ABSTRACT
          An earlier path analytic study of the predictive
validity of Tinto's theory of college student attrition was
replicated using an independent sample of students from another
university. Tinto conceived of the attrition/retention process as a
series of sociopsychological interactions between the characteristics
students bring with them to college and their experiences while
enrolled. Usable responses to a questionnaire were received from
1,105 college freshmen at summer orientation, and after the first
academic year 723 freshmen were assessed. Attention was directed to
the major constructs of Tinto's model: background characteristics,
including family background, individual attributes, and pre-college
schooling; academic aspiration; commitment to staying at the college;
and academic and social integration. With some few exceptions, the
results are consistent with those of the earlier work and with
theoretical expectations based on the model. A significant
compensatory interaction between levels of goal and institutional
commitment were found, indicating that institutional commitment had
its greatest positive influence on retention for students with
comparatively low levels of commitment to completing a college
degree, and vice versa. (SW)

A PATH ANALYTIC VALIDAT.ON OF TINTO'S THEORY OF COLLEGE STUDENT ATTRITION

Patrick T. Terenzini, Director
Office of Institutional Research (AD-260)
State University of New York at Albany
Albany, NY 12222
Telephone 518-457-4621

Ernest T. Pascarella
Professor of Education
University of Illinois at Chicago

Christos Theophilides
Assistant for Institutional Research
State University of New York at Albany

Wendell G. Lorang
Associate Director of Institutional Research
State University of New York at Albany

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A PATH ANALYTIC VALIDATION CF TINTO'S

THEORY OF COLLEGE STUDENT ATTRITION

Abstract

This paper describes the results of an attempt to replicate an earlier path
analytic study of the predictive validity of Tinto's theory of college student
attrition using an independent sample of students from another university.
With some few exceptions (several of them notable), the results of this study
are highly consistent with those of the earlier work and with theoretical
expectations based on the model. This study also replicated a significant,
compensatory interaction between levels of goal and institutional commitment
indicating that institutional commitment had its greatest positive influence
on retention for students with comparatively low levels of commitment to
completing a college degree, and vice versa. Important differences in the
results were also apparent, however, the most striking being the
non-appearance of a theoretically predicted direct effect of academic
integration on persistence.

A PATH ANALYTIC VALIDATION OF TINTO'S
THEORY OF COLLEGE STUDENT ATTRITION

College student attrition has long been a topic of substantial
scholarly and administrative interest, as the extensive literature reviews of
Spady (1970), Cope and Hannah (1975), Tinto (1975), Pantages and Creedon
(1978) and Lenning, Sauer and Beal (1980) make clear. Until the 1970's,
however, much of the research was atheoretical, identifying a considerable
number and variety of statistically significant associations among various
student and institutional characteristics and attrition, but offering a
decidely unparsimonious description of the influences on students' attendance
patterns. A number of theoretical models have since been developed in efforts
to bring some conceptual coherence to this area of inquiry (Spady, 1970;
Kamens, 1971; Rootman, 1972; Tinto, 1975; Bean, 1980).

Tinto's (1975) theory is probably the best known of these (see
Figure 1). Building upon the work of Spady (1970), Tinto conceives of the
attrition/retention process as a series of socio-psychological interactions
between the characeristics students bring with them to college and their
experiences while enrolled. According to Tinto, students come to college with
a variety of family background characteristics, individual attributes and
pre-college schooling experiences. These pre-matriculation characteristics
are presumed to lead to varying initial levels of commitment to obtaining a
college degree and to the institution being attended. These initial

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commitment levels, in turn, interact with various structural and normative features of the particular college or university, leading to varying levels of integration into the academic and social systems of the institution. "Other things being equal, the higher the degree of integration of the individual into the college systems, the greater will be [the student's] commitment to the specific institution and to the goal of college completion" (Tinto, 1975, p. 96).

A number of studies have been undertaken in the past few years testing the predictive validity of Tinto's model (Aitken, 1982; Baumgart and Johnstone, 1977; Terenzini & Pascarella, 1977, 1978; Munro, 1981; Pascarella & Terenzini, 1979, 1980; Pascarella & Chapman, in press; Pascarella, Duby & Iverson, 1983). Each of these studies lends support to the predictive validity of the major constructs of Tinto's model, but only two (Pascarella & Terenzini, 1983; Pascarella, Duby & Iverson, 1983) provide a comprehensive test of the major conceptual elements of the model and their causal sequence. Pascarella and Terenzini (1983) obtained results generally quite consistent with theoretical expectations when analyzing their overall sample. When the analyses were performed separately for each gender, however, academic integration was found to be more influential among men while social integration had a somewhat stronger direct influence on persistence among women.

Moreover, as Pascarella and Terenzini (1983) note, the research to date has focused, with few exceptions, on the main effects of variables in the model, ignoring Tinto's suggestion of potentially important compensatory interactions among major elements of the model. Pascarella and Terenzini

(1983) found, for example, that high levels of academic integration compensated for low levels of social integration, and vice versa. Similarly, high levels of institutional commitment were found to counterbalance the theoretically negative effects of low goal commitment, and vice versa.

Kerlinger and Pedhazur (1973, pp. 446-448) warn about the instability of beta weights in multiple regression and emphasize the importance of replicating results, noting that replication bears on both the internal and external validity of study results. It is common knowledge, however, that the replication of results is extremely difficult in the social sciences. Because replication is the cornerstone of theory-testing, however, this study attempted to reproduce the results reported in Pascarella and Terenzini (1983) with an independent sample of students and in a different institutional setting.

METHODS

The institution at which the Pascarella and Terenzini (1983) study was done will be referred to as Institution 1 (and the study itself as "Study 1"); the present study will be referred to as "Study 2" (done at "Institution 2"). Both institutions are large, comprehensive, research-oriented universities in the northeast with undergraduate enrollments of approximately 11,000 students. Institution 1 is an independent university, whereas Institution 2 is public. Freshmen enroll at both schools in approximately equal numbers (2100 to 2400). About one-fourth of Institution 1's freshmen and about 40 percent of those at Institution 2 ranked in the top 10 percent of their

graduating high school class. Both institutions are residential. Except where noted otherwise, the present study was identical to Study 1 in overall design, population definition, variables employed and analytical procedures adopted.

Design and Sample

The overall study design was longitudinal and ex post facto. During the summer of 1980, students attending five of nine, two-day, summer orientations sessions were asked to complete a locally-developed questionnaire. The five sessions were randomly selected. The instrument solicited a variety of information, including students' reports of the quality of their high school preparation, their educational and career goals, parents' education, the highest degree they expected to earn and related background information. Usable responses were received from 1,105 (50.6%) of the 2,183 students who subsequently matriculated at the university.

In April 1981, a detailed questionnaire asking for information about their freshman year was sent to the 1,105 summer respondents. After a follow-up mailing, usable responses were received from 730 freshmen (66.1%; one-third of the entire freshman class). A review of institutional records indicated that 677 of these students continued their enrollment into their sophomore year (Fall 1981), whereas 46 had withdrawn voluntarily prior to the start of the sophomore year and 7 had been dismissed for academic reasons. As in Study 1, and because of their small number, this research excluded academic dismissals from all analyses. Tests indicate that respondents were representative of the population of freshmen with respect to academic aptitude (combined SAT scores) and high school achievement (percentile rank in high school class). Women students, however, were overrepresented at statistically

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reliable levels. To correct for this response bias, weights were assigned to bring the proportional representation of men and women in the sample into line with that of the population. These weights were selected such that the number of weighted cases was equal to the original 723 freshmen and statistical tests would not be affected by the weighting procedure.

Variables

As can be seen in Figure 1, Tinto's model consists of five major constructs or variable sets, each of which was operationalized as follows:

I. Background Characteristics

A. **Family Background** was a single variable, labeled "Parents' Education," consisting of the sum of each parents' level of formal education, using seven ordinal categories from "some grammar school" to "graduate degree." Study 1 also used parents' combined annual income; that information was not available in the present study.

B. **Individual Attributes.**
   1. Sex (coded 1=male and 2=female);

   2. Educational Opportunity Program (EOP) student (a special admissions category for educationally and economically disadvantaged students, approximately two-thirds of whom are from minority groups); Study 1 employed a dichotomously coded race/ethnicity variable.

   3. Academic Aptitude (combined SAT scores);

   4. Intended Academic Major (dummy coded 1=liberal arts, 0=professional);

C. **Pre-College Schooling.**

   1. Academic Achievement (percentile rank in high school class);

   2. High School Preparation (sum of students' ratings of the quality of their high school preparation in mathematics, reading, composition, foreign languages, science, social science/history,

II. Initial Commitments

A. Goal Commitment I was operationalized as a single item—the highest degree the student expected to earn anywhere (1=baccalaureate, 2=master's and 3=doctorate). Study 1 also included in this category an item assessing the importance of graduating from college. That item was unavailable in the present study;

B. Institutional Commitment I was the sum of three items:

1. This university's rank as a college choice (1=first choice to 4=fourth or lower choice; reverse coded for analyses);

2. Probability of transfering before graduation (1=no chance, to 4=very good chance; reverse coded);

3. Highest degree expected at this institution (1=baccalaureate, 2=master's and 3=doctorate). Study 1 also included an item measuring the student's confidence that the "decision to attend this institution" was a good one, but excluded items 2 and 3 above. Only item 1 above was common to this variable set in both studies.

The two commitment scales correlated .03 in Study 1 and .04 in the present research.

According to Tinto's model, academic integration is determined primarily by the student's academic performance and his or her level of intellectual development, while social integration is primarily a function of the extent and quality of peer-group interactions and the extent and quality of student interactions with faculty. While Tinto places interaction with faculty under social integration, he nevertheless argues that, depending on their focus, such interactions may postively influence academic integration. Thus, in this study, as in Study 1, different aspects of the extent and quality of students' interaction with faculty were considered as measures of either academic or social integration.

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III. Integration Variables

    A. <u>Academic Integration</u> was operationalized as the sum of the following scales or variables:

       1. Cumulative freshman-year grade-point average;

       2. A seven-item, factorially derived scale measuring a students' perceived level of intellectual development; the derivation and composition of this scale is given in Pascarella and Terenzini (1980), from whom it was borrowed;

       3. A five-item, factorially derived scale measuring student's perceptions of faculty members' concern for student development and teaching (see Pascarella & Terenzini, 1980);

       4. The frequency of students' out-of-class contact with faculty of 10 minutes or more for each of the following purposes:
          a. "to get basic information and advice about any academic program;"
          b. "to discuss intellectual or course-related matters;"
          c. "to discuss matters related to my future career."

    B. Social integration was operationally defined as the sum of the following scales and items:

       1. The number of hours per week, on average, spent during the past year in organized extra-curricular activities;

       2. A seven-item factorially derived scale measuring the extent and quality of students' interactions with their peers (Pascarella & Terenzini, 1980);

       3. A five-item factorially derived scale measuring the quality and impact of students' out-of-class contact with faculty;

       4. The frequency of freshman non-classroom contact of 10 minutes or more with faculty for each of the following purposes:
          a. "to discuss a personal problem;"
          b. "to discuss a campus issue or problem;"
          c. "to socialize informally."

Because of positive skewness in the distributions of the frequency of faculty contact variables, the distributions of these items were smoothed by taking the natural logarithm of each variable. A constant of 1 was added to each variable prior to transformation in order to avoid taking the log of zero. The academic integration scale had an internal consistency (alpha) reliability of .60 (.64 in Study 1), while the social integration scale's alpha coefficient in this study was .47 (.46 in Study 1). The two scales correlated .48 in this study and .36 in Study 1.

IV. Subsequent Commitments

A. Goal Commitment II was a single item: "It is important for me to graduate from college," rated at the end of the freshman year (on a scale where 5=strongly agree to 1=strongly disagree);

B. Institutional Commitment II was the sum of two items, both rated at the end of the freshman year:

1. "I am confident I made the right choice in choosing to attend [this university]" (on a scale where 5=strongly agree and 1=strongly disagree);

2. "It is not important to me to graduate from [this university]" (on a scale where 5=strongly agree and 1=strongly disagree, reverse coded prior to analysis). In this study, the Goal Commitment II and the Institutional Commitment II scales correlated .16; in Study 1 the zero order r was .24.

As in Study 1, the dependent variable, persistence into the sophomore year or voluntary withdrawal before that time, was dummy coded 1=persisters and 0=voluntary withdrawals.

In all instances where scales operationalizing components of the model were constructed from variables with different metrics (e.g., academic and social integration), the same two-step procedure followed in Study 1 was employed. First, each individual item or scale was standardized to provide the same metric, and second, a constant of 10 was added to eliminate negative numbers. The scale was then formed by summing across the standardized items (Armor, 1974).

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Statistical Analyses

As noted earlier, this study is based on the responses of 723 freshmen, 46 of whom voluntarily discontinued their education at this university prior to the start of their sophomore year. Study 1 has 763 respondents, 90 of whom dropped out voluntarily. Because of the larger number of dropouts, it was possible in Study 1 to perform all analyses for each sex separately, as well as for the combined sample. Because of the small number of dropouts in the present study, however, analyses were limited to the overall sample.

Multiple group discriminant function analysis and path analysis were the principal analytical procedures. While the two-group case of discriminant function analysis is known to give results proportional to those of a multiple regression with a dichotomously coded dependent measure, discriminant analysis was employed because of its added advantage of providing a classification procedure that permits assessment of the stability and predictive power of the equation for correctly classifying individual members of the two groups. The predictor variables were entered in sets in an order consistent with Tinto's model: 1) background characteristics, 2) initial commitments, 3) academic and social integration, and 4) subsequent commitments. At each step, the variable set entered was tested for the significance of its contribution to explained variance beyond that associated with all causally prior variable sets.

To test the hypothesized interactions between academic and social integration, and between Goal Commitment II and Institutional Commitment II, two cross-product interaction terms were created by multiplying academic and social integration, and goal and institutional commitment. Those two terms

were added in a fifth step in the discriminant analysis in order to assess
their ability to explain variance beyond that attributable to the main effects
(additive model) variables. Following the discriminant function analysis,
path analysis was employed to test the causal relations among the variables as
given in Tinto's model. Background variables were treated as exogenous
variables (sources of variation outside the model's conceptual pattern), while
the remaining variables were considered endogenous (determined by other
variables inside the model). This analysis required the solution of seven
structural equations in which each set of endogenous variables was regressed
on all exogenous variables and all causally prior endogenous variables in the
model. These regressions yielded standardized partial regression coefficients
(beta weights) that can be considered as path coefficients reflecting direct
effects (Kerlinger & Pedhazur, 1973).

Following the seven regressions in which all variables were entered in
their turn, paths with non-significant weights were deleted and a second set
of regressions performed using only those variables that produced
statistically reliable paths in the initial regressions. These analyses
produce a "reduced" path model that offers both visual simplicity and a test
of the extent to which the correlation matrix supports the hypothesized
relations. As in Study 1, the criterion for retaining a path for the reduced
model was $p < .05$. Exceptions to this rule were made under only two
circumstances: 1) if no other path leading to an endogenous variable was
significant at $p < .05$, or 2) if the path was hypothesized in the model to be
a theoretically important influence on persistence. In Study 1, such
exceptions occurred only twice; in the present study, they occurred four times.

RESULTS

Table 1 summarizes the results of the discriminant function analyses for both studies. As can be seen, in neither study did students' background characteristics differentiate between persisters and dropouts. Similarly, the entry of initial goal and institutional commitments added little to the separation of the two groups, although the increase in the canonical R^2 (analagous to the R^2 in multiple regression) for Study 1 was statistically reliable.

The inclusion of the academic and social integration variables in Study 1 produced a substantial and significant increase in the variance explained, but the magnitude of the increase was not mirrored in the present study, although the 1 percent increment was also statistically reliable. The significant increases in both studies are consistent with theoretical expectations, but the size of that increase in the present research is decidedly smaller than might be expected. The difference in the two sets of results is highlighted in the differences in the percentages of correct classification: whereas 71.6 percent of the cases in Study 1 could be correctly classified at this step in the analysis, correct classification was possible in Study 2 in only 57.6 percent of the cases, a statistically significant, but unimpressive departure from chance expectations.

In both studies, the incorporation of subsequent levels of goal and institutional commitment produced reliable increases in the value of the canonical R^2, but the increase in Study 2 was nearly twice that of Study 1 (11 percent and 6.3 percent, respectively). The main effects variables in Study 2 explained 19 percent of the total variance, whereas those in the

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present study accounted for only 11.5 percent. Nonetheless, the amount of
variance explained in this study compares favorably with other path analytic
studies of attrition. Munro's (1981) test of Tinto's model, for example,
explained 15 percent of the total variance, and Bean (1980) accounted for 21
percent, and 12 percent of the variance in attendance behavior among women and
men, respectively.

Finally, as Table 2 shows, the interaction terms yielded a slight, but
reliable, increase in the explanation of variance, replicating the results
observed in Study 1. The precise nature of the significant interactions is
discussed below.

Figure 2 shows the statistically reliable paths in the reduced model.
A visual comparison of Figures 1 and 2 suggests substantial similarity between
Tinto's theoretical model and the significant paths in this study. Moreover,
a comparison of the reduced path models for this study and Study 1 reveals
equally close similarities.

As can be seen in Figure 2, and consistent with Tinto's model,
students' individual background characteristics had a direct influence on
initial levels of both goal and institutional commitment, the influences of
individual attributes on initial goal commitment tending to be both the
strongest and the most numerous. Family background influenced initial
institutional, but not goal, commitment, and pre-college schooling had a
direct influence on early goal, but not institutional, commitment. Both
patterns were found in Study 1 as well.

Tinto's model leads one to expect that early institutional commitment
will influence social integration, but that expectation was not supported in

this study, nor in the earlier study. Early goal commitment had a significant influence on social integration (in both studies), but goal commitment was not related in this study to academic integration, as Tinto's model suggests and the results of Study 1 indicate. The failure of this path to emerge constitutes one of four major departures of the present results from both theoretical expectations and the results of Study 1.

A second major inconsistency is in the absence of a significant path to social integration from either initial institutional commitment or pre-collge schooling. Tinto' model suggests an indirect influence of pre-college schooling through institutional commitment, and Study 1 found a direct path from pre-college schooling to social integration. Neither path was observed in the present results. This departure may, however, be attributable to the variables used to operationalize pre-college schooling. Study 1 included a measure of high school extra-curricular activities, whereas the present study used only academic variables. Thus, the inconsistency may be more artifactual than substantive.

As expected from both the model and from Study 1, academic integration had a significant influence on subsequent goal commitment. Its effect on institutional commitement was not suggested by Tinto's model but is consistent with Study 1 results. Indeed, in both studies, the influence of academic integration on subsequent institutional commitment was second in magnitude only to initial institutional commitment. Social integration did not have a reliable influence on later institutional commitment, however, and this difference consititutes the third major departure of the present results from both theory and earlier results.

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Both studies identified significant paths--consistent with Tinto's
model--between subsequent goal and institutional commitments and persistence.
In both studies, moreover, institutional commitment was the more powerful of
the two in its influence. Indeed, in both studies subsequent institutional
commitment was three times as powerful as later goal commitment in predicting
persistence. Pascarella and Terenzini (1983) suggest that this result in
Study 1 may be attributable to the strong commitment to completion of college
among students in the sample. The same is likely to be the case in the
present study. In Study 1, the mean response to the item about the importance
of graduating from college was 4.49 on a 1-5 scale where 5 is high; in Study
2, using the same item and scale, the mean was 4.76 (the standard deviations
were .87 and .69 in Studies 1 and 2, respectively). At schools with students
who are more heterogeneous in their commitment to obtaining a degree than
those in these two studies, that variable may have greater salience.

The significant direct path between initial institutional commitment
and persistence is inconsistent both with theoretical expectations and with
the results of Study 1. It seems likely, however, that this apparently
reliable link is a reflection less of any substantive influence than of a
statistical suppression effect. While the zero-order correlation between the
two variables is negative, it is also slight (-.005). Moreover, the partial
correlation, controlling for background traits, is similarly small (-.009).
Both of these correlations are non-significant, and it is only upon the entry
of subsequent institutional commitment in the last step of the analysis that
the beta weight for initial institutional commitment reaches the statistically
significant level (-.08) shown in Figure 2.

The fourth--and most striking--departure of the present results from both theoretical expectations and the results of the earlier study is the failure in Study 2 to identify a significant and direct path between academic integration and persistence. That path is prominent and substantial in Study 1, and is also at the ccre of Tinto's model. The reason behind the absence of such a path in the present study is not easily discerned, although there is some evidence to suggest that it, too, is artifactual. A comparison of the standard deviations for academic integration in the two studies indicates that the variation in Study 2 is nearly 25 percent less than that in Study 1 (s.d.'s = 2.74 and 3.59, respectively). Moreover, academic integration's influence on persistence is detectable--but indirectly--through later institutional commitment, on which academic integration has the second most powerful influence. Indeed, the partial correlation between academic integration and persistence (.08), controlling for all logically prior variables in the model, is significant, and the beta weight for academic integration is also significant when that variable enters the regression on persistence. Upon entry of subsequent institutional commitment, however, the direct path from academic integration to persistence disappears.

A path between social integration and persistence is discernible, but tenuous, in this study, having a coefficient significant at $p < .15$. That relation, however, is negative in this study, whereas it was positive in Study 1. A possible explanation for this finding is discussed below.

The surprisingly close correspondence between the results of the present path analysis and the overall model tested in Study 1 is apparent in a few simple tabulations. Study 1 produced 24 significant paths; in the present

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study, 22 were identified. Sixteen (72.7%) of those paths were common to the two models. For five of those paths, the signs were opposite one another, but in two of those instances, the differences are attributable more to the specific variables used to operationalize Tinto's concepts than to any substantive differences. Of the six paths identified in the first study but missing in the present investigation, one is attributable to attenuated variance (academic integration). Moreover, the present study replicated another important result of the initial study, as is discussed below.

Interactions

As noted in Table 1, the set of interaction terms was significant when entered last in the discriminant analysis to test Tinto's concept of compensatory interaction between academic and social integration, and between subsequent goal and institutional commitments. That result justified an inspection (via a multiple regression) of the individually significant interactions. In Study 1, both interaction terms were statistically significant and compensatory, indicating that so far as promoting retention is concerned, high levels of one variable tended to counter-balance low levels of the other, interacting variable. In the present study, the interaction of academic and social integration was not reliable (probably also attributable to the attenuated variance in academic integration), but the goal institutional commitment interaction of Study 1 was replicated: commitment to the institution had its strongest positive influence on persistence for students relatively low in goal commitment, and vice versa. The replication of this interaction is striking, particularly in view of the difficulty of replicating main effects in correlational research, much less interaction effects.

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Limitations

The present study is limited in several respects. First, the results are based on the responses of students enrolled at a single institution. To the extent that these students and their experiences differ from those at other institutions, the results may not be generalizable and the validation of Tinto's model may be correspondingly incomplete. Second, as in Study 1, this investigation was unable to test the predictive validity of Tinto's model as it applies to academic dismissals because of the small number of cases in that category. Similarly, neither study could differentiate dropouts who were transfering to another institution from those who were leaving the higher educational system entirely. It seem: highly likely that the dynamics behind voluntary and involuntary attrition, and behind transfer and systemic withdrawal as well, are very different. Given the comparatively high levels of commitment to college completion among the students in both of these studies, it would appear that both have, in fact, tested the validity of the model for predicting transfer, rather than permanent dropout, behavior.

DISCUSSION AND CONCLUSIONS

With some small number of exceptions (but also some noteworthy ones), the results of this study are highly supportive of the major constructs and their causal linkages in Tinto's model of college student attrition. Moreover, present results replicate to a remarkable degree those obtained in an earlier path analytic validation of Tinto's model on another university campus (Pascarella & Terenzini, 1983). Although the amount of variance in attendance behaviors explained in both studies was, by some standards, slight, and the present study's predictive power was about two-thirds that of the earlier work, theoretically significant variable sets made statistically reliable

increments in the variance explained upon entry, and the percentage of cases correctly classified was high in both studies (81 and 83 percent, respectively), even when allowance is made for the fact that the classification of the same cases used to derive discriminant weights tends to produce somewhat inflated correct classification percentages.

Path analytic results indicate that Tinto's model has considerable predictive validity and utility for explaining voluntary attrition beteen freshman and sophomore year. Although the causal ordering and interconnections among most of the concepts in Tinto's model were supported by the results of both studies, present findings also suggest potentially significant disjunctures. There is some evidence, however, to suggest the inconsistencies between theory or earlier results and the present findings may be artifactual.

The most notable disjuncture was the non-appearance in this study of a significant and direct path between students' level of academic integration and subsequenct persistence. This particular relation is one of two fundamental causal paths in Tinto's theory. Attenuated variance in the composite academic integration variable may explain this finding. The fact that academic integration had a significant and direct influence on persistence until the entry of subsequent institutional commitment, and that it continues to have a comparatively strong indirect effect on persistence through institutional commitment, lends additional support to the suggestion that the non-significant direct path is artifactual. The finding nonetheless continues to be troublesome. Neither real institutional differences nor the predictive failure of the model can be entirely discounted as alternative explanations.

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Similarly, the direct path between social integration and persistence
is only marginally reliable (p < .15). Moreover, the nature of the influence
is negative where it was expected to be positive. Neither attenuated variation
in social integration, nor the presence of an indirect effect are possible
explanations; neither is present. Tinto (1975, p. 108) notes that excessive
social involvement may detract from time spent on studies and lead,
consequently, to lower grades and possible academic dismissal. He states,
however, that excessive social involvement rarely culminates in voluntary
withdrawal. It may also be the case, however, that some students withdraw
"voluntarily" because they recognize their poor academic performance puts them
at risk of being dismissed, and "voluntary" withdrawal is preferable to
academic dismissal. The academic competition at the institution where this
study was done is known to be keen, and high levels of social involvement may
contribute to weakened academic performance and lead either to voluntary
withdrawal in an effort to avoid dismissal, or to dissatisfaction with the
competitive environment and transfer to another institution. In the end, one,
can only speculate on the reasons behind the opposite signs for this path in
the two studies. It is clear, however, that this result does not support the
role of social integration as specified in Tinto's model.

Like the earlier study, the findings of this investigation indicate
that students' pre-college characteristics have no direct effect on
retention/attrition. Rather, their influence is mediated by the nature of
students' collegiate experiences and their interactions with the institutional
environment. These findings are also consistent with earlier efforts to
validate Tinto's model (Terenzini & Pascarella, 1978; Pascarella & Terenzini,

1980; Bean, 1980). It seems clear from this and from other studies that the characteristics students bring with them to college are less influential in subsequent attendance decisions than what happens to students following matriculation.

Finally, and perhaps most importantly from both a theoretical and practical standpoint, this study found a significant statistical interaction between students' levels of subsequent goal and institutional commitment--both commitments influenced directly by various aspects of the collegiate experience. The interaction indicates that high levels of institutional commitment have their greatest positive influence on persistence for those students with relatively low levels of commitment to completing a college degree. The obverse is also the case, indicating the presence of potentially important compensatory mechanisms. While this study did not replicate a similar interaction identified earlier between academic and social integration, the replication of the goal x institutional commitment interaction is both theoretically and practically important. The replication of results in correlational research is not common; the replication of an interaction effect is remarkable. In this instance, it calls attention dramatically to the potential importance of compensatory mechanisms in students' decisions to terminate or continue their enrollment at a particular institution. The evidence is compelling that attitudes or behaviors that might be expected to lead to voluntary withdrawal may be counterbalanced by other attitudes or behaviors, culminating in retention rather than attrition. Given the apparent presence of this mechanism, it seems clear that future research on college student retention should give close attention to

potentially important compensatory interaction effects, and that we must avoid the tendency to consider retention as the result of one or more relatively independent main effects.

From a practical viewpoint, the replication of the institutional x goal commitment interaction suggests the importance in retention efforts of helping students find something in the collegiate environment that takes on significance for them and which may serve as something of a psycho-social anchor inside the institution. Institutional commitment was influenced in this study by students' levels of normative and academic integration in the academic systems of the institution, a finding replicated in Study 1. The evidence seems clear that to the extent that institutional policies, programs or practices tend to facilitate a student's involvement in the academic life of the institution the likelihood of retaining that student increases.

The replication in this study of most of the findings observed in Study 1 constitutes compelling evidence in support of the general conceptual outlines of Tinto's model of college student attrition. Both the conceptual components and the causal links among them are generally supported in both studies, adding to the evidence mounting in support of this theory as a conceptually useful tool for scholars' studying of the sources of college student attrition, as well as for administrators seeking to design policies or programs intended to reduce voluntary withdrawal on their campuses.

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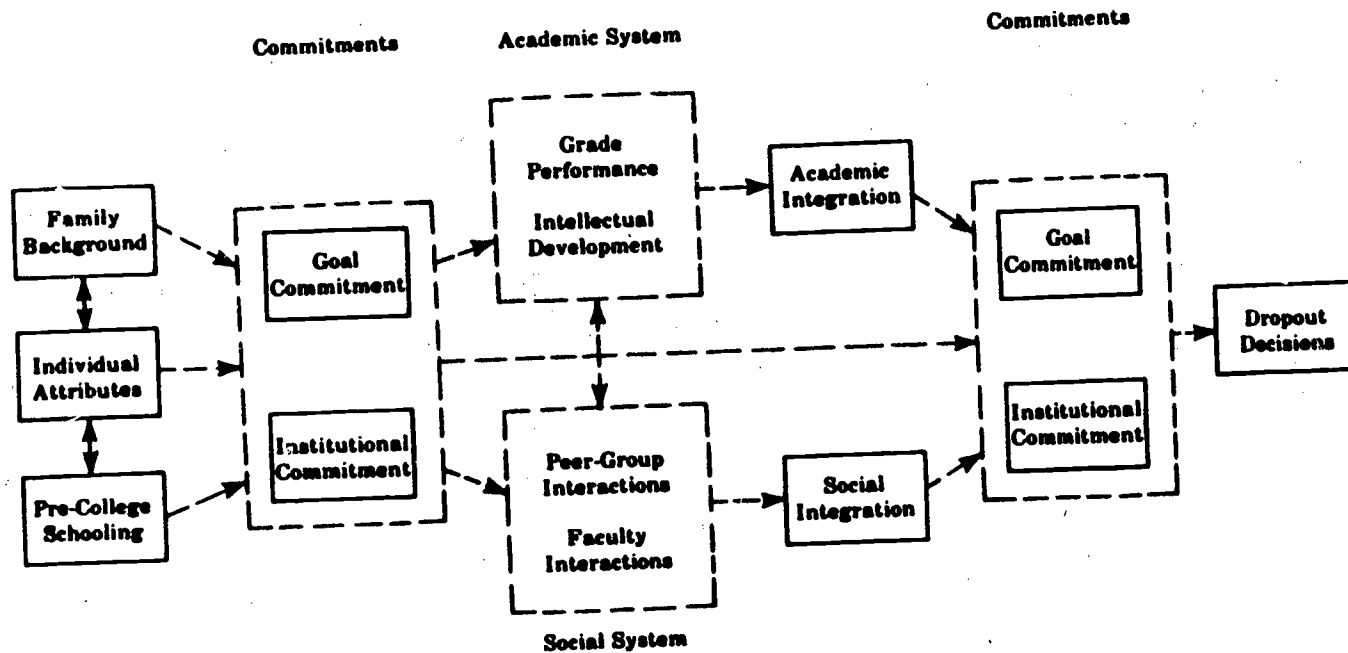
Figure 1. A conceptual schema for dropout from college (Tinto, 1975, p. 95).

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TABLE 1

DISCRIMINANT ANALYSIS SUMMARIES
FOR TWO STUDIES

Step	Variable Set	Cumulative R_c^2		R_c^2 - Increase		% Correct Classification[a]	
		Study #1	Study #2	Study #1	Study #2	Study #1	Study #2
1	Background Characteristics (Family background, individual attributes and pre-college schooling)	.009	.002	.009	.002	54.3%	46.8%
2	Institutional and Goal Commitment (I)	.022	.002	.013*	.000	59.2**	49.4
3	Academic and Social Integration	.127	.012	.105**	.010*	71.6**	57.6**
4	Institutional and Goal Commitment (II)	.190	.122	.063**	.110***	77.3**	78.5***
5	Interactions (Academic Integration x Social Integration; and Institutional Commitment II x Goal Commitment II)	.229	.140	.039**	.018***	80.6**	83.1***

[a]Percent overall correct classification with prior probabilities = .50.
*p < .05   **p < .01   ***p < .001
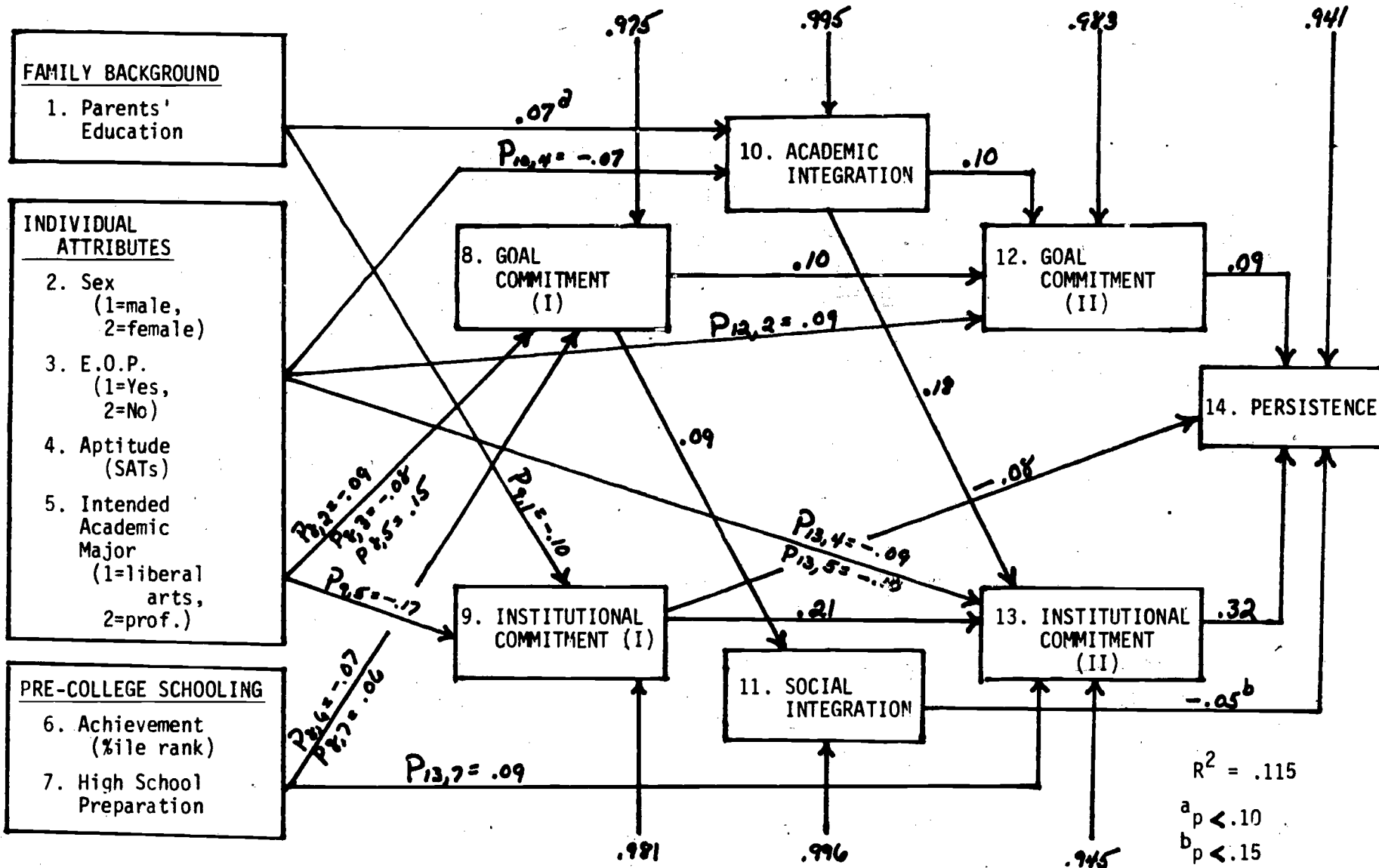Study #1: Persisters n = 673;   Dropouts n = 90
Study #2: Persisters n = 677;   Dropouts n = 46

Figure 2. Reduced path model.