggest certain developmental interpretations, such explanation should be made with caution since these values (1) were obtained from a restricted panel, and (2) were based on aggregate rather than individual measures.

(2) The matrix of zero-order correlations between the six variables for Model I are reported in Table 2. Three rather clear patterns among the correlation coefficients were discerned. First, the correlations between occupational aspirations and expectations measured at the same wave (r_{12} = .66, r_{34} = .63, and r_{56} = .50) were found to be among the largest coefficients in the matrix. These correlations were viewed as an indication of the relatedness and overlap of the two types of occupational projections at the same point in time. Second, correlations between variables in Waves I and II (r_{13} = .52, r_{14} = .46, r_{23} = .45, and r_{24} = .53) and correlations between variables in Waves II and III (r_{35} = .44, r_{36} = .41, r_{45} = .39, and r_{46} = .48) were larger than the corresponding correlations between variables in Waves I and III (r_{15} = .30, r_{16} = .31, r_{25} = .37 and r_{26} = .41). Thus, there appeared to be a time-linked pattern for the degree of correlation between projections to diminish when the time lag between measurements increased. Third, consistency correlations (correlations between aspirations and aspirations or between expectations and expectations) were generally larger than cross-lagged correlations (correlations between aspirations and expectations). That is, correlations between like variables were generally larger than correlations between related variables.

(3) The diagram for the three-wave, two-variable submodel applied to the total male panel is presented as Model I. Each path coefficient in the model was found to be greater than .15 and all paths were at least three times their standard error and, thus, were considered to have sufficient magnitude to indicate effect. As in the analysis of correlations, several patterns emerged. First, the multiple correlation coefficients associated with both aspirations and expectations at Waves I and II were roughly equivalent with Wave I coefficients being slightly larger ($r_{3.12}$ = .54, $r_{4.12}$ = .55, $r_{5.34}$ = .46, and $r_{6.34}$ = .50). These figures indicated that from 21 to 30 percent of the variation in either aspirations or expectations could be explained by levels of the two variables at

the just prior wave. Second, the consistency paths (p_{31}, p_{43}, p_{53}, and p_{64}) were all larger than the cross-lagged paths (p_{32}, p_{41}, p_{54}, and p_{63}). The magnitude of the consistency paths at the various waves suggests that (1) both aspirations and expectations were moderately stable within the range of the data and (2) that there was no clear trend for either variable to have a higher degree of stability than the other. Third, an examination of cross-lagged paths revealed consistent effects. The paths from aspirations to expectations (p_{41} = .20 and p_{63} = .17) and the paths from expectations to aspirations (p_{32} = .18 and p_{54} = .19) indicated a pattern of mutual dependency with neither variable having a causal priority.

Analysis of Model II: Dynamics of Educational Aspirations and Expectations.

(1) The mean and standard deviation values for both educational aspirations and expectations at each of the three waves are reported in Table 1. The educational aspiration mean was 4.28 at the sophomore year, increased slightly by the senior year ($\bar{X}_3$ = 4.30), and increased to the largest value four years after high school ($\bar{X}_5$ = 4.89). To assist in interpreting these values, it should be pointed out that a value of 4 would indicate a response "to graduate from a junior college" and a value of 5 would indicate a response "to graduate from a four year college or university". Thus, there was a tendency for the aggregate to aspire to higher educational goals (to graduate from a four year college or university) by Wave III. This change suggests that the panel was placing an increased value on educational attainment. The mean values for educational expectations, however, followed a much different pattern in that they changed very little ($\bar{X}_2$ = 3.90, $\bar{X}_4$ = 3.87, and $\bar{X}_6$ = 4.05). Also, there was a consistent wave-by-wave pattern for the differences between aspirations and expectations to widen ($\bar{X}_1 - \bar{X}_2$ = .38, $\bar{X}_3 - \bar{X}_4$ = .43, and $\bar{X}_5 - \bar{X}_6$ = .84). The percentage change in these mean differences between Waves I and II was 13 percent and 95 percent between Waves II and III.

(2) The zero-order correlations between educational aspirations and expectations measured at each of the three waves are presented in Table 3. All correlations in the matrix were found to be of sufficient magnitude to indicate statistical significance at a probability level less than .0001. The correlations between educational aspirations and expectations measured at the same wave were among the larger coefficients (r_{12} = .76, r_{34} = .72, and r_{56} = .62). When we used the coefficient of determination as the criterion of comparison (r^2_{12} = .57, r^2_{34} = .52, and r^2_{56} = .38) it was found that the shared variation between aspirations and expectations at Waves I and II was approximately one and one-half that observed for Wave III. This was considered further evidence of age-linked divergence of educational aspirations and expectations. The consistency and cross-lagged correlations between Wave I and Wave III were generally of less magnitude than the other correlations in the matrix (r_{15} = .32, r_{16} = .38, r_{25} = .37, and r_{26} = .41). The wave-by-wave, consistency and cross-lagged correlations were mixed and of moderate magnitude (ranging between .38 to .54).

(3) The 3W-2V path diagram for the dynamics of educational aspirations and expectations appears as Model II. Multiple correlation coefficients for aspirations and expectations were as follows: $R_{3\cdot12}$ = .44, $R_{4\cdot12}$ = .54, $R_{5\cdot34}$ = .45, and $R_{6\cdot34}$ = .55. Thus, the associated explained variation at each point in the model was $R^2_{3\cdot12}$ = .19, $R^2_{4\cdot12}$ = .29, $R^2_{5\cdot34}$ = .20, and $R^2_{6\cdot34}$ = .30. Thus, there was a tendency for higher prediction for expectations at both Waves II and III. Each of the consistency paths was found to be of significant magnitude to indicate effect and there was slight trend for expectation consistency coefficients to be larger than aspiration coefficients (p_{31} = .31, p_{42} = .35, p_{53} = .35, and p_{64} = .43). All cross-lag paths were found to be at least twice their standard error (p_{32} = .15, p_{41} = .23, p_{54} = .13, and p_{63} = .16). Again the pattern is one of mutual dependency with no clear priority of one dimension over the other.

Analysis of Model III: Dynamics of LOA and LEA.

(1) Mean and standard deviation values for Model III are reported in Table 1. Since LOA is the average of occupational aspirations and expectations, LOA also increased somewhat in Wave II and decreased slightly in Wave III ($\overline{X}_1 = 50.27$, $\overline{X}_3 = 52.00$, and $\overline{X}_5 = 49.39$). Similarly, LEA means are comparable to those for educational aspirations and expectations with a similar level at Waves I and II. and a large increase at Wave III ($\overline{X}_2 = 4.09$, $\overline{X}_4 = 4.10$, and $\overline{X}_6 = 4.46$). These means summarize the overall pattern of the aggregate data in that LOA was highest during the senior year and LEA was highest four years later. Thus, the LOA trend peaked during high school and declined later while the LEA continued to increase.

(2) The matrix of zero-order correlations for Model III is reported in Table 4. All correlations were of at least moderate strength ranging from .37 to .58. Consistency correlations were all generally large, even those between Waves I and Waves III ($r_{31} = .56$, $r_{53} = .49$, $r_{51} = .45$, $r_{42} = .51$, $r_{64} = .55$, and $r_{62} = .44$). These coefficients generally reflect the increased reliability of using a composite score for both educational and occupational measures as compared to the aspirational and expectational indicators.

(3) The path diagram for the dynamics of LOA and LEA is presented as Model III. Multiple correlation coefficients associated with LOA and LEA in Waves II and III were somewhat higher than for occupational or educational aspirations and expectations ($R_{3.21} = .57$, $R_{4.21} = .58$, $R_{5.34} = .52$, and $R_{6.34} = .60$). This indicated that one-third or more of the variance in LOA and LEA was accounted for by the variables in the prior wave ($R^2_{3.21} = .33$, $R^2_{4.21} = .33$, $R^2_{5.34} = .27$, and $R^2_{6.34} = .36$). The consistency paths ($p_{31} = .50$, $p_{42} = .36$, $p_{53} = .37$, and $p_{64} = .39$) were all larger than the cross-lagged paths ($p_{32} = .13$, $p_{41} = .31$, $p_{54} = .20$, and $p_{63} = .28$). All of the paths including cross-lagged paths

were at least twice their standard error. This suggests that LOA and LEA were moderately stable with (1) LOA more stable between Waves I and II and (2) LOA and LEA exhibiting similar stability between Waves II and III.

The cross-lagged paths between Waves I and II (p_{32} = .13 and p_{41} = .31) were both of sufficient magnitude to indicate mutual dependency. In addition, the much larger path from LOA66 to LEA68 (p_{41}) of .31 seems to strongly support a causal priority of LOA over LEA within the pattern of mutual dependency. Again between Waves II and III, a pattern of mutual dependancy was obtained (p_{54} = .20 and p_{63} = .28) but the argument for a priority of LOA over LEA was less convincing.

High School Versus Post-High School Stability in Attitudes

An interesting and potentially significant problem that can be addressed in multi-wave, repeated measurement panel designs is differential rates of stability expressed as a function of time. Stated substantively in terms of the present research, such designs allow the researcher to ascertain whether the stability of the various measures of attitudes became more or less stable as the panel moved from the high school to post-high school periods. This could be estimated roughly by inspecting the relative magnitude of the corresponding stability paths if the lags between waves were identical. However, in variable lag designs such as ours, the analysis becomes somewhat complicated in that the stability paths across waves are not directly comparable.

One obvious solution to this problem of variable lags is the application of the principles of elementary differential calculus to the appropriate equations. That is, the first derivative ($\frac{dy}{dt}$) of stability (y) expressed as a function of time (t) results in a measure of the rate of change in stability. Therefore, if we take the first derivative of the appropriate function $y = f(t)$ for the high school period and compare it with the first derivative of the corresponding function for the post-high school period, a direct comparison of stability can be achieved regardless of lags. Unfortunately, this assumes that the required stability equations have been determined and can be applied readily to the data set. Since this information was unknown for the stability of these attitudes, experimenting with likely functions became a task of this research.

Intuitively, linear, exponential, and logistic functions seemed to represent reasonable options. The linear form was selected as a point of departure since it involved the option with the least and simplest assumptions. A linear solution can be approached as follows. Logically, we can assume that stability (y) equals one when time (t) equals zero, i.e., there could be no instability without an incremental change in time. In addition, we have obtained a measure of stability (the stability path) at a given time for each period. Therefore, the linear solution can be achieved since we have two known points by applying the slope formula ($m = y_2 - y_1 / x_2 - x_1$). Using these procedures, stability equations were derived for each status projection variable during the high school and post-high school periods. The first derivatives were taken for each equation and interpreted as the rate of change in stability.

The stability paths and the corresponding rates of change in stability for each measured variable are presented in Table 5. When the stability paths for the high school period were compared with the corresponding post-high school paths, the resulting pattern of stability paths was mixed, i.e., some paired paths were larger for the high school periods while others were larger in the post-high school period. As we have already indicated, the comparison of these paths for the given periods may not lead to a straightforward interpretation as a result of different lags.

Based on analysis of the rates of change ($\frac{dy}{dt}$), the previously discussed caution in interpreting stability paths proved to be prudent in that a clear pattern was revealed which had been concealed in the original coefficients. In each rate of change in stability comparison, post-high school attitudes were found to be considerably more stable than the comparable high school attitudes. That is, the rates ($\frac{dy}{dt}$) were of smaller negative value for post-high school measures than for high school measures, indicating greater resistance to changes after high school. Based on the ratio of the high school to the post-high school rates, the stability of the latter appeared to be approximately one and one-half to two and one-quarter times greater than the former. It should be noted that these conclusions were based on a linear function of the relationship between stability of attitudes and time, when in fact, the form of these relationships has not been adequately established. We feel that the use of either exponential or logistic functions would not alter the central finding of increasing stability; however, the use of such functions would definitely effect the magnitude between the rates of stability.

Discussion and Implications

The problem addressed in this research was the submodeling of selected components of achievement attitudes. More specifically, modeling the stability of and the relationships between several measures of occupational and educational achievement attitudes were developed as components for a yet-to-be constructed status attainment model. The submodeling was centrally concerned with the dynamics of educational and occupational aspirations stated in terms of the Wisconsin model. This delimited approach was based on the rationale that "the status attainment process" is so complex that component-by-component submodeling would prove a sound research strategy. It was felt that the treatment of occupational and educational aspirations as simple one-time variables in current models oversimplifies their effect in the process and that instead, viewing these phenomena as dynamic multivariate components subject to submodeling should further elaborate the understanding of status attainment processes. Before discussing the implications of the submodels, a brief outline of several "findings" would be useful.

(1) Mean aspirations measures (both occupational and educational) at each of the three waves were found to be consistently larger than the corresponding expectational measures. Furthermore, the gap between aspirational and expectational means became larger at each subsequent wave. This strongly supports the treatment of aspirational and expectational phenomena in a developmental framework and suggests that divergence of the two types of attitudes may take on greater significance relatively late in the status attainment process.

(2) From the statistical perspective of simple prediction, prior levels of achievement attitudes were found to yield a moderate level of prediction of subsequent measures. For example, coefficients of determination (R^2) obtained at the senior contact (Wave II) in Model III for both LOA and LEA was .33. That is, 33 percent of the variation in senior year LOA and in the variation in senior year LEA could be associated with sophomore levels of LOA and LEA. Interestingly, these coefficients were approximately the same magnitude as the coefficients of determination in the Wisconsin model for farm youth. The coefficients obtained with the Wisconsin farm subsample were .32 and .34 for LOA and LEA, respectively. Admittedly, these coefficients were not directly comparable since the Wisconsin estimates are based on the effect of significant other influence and academic performance on LOA and LEA observed in a single wave, whereas estimates in this study were based on effects of prior levels of LOA and LEA on subsequent levels of the same variables in a multi-wave, panel design. Nevertheless, it does suggest that approximately the same degree of prediction of LOA and LEA can be achieved from knowledge of prior levels of the variables as from current knowledge of causal networks.

(3) Coefficients of nondetermination ($1-R^2$) for the various status projection variables measured at Waves II and III in the three models were found to range from a high of .81 to a low of .64. This indicated that considerable variation remained unassociated with the prior measures of the same variables. This suggests an interesting problem. By inference, the amount of variation (considering direct effects) that remained "unexplained" would be some function of measurement error and unknown intervening influences. If we were to assume for the moment that measurement errors were negligible, we would conclude from our models that the major source of influence on senior measures of these variables occurred during the high school period and that pre-sophomore influences played a relatively minor role. Of course, the assumption of minimal measurement error would be unfounded without additional information. This argument, however, not only points to the usual concern for measurement error to improve the precision of estimates, it also suggests a possible line of analysis heretofore not addressed in status attainment modeling. That is, an analysis of measurement error could lead to an understanding of the point of intervention of unknown influences into the process.

(4) An analysis of the cross-lagged effects of aspirations and expectations for the occupational model (Model I) indicated a mutual dependency between aspirations and expectations during the high school and post-high periods. Likewise, a similar pattern of mutual dependency was found in the educational variable model (Model II) during both periods. It is interesting to note here that a causal priority of expectations over aspirations might have been positive as an indication of increasing realism of attitudes. However, neither the actual means nor the cross-lagged effects observed in this study would support such a contention.

(5) An analysis of the cross-lagged effects of LOA and LEA resulted in the

observation that during both the high school period and post-high school period, LOA and LEA were mutually effecting one another. As already noted, Woelfel and Haller (1971) had hypothesized such a reciprocal relationship and had initiated analysis with a one-wave data set. When we compare the cross-lagged paths observed during high school and after high school, somewhat different patterns can be discerned. During the high school period there appears to be a priority of LOA over LEA. This is to say that although LOA and LEA are mutually dependent, LOA had much larger effects upon subsequent LEA levels than was the reverse. During the post-high school period, the effects of LOA were again greater than the effects of LEA, but the magnitude of the difference was considerably less. It should be noted that a priority of LOA over LEA would be consistent with the notion of youth perceiving educational attainment as instrumental behavior in the achievement of occupational goals.

(6) Perhaps the most consistent finding was that post-high school projections were considerably more stable than projections observed during high school. This observation held for occupational aspirations and expectations; educational aspirations and expectations; and LOA and LEA. That is, the rates of change in these attitudes had decreased after high school and were "crystallizing" as Ginzberg et al., (1951) had theorized for this period.

The preceding exercise in submodeling has led us to several "findings" which we feel may lead to further elaboration and reformulation of current status attainment models. The general impression gained from our experience in working with these 3W-2V models was that the dynamics and interrelationship evidenced by LOA-LEA phenomena are so complex that one-wave treatments of such variables may result in both an oversimplification of the role they play and an underestimation of their influence on actual status attainment. This, of course, is suggestive of a strategy of including multi-wave repeated measurement attitudinal data in status attainment models. Although intuitively appealing, the utility of this argument remains problematic until such data are combined with measures of attainment in the same model. The submodeling conducted in this research does, however, provide information from which to speculate on the nature of such a restructured model.

First, it appears that the aspirational-expectational distinction, heretofore unconsidered in status attainment models, may have utility in the explanation and that the causal significance of the distinction may occur relatively late in the process (post-high school). It should be recalled that aggregate aspirational and expectational measures for both occupational and educational attitudes become more divergent over the temporal range of our data. It could be that this divergence is a product of the interplay between attitudes and actual status attainment which is occurring during the post-high school period. Second, all the modeling conducted in this report whether dealing with aspirations and expectations or dealing with LOA and LOE strongly support the notion of mutual dependency as a desirable form of causal specification. Every cross-lagged path was found to be of sufficient magnitude to indicate mutual effect. By inference, the specification of LOA and LEA within the Wisconsin model can be questioned. Third, there was some evidence, although not overwhelming, that LOA has priority over LEA within a pattern of mutual dependency. Should this be collaborated in parallel research, an ordering of attitudes can be considered. Fourth, the finding that these attitudes were only moderately stable with the degree of stability increasing with maturity is an aspect of the phenomena completely omitted in the Wisconsin model. It is hypothesized that the incorporation of these components in a general status attainment model would lead to further explanation of the role of occupational and educational achievement attitudes in attainment processes.

FOOTNOTES

[1] The rationale for adopting an explicit component-by-component submodeling approach is somewhat convincing: (1) To move directly to a complete model of a complex system or process logically entails risk of oversimplification and errors of specification and omission; (2) Submodeling allows status attainment researchers to proceed even in the absence of comprehensive and difficult to obtain data sets required for general process models; (3) Submodeling encourages the elaboration of components and elements, i.e., in submodeling, single variables can be viewed as complex multivariate phenomena subject to modeling; and (4) Component-by-component submodeling has become a proven and standard method for stimulation of physical systems.

[2] Numerous theoretical treatments developed both in sociology and other disciplines have viewed occupational and educational achievement attitudes as highly variable and generally stress the dynamics of the phenomena (e.g., Musgrave, 1967; Kuvlesky, 1970; Cosby and Ohlendorf, 1973). Ginzberg-like explanations of change in status projections that stress a shift from early fantasy (goal-centered) choices of pre and early adolescence to more realistic (means-centered) choices of late adolescence and early adulthood typify many of the theoretical formulations. Whatever the merit of these formulations, there appears to be consistent agreement among these theorists on the dynamic nature of projections.

[3] This research project [USDA (CSRS) Regional Project S-81] has available for analysis, standardized data collected in a six-year, three-wave panel of youth from six southern states. The regional study has the potential for ecological and economic analysis as well as for much of the contextual, social psychological, and attainment data included in the Wisconsin model. The strategy of the larger research project has centered around three general assumptions: (1) The "status attainment process" is so complex that component-by-component modeling would prove to be a prudent approach; (2) Many aspects of the phenomena which have been treated as single variables in existing models represent an oversimplification of the reality of the process and should instead be treated as dynamic multivariate components subject to submodeling; and (3) The inclusion of ecological and economic influences could improve the generality and efficiency for the resulting model.

[4] The Southern Youth Study three-wave panel consists of 1,228 students who were originally high school sophomores in the states of Alabama, Georgia, Louisiana, Mississippi, South Carolina, and Texas during 1966-67. The male subset for all six states consisted of 700 students. Wave-one data was not collected in Louisiana and Wave-two data was not collected in Mississippi. The deletion of these two states for the purposes of our three-wave analysis resulted in the male subset of 495.

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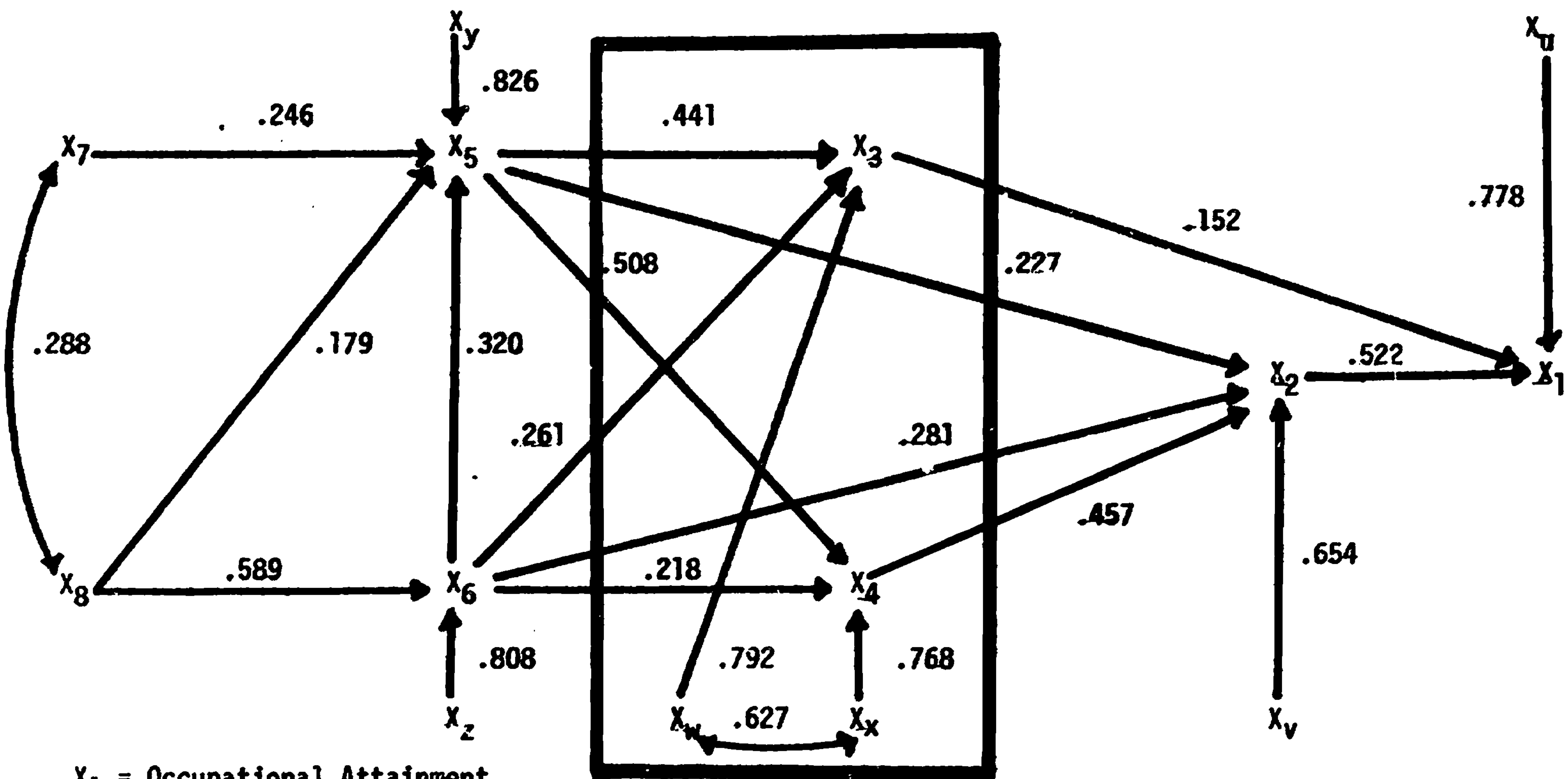
FIGURE 1: THE WISCONSIN MODEL OF EDCUATIONAL AND EARLY OCCUPATIONAL ATTAINMENT[1]



X_1 = Occupational Attainment
X_2 = Educational Attainment
X_3 = Level of Occupational Aspiration
X_4 = Level of Educational Aspiration
X_5 = Significant Other's Influence
X_6 = Academic Performance
X_7 = Socioeconomic Status
X_8 = Mental Ability

[1] From Haller, Archibald O., and Alejandro Portes, "Status attainment processes." Sociology of Education 46 (Winter):51-91, 1973.

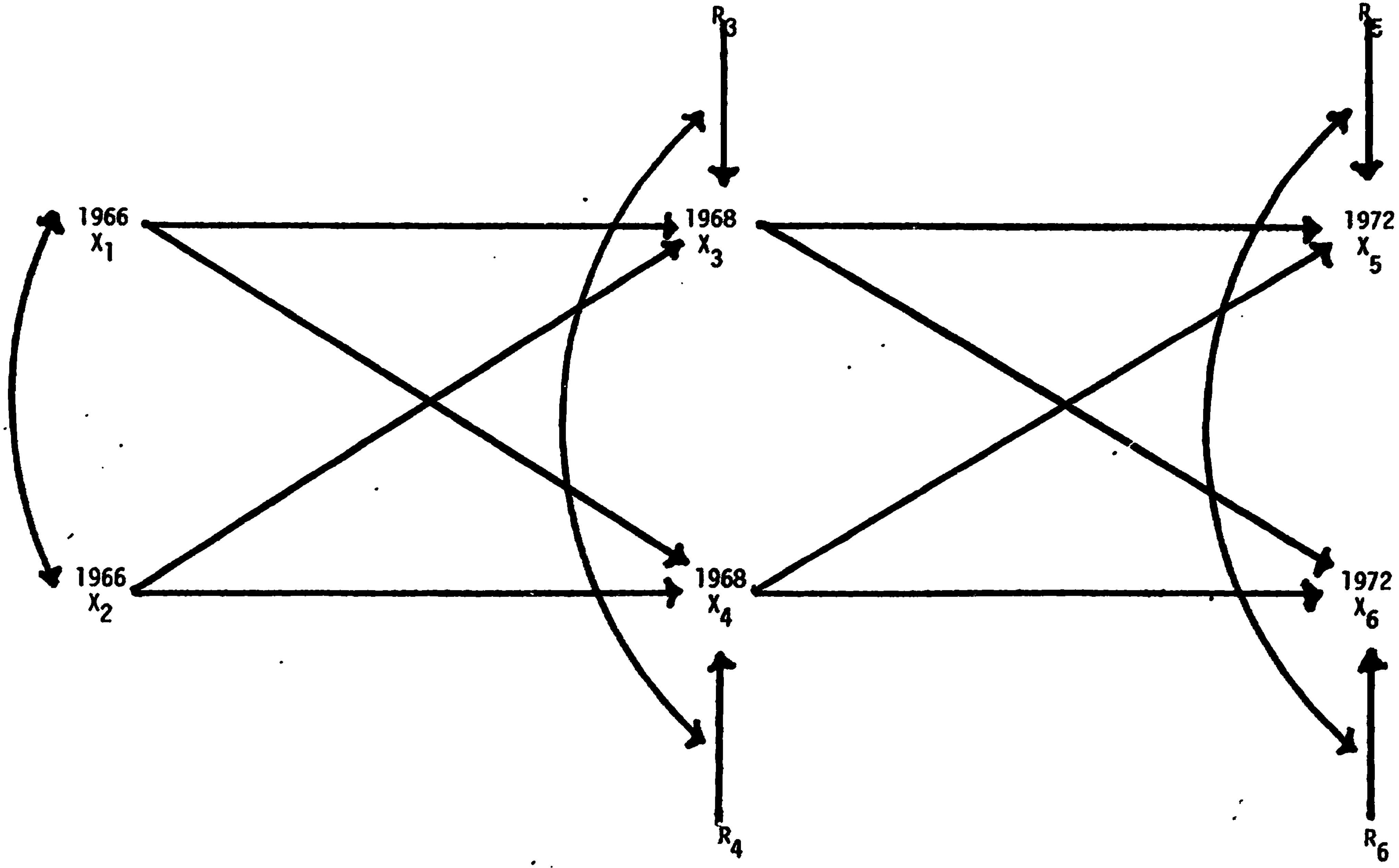


FIGURE 2. GENERALIZED THREE-WAVE, TWO-VARIABLE MODEL (3W-2V MODEL)

TABLE 1. DESCRIPTIVE STATISTICS FOR EACH VARIABLE AT EACH WAVE

VARIABLE	MEANS	STANDARD DEVIATION
SOPHOMORE YEAR 1966-67		
Occupational Aspirations (OA66)	53.178	27.747
Occupational Expectations (OE66)	48.789	28.847
Educational Aspirations (EA66)	4.280	1.408
Educational Expectations (EE66)	3.945	1.384
Level of Occupational Aspirations (LOA66)	50.266	25.599
Level of Educational Aspirations (LEA66)	4.090	1.329
SENIOR YEAR 1968-69		
Occupational Aspirations (OA68)	55.952	25.304
Occupational Expectations (OE68)	49.648	28.269
Educational Aspirations (EA68)	4.307	1.392
Educational Expectations (EE68)	3.869	1.332
Level of Occupational Aspirations (LOA68)	51.996	23.760
Level of Educational Aspirations (LEA68)	4.097	1.260
POST HIGH SCHOOL 1972		
Occupational Aspirations (OA72)	54.771	24.340
Occupational Expectations (OE72)	45.066	26.707
Educational Aspirations (EA72)	4.892	1.316
Educational Expectations (EE72)	4.050	1.383
Level of Occupational Aspirations (LOA72)	49.386	22.128
Level of Educational Aspirations (LOA72)	4.455	1.213

TABLE 2. CORRELATION MATRIX BETWEEN OCCUPATIONAL ASPIRATIONS AND EXPECTATIONS.[1]

	OA66 X_1	OE66 X_2	OA68 X_3	OE68 X_4	OA72 X_5	OE72 X_6
OA66 X_1	--	.655	.529	.457	.301	.314
OE66 X_2		--	.451	.525	.373	.410
OA68 X_3			--	.626	.440	.406
OE68 X_4				--	.388	.479
OA72 X_5					--	.499
OE72 X_6						--

[1]All probability levels are less than .0001 under Ho: Rho = 0.

TABLE 3. CORRELATION MATRIX BETWEEN EDUCATIONAL ASPIRATIONS AND EXPECTATIONS.[1]

	EA66 X_1	EE66 X_2	EA68 X_3	EE68 X_4	EA72 X_5	EE72 X_6
EA66 X_1	--	.760	.426	.494	.333	.385
EE66 X_2		--	.388	.524	.374	.409
EA68 X_3			--	.723	.378	.466
EE68 X_4				--	.438	.542
EA72 X_5					--	.623
EE72 X_6						--

[1]All probability levels are less than .0001 under Ho: Rho = 0.

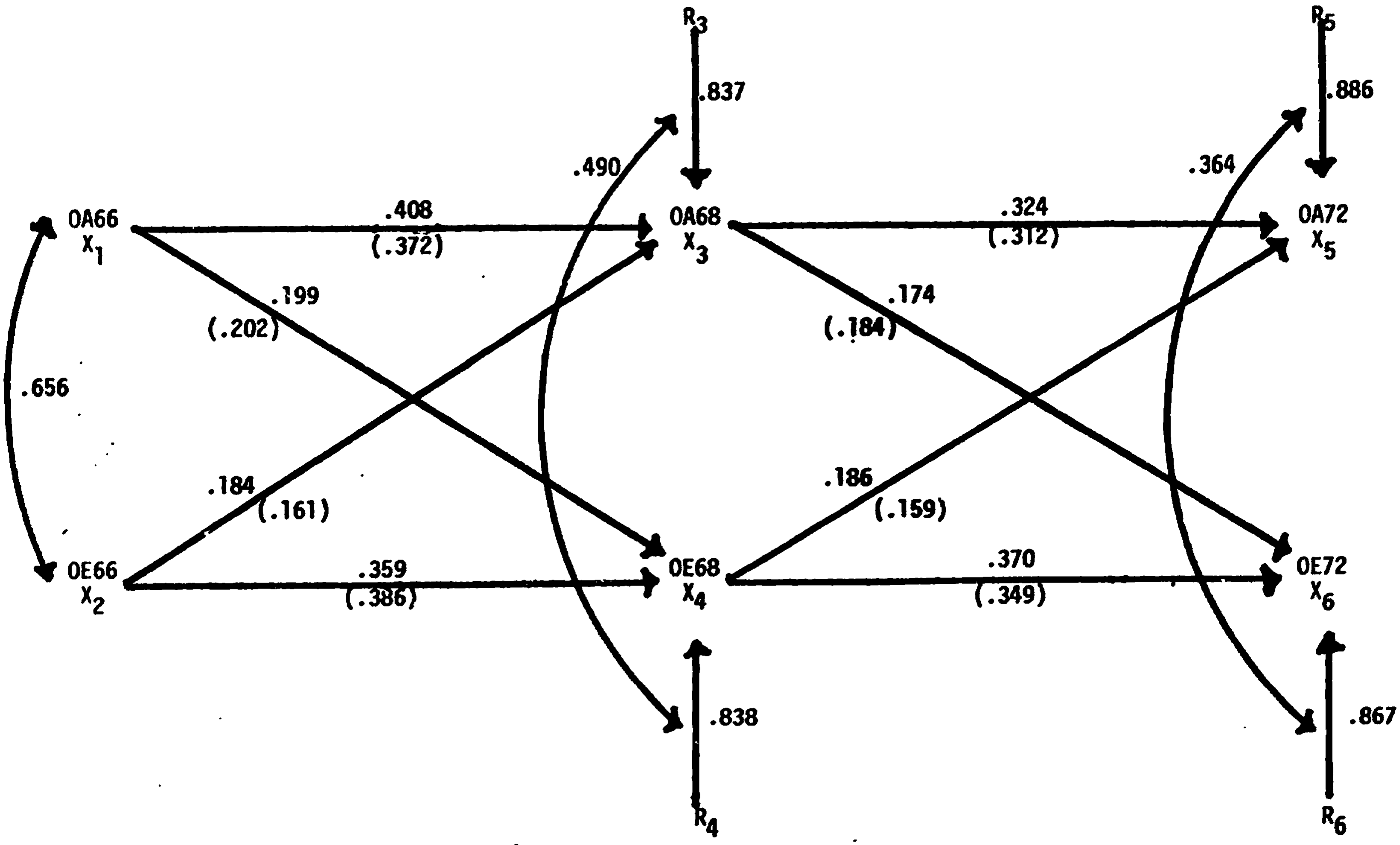
TABLE 4. CORRELATION MATRIX BETWEEN LEVEL OF OCCUPATIONAL ASPIRATIONS (LOA) AND LEVEL OF EDUCATIONAL ASPIRATIONS (LEA).[1]

	LOA66 X_1	LEA66 X_2	LOA68 X_3	LEA68 X_4	LOA72 X_5	LEA72 X_6
LOA66 X_1	--	.484	.562	.483	.446	.454
LEA66 X_2		--	.373	.507	.319	.439
LOA68 X_3			--	.583	.491	.505
LEA68 X_4				--	.424	.554
LOA72 X_5					--	.559
LEA72 X_6						--

[1]All probability levels are less than .0001 under Ho: Rho = 0.

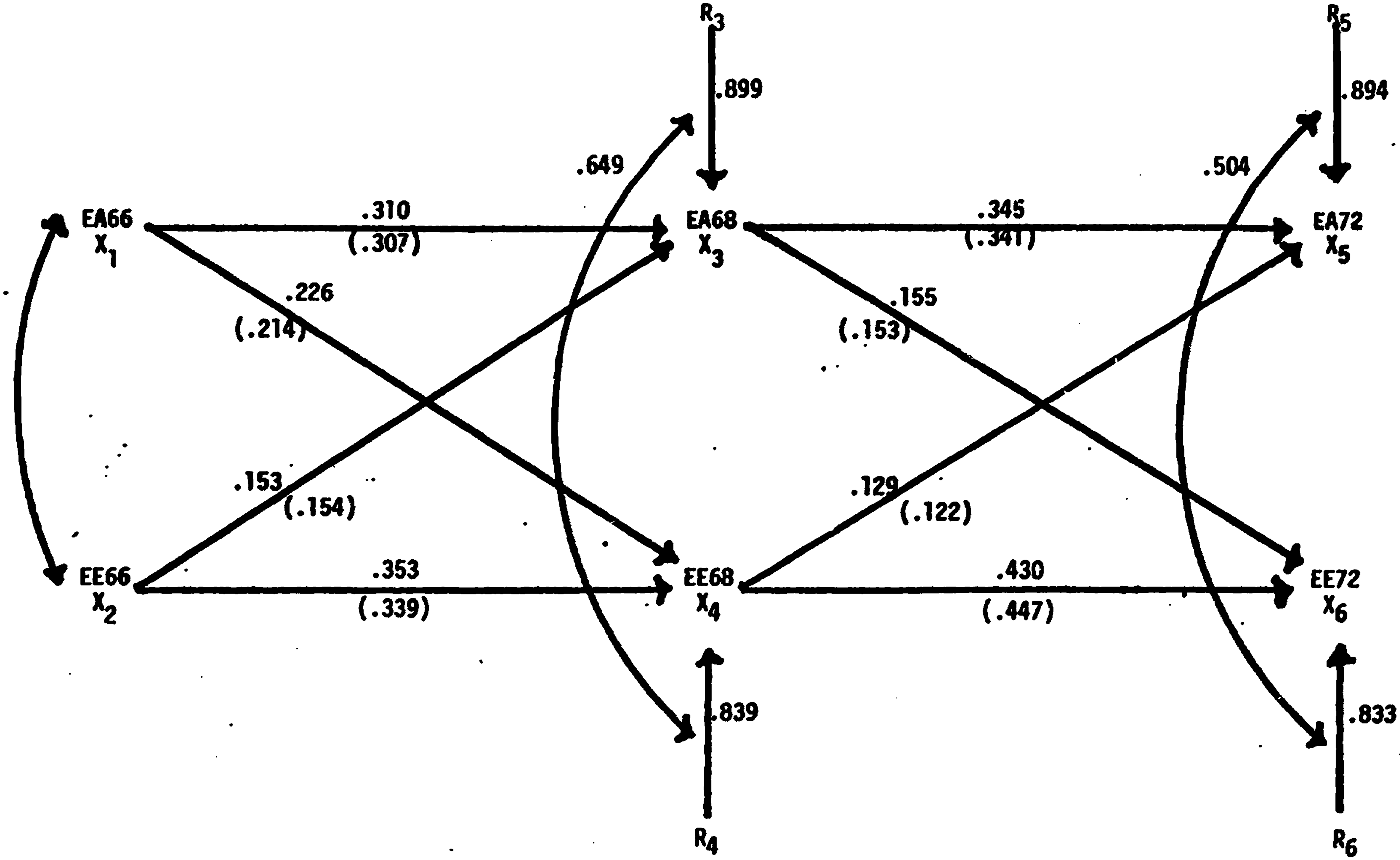
TABLE 5. Stability Paths and Corresponding Rates of Change in Stability Between High School and Post-High School Periods (Linear Form)

Model		Stability Paths (P_i)		Rates of Change in Stability $\frac{dP_i}{dt_i}$		$\frac{dP_i}{dt_i}$ HS / $\frac{dP_i}{dt_i}$ Post HS
		HS Period (Wave I-II) 66 → 68 (1)	Post HS Period (Wave II-III) 68 → 72 (2)	HS Period (Wave I-II) 66 → 68 (3)	Post HS Period (Wave II-III) 68 → 72 (4)	(5)
Model I	Occupational Aspirations	.408	.324	-.296	-.169	1.751
	Occupational Expectations	.395	.370	-.303	-.158	1.918
Model II	Educational Aspirations	.310	.345	-.345	-.163	2.117
	Educational Expectations	.353	.431	-.324	-.142	2.282
Model III	LOA	.498	.370	-.251	-.157	1.599
	LEA	.357	.394	-.322	-.152	2.118



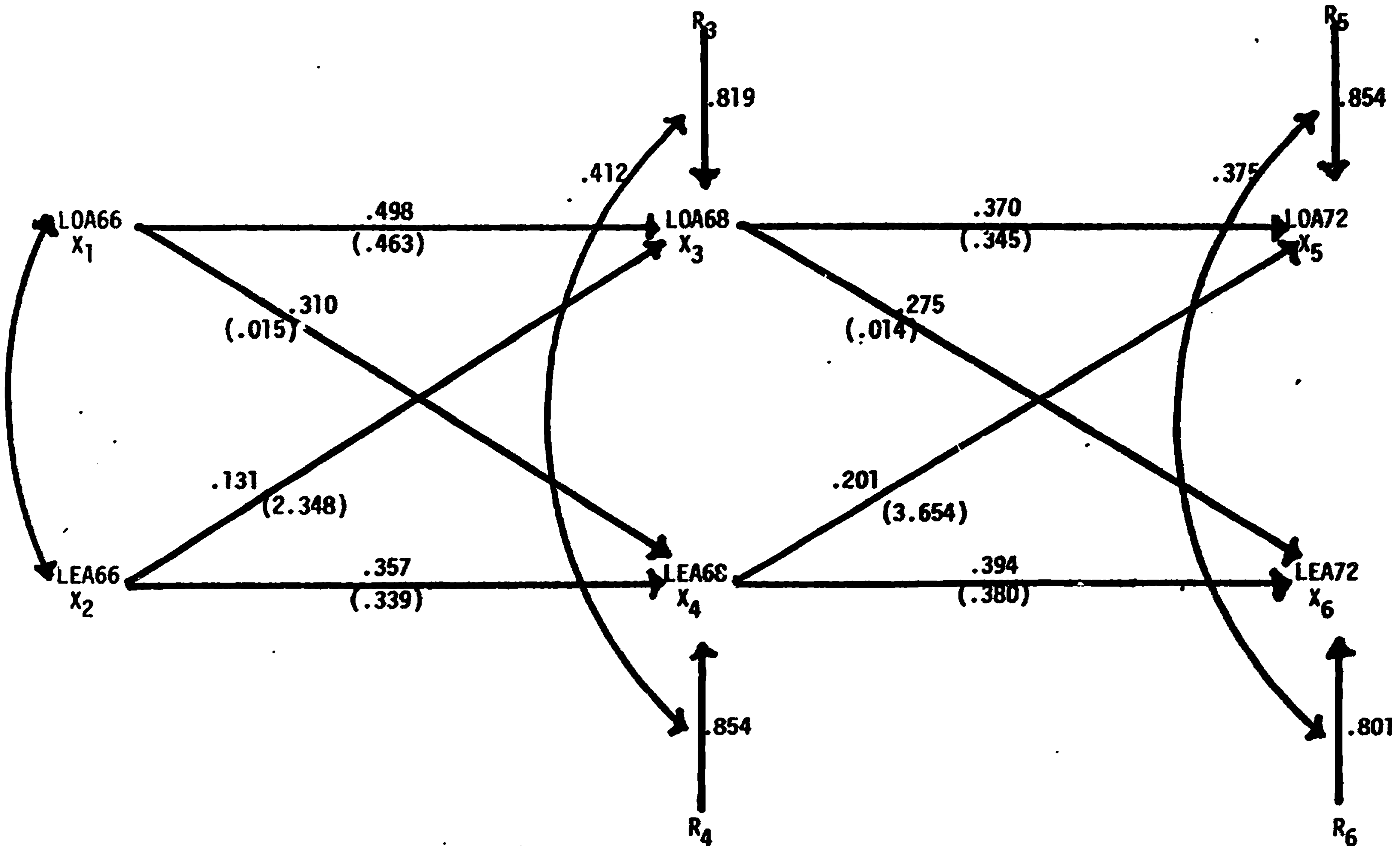
MODEL 1. 3W-2V MODEL OF THE DYNAMICS OF OCCUPATIONAL ASPIRATIONS AND EXPECTATIONS

[Standardized path coefficients are reported above the path arrows and unstandardized coefficients are reported in parentheses below the path arrows. All path coefficients in this model were found to be at least three times their standard error. Sample size equals 376.]



MODEL II. 3W-2V MODEL OF THE DYNAMICS OF EDUCATIONAL ASPIRATIONS AND EXPECTATIONS

[Standardized path coefficients are reported above the path arrows and unstandardized coefficients are reported in parentheses below the path arrows. All path coefficients in this model were found to be at least twice their standard error. Sample size equals 475.]



MODEL III. 3W-2V MODEL OF THE DYNAMICS OF LEVEL OF OCCUPATIONAL ASPORATIONS (LOA) AND LEVEL OF EDUCATIONAL ASPIRATIONS (LEA).

[Standardized path coefficients are reported above the path arrows and unstandardized coefficients are reported in parentheses below the path arrows. All path coefficients in this model were found to be at least twice their standard error. Sample size equals 472.]