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## College Persistence

### Structural Equations Modeling Test of an Integrated Model of Student Retention

Although several theories have been advanced to explain the college persistence process [6, 44, 45, 50, 52], only two theories have provided a comprehensive framework on college departure decisions. These two theoretical frameworks are Tinto's [50, 52] Student Integration Model and Bean's [7] Student Attrition Model. A review of the literature indicates that the Student Integration Model, for instance, has prompted a steady line of research expanding over a decade [see, for example, 37, 42, 30, 35, 24, 46, 18]. This research has validated Tinto's model across different types of institutions with differing student populations. In turn, the Student Attrition Model [4, 5, 6, 7, 10] has also been proven to be valid in explaining student persistence behavior at traditional institutions [3, 4, 6, 7, 10, 18], while modifications to the model have been incorporated to explain the persistence process among non-traditional students [9, 26]. Insofar as the two theories have attempted to explain the same phenomenon, no efforts have been made to examine the extent to which the two models can be merged to enhance our understanding of the process that affects students' decisions to remain in

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college. However, Cabrera, Castañeda, Nora, and Hengstler [18] have provided evidence that there is considerable overlap between the two theoretical frameworks. Taking these findings one step further, this study attempts to document the extent to which these two theories can be merged in explaining students' persistence decisions by simultaneously testing all non-overlapping propositions underlying both conceptual frameworks.

### *Theoretical Framework*

#### *Student Integration Theory*

Building on Spady's [44, 45] work, Tinto [50, 51, 52] advanced a model of student departure that explains the process that motivates individuals to leave colleges and universities before graduating. Tinto's theory attributes attrition to the lack of congruency between students and institutions. Tinto's theory basically asserts that the matching between the student's motivation and academic ability and the institution's academic and social characteristics help shape two underlying commitments: commitment to an educational goal and commitment to remain with the institution. Accordingly, the higher the goal of college completion and/or the level of institutional commitment, the greater is the probability of persisting in college.

The Student Integration Model has been subjected to considerable testing, and research findings have largely supported the predictive validity of the model as far as the role of precollege variables is concerned [37, 38]. Results are mixed, however, when the structural relations that the theory presumes to exist among academic integration, social integration, and institutional and goal commitments are subjected to empirical testing [14, 28, 30, 33, 39, 40, 36, 41, 46, 47]. Although contradictory findings have been attributed to type of institution, gender, ethnicity, and inconsistencies on the measurement of the constructs [19, 35, 31], these mixed results can also be attributed to the lack of control for variables external to the institution.

A major gap in Tinto's theory and allied research has been the role of external factors in shaping perceptions, commitments, and preferences [7]. This topic is particularly relevant from both a policy analysis and an institutional perspective, given the different social and institutional programs aimed at stimulating enrollment and preventing attrition by addressing variables other than institutional ones (that is, ability to pay, parental support). In spite of this limitation, researchers have found that the Student Integration Model is useful in exploring the role of such ex-

ternal factors as significant other's influence [30, 35, 19] and finances [15, 19, 24, 30].

#### *Student Attrition Model*

Over the years, Bean [3, 4, 5, 6, 7, 8] has advanced an alternative model to explain the college persistence process. Bean's work builds upon process models of organizational turnover [43, 25] and models of attitude-behavior interactions [12, 13]. Bean and associates [9, 10] have argued that student attrition is analogous to turnover in work organizations and stress the importance of behavioral intentions (to stay or leave) as predictors of persistence behavior. In this context, the Student Attrition Model presumes that behavioral intentions are shaped by a process whereby beliefs shape attitudes, and attitudes, in turn, influence behavioral intents. Beliefs are presumed to be affected by a student's experiences with the different components of an institution (that is, institutional quality, courses, and friends). The Student Attrition Model also recognizes that factors external to the institution can play a major role in affecting both attitudes and decisions while the student is still attending college [10].

Bean and associates have tested different variations of the Student Attrition Model, and results are largely supportive of the presumed role of organizational variables, personal variables, and environmental variables in shaping both attitudes and intents as well as of the presumed role of intent to persist on the dropout criterion. Recently, Bean and Vesper [10] found that only six environmental, personal, and organizational variables accounted for most of the variance observed in the dropout criterion among a freshman class enrolled in a midwestern college in the fall of 1989. Their results suggest that non-intellectual factors play a major role in dropout decisions and that family approval, an environmental factor, exerts both direct and indirect effects.

#### *Comparison between Models*

As noted by Hossler [21], the two models have several commonalities. Both models regard persistence as the result of a complex set of interactions over time. The two models also argue that precollege characteristics affect how well the student would subsequently adjust to the institution. Further, the two models argue that persistence is affected by the successful match between the student and the institution. A close examination of the two theories, for instance, apparently indicates that a high degree of overlap exists across the two theories in terms of organizational factors (courses and academic integration) and commitments to the institution (institutional commitment, institutional fit and quality).

Unlike the Student Integration Model, the Student Attrition Model emphasizes the role of factors external to the institution in affecting both attitudes and decisions [5, 6, 10]. Furthermore, the Student Integration Model regards academic performance as an indicator of academic integration, whereas the Student Attrition Model regards college grades as an outcome variable resulting from academic experiences and social-psychological processes [7].

As pointed out by Hossler [21], research on the two models brings a different perspective to what affects college persistence the most. Whereas research on the Student Integration Model appears to suggest that academic integration, social integration, institutional commitment and, to some extent, goal commitment, exert the highest effects on persistence [38, 49, 36, 1, 28], research on the Student Attrition Model emphasizes the role of intent to persist, attitudes, institutional fit, and external factors in the form of family approval of institutional choice, friends' encouragement to continue enrollment, finance attitudes, and perceptions about opportunity to transfer to other institutions on withdrawal decisions [4, 5, 10].

The validity of each theory as well as the proposition that constructs across theories overlap has received support from recent research. Cabrera, et al.'s [18] study reveals that the Student Integration Model appears to be more robust in terms of the number of hypotheses validated (70 percent versus 40 percent), but when judged in terms of variance explained in the persistence criterion, the Student Attrition model was found to explain more of the variance observed (44 percent versus 38 percent). The authors also reported that the role of organizational and environmental variables are channeled mostly through a student's intent to persist in college in a manner consistent with both theories. However, Cabrera et al. reported that the two theories were not orthogonal to one another and that considerable overlap was present between organizational variables and commitments to the institution. Cabrera et al.'s findings indicated that the construct Courses in the Student Attrition Model and the construct Academic Integration in the Student Integration Model underline a single construct. Likewise, Cabrera et al. reported that the construct of Institutional Fit and Quality in the Student Attrition Model and the construct Institutional Commitment in the Student Integration Model can be regarded as manifestations of a single underlying factor. The question remains to what extent these two theories could be merged in order to improve our understanding of the underlying processes of persistence in college. This article addresses this research question by simultaneously testing the two theories on the persistence criterion.

## Methodology

### Data Analysis

A two-step structural equation modeling strategy [2] via LISREL VII [22] was employed in estimating parameters. This strategy involves the separate estimation of the measurement model prior to the simultaneous estimation of the measurement and structural submodels. While the measurement model provides a confirmatory assessment of convergent validity and discriminant validity, the measurement model in conjunction with the structural model enables a comprehensive, confirmatory assessment of construct validity [cf. 22].

Although previous research has specified persistence as a continuous variable when testing Tinto's model of college persistence, it was decided to test the persistence criterion as a dichotomous variable and employ PRELIS [23] to compute polyserial, polychoric correlations. PRELIS enables the estimation of the correct correlations among ordinal, categorical, and continuous variables and produces an estimate of the asymptotic covariance matrix under arbitrary non-normal distributions [16, 17]. Because polyserial, polychoric correlations were used and because departures of the assumption of normality were observed among the variables, the asymptotic covariance matrix, estimated by PRELIS, was analyzed via LISREL using a weighted least square (WLS) solution. The WLS method produces asymptotically correct standard errors and  $X^2$  values under non-normality when one or more of the observed variables are ordinal [22].

In judging the goodness of fit of the overall models, the chi-square, the Goodness of Fit Index (GFI), the Adjusted Goodness of Fit Index (AGFI), the Root Mean Square Residual (RMR) and the Total Coefficient of Determination (TCD) for the structural model were employed. Joreskog and Sorbom [22] and Bentler and Bonett [11] advise against the sole use of the chi-square value in judging the overall fit of the model because of the sensitivity of the chi-square to sample size. Accordingly, the test of differences in chi-squares ( $\Delta X^2$ ) and the Normed Fit Index [27] were also utilized to judge whether alternative models better explained the data. Bentler and Bonett [11] proposed the Normed Fit Index, which involves a comparison of fit of a given model to the null model when all the observed variables are constrained to be independent of each other. To the extent to which the difference in the fit function of the alternative model is large relative to the fit function of the null model, the NFI will approach one, indicating that most of the sample covariance matrix has been accounted for [11, 53, 20].

### *The Models*

Building upon the results of previous research [cf. 18], a baseline model was identified that incorporated both theoretical frameworks. In the case of the Student Attrition Model, all those structural paths that were substantiated among the variables were included in the integrated model. Those paths that were not (absenteeism and opportunity to transfer) were excluded along with their corresponding variables. The former results indicated that the latent construct, Courses, and the construct of Academic Integration, indeed reflected a single construct and were merged accordingly. Similarly, Institutional Fit and Quality were combined with Institutional Commitment, based on the convergence results from the previous study [cf. 18]. In addition, Cabrera et al. found that grade point average (GPA), a variable that the Student Integration Model regards as an indicator of academic integration, loaded poorly as a measure of academic integration. Consequently, in testing the present model, GPA and academic integration were viewed as two separate but interdependent constructs. Moreover, according to the latest revision of the Student Attrition Model [8], the baseline model presumes a direct effect of GPA on persistence decisions (see fig. 1). The baseline integrated model also reflects propositions in the Student Attrition Model [7, 8, 10] that environmental factors, in the form of finance attitudes and encouragement from friends and family, can exert significant effects upon academic integration, commitments to the institution, as well as on persistence decisions.

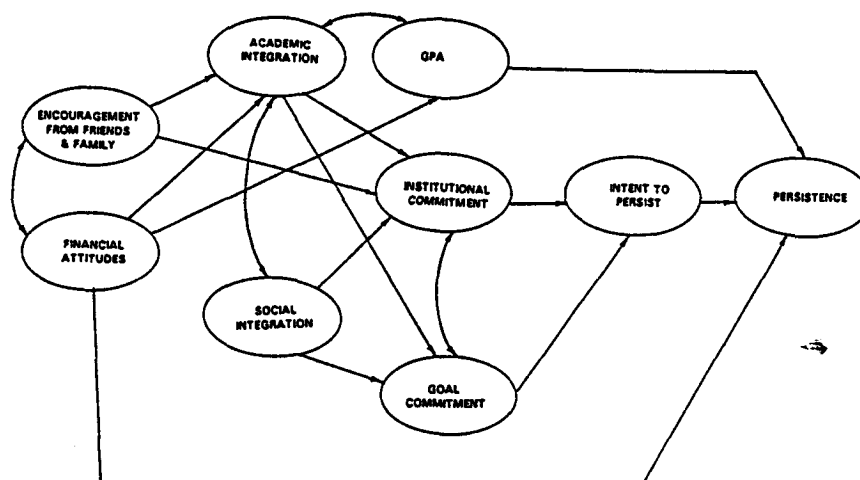


FIG. 1. Hypothetical Model

In the second stage of the study, two alternative models were tested. These two models were based on Nora and associates' [30, 34, 35] research on the role of significant others in the persistence process. Nora and associates, building upon the educational attainment literature [48], have argued that the effect of encouragement from significant others also impacts the successful integration of the student into the social component of his or her institution as well as in sustaining a high degree of commitment toward college completion.

Prior to testing these alternative models, modification indices associated with the model under consideration were also examined in judging whether or not empirical evidence substantiated structural modifications. As a rule of thumb, modification indices indicating a reduction in the chi-square of 20 or above were employed in determining whether structural paths needed to be unconstrained.<sup>1</sup>

### *Subjects*

A longitudinal research design was used. The student population was drawn from the fall 1988 entering freshman class at a large southern urban institution. Because both theoretical models have been tested on traditional students, only first time freshmen who were United States citizens or permanent residents, under twenty-four years of age, and not married were selected. The number of freshmen meeting these criteria was 2,459.

### *Procedures*

Data were gathered from several sources at two different points in time (spring 1989, fall 1989) during the 1988-89 academic year. Attitudinal data were collected by means of a survey questionnaire. The survey was sent to students during the spring semester (April). Student college transcripts were also consulted to determine GPA at the end of the spring semester. Finally, fall institutional transcripts were accessed to determine academic status at the beginning of the fall 1989 semester.

An initial survey and a follow-up survey yielded 466 useable surveys. Comparisons between the characteristics of students responding to those non-responding indicated that the sample mirrored the target population in terms of gender distribution, age, ethnic composition, high-school performance, and standardized test scores. However, the sample slightly underestimated the spring attrition rate by only one percentage point (15.5 percent versus 17 percent).

<sup>1</sup>Reductions of 20 or more in the chi-square corresponding to a decrease in 1 degree of freedom are significant at 0.05.



*Variables in the Study*

*Environmental variables.* Three indicators were used to provide a measure of Encouragement from Friends and Family. These items included: (1) "My family approves of my attending (institution)," (2) "My family encourages me to continue attending (institution)," and (3) "My close friends encourage me to continue attending (institution)." These items represented construct definitions provided by Bean [3, 4] and by Bean and Vesper [10] for Family Approval and Encouragement of Friends.

The second environmental variable in the quantitative model, Finance Attitudes, was measured by one item: "I am satisfied with the amount of financial support (grants, loans, family, jobs) I have received while attending (institution)." This item was drawn from the Finance Attitude Scale [29]. A series of exploratory and confirmatory factor analysis revealed that this item was the most representative and valid indicator for the construct [18].

*Endogenous variables.* Three items served as multiple measures of the latent construct Academic Integration. These indicators included: (1) "I have performed academically as well as I anticipated I would," (2) "I am satisfied with my course curriculum," and (3) "I am satisfied with my academic experience." Items 1 and 3 were adapted from the Academic and Intellectual Development Scale [37, 38], while item 2 was adapted from sample items employed by Bean [4] to measure the Student Attrition's construct Courses. These three items were employed as indicators of a single construct after a series of confirmatory factor analyses revealed that the Student Integration Model's construct Academic Integration converged with the Student Attrition's construct Courses [18]. Academic Performance was measured by a single item: cumulative grade point average in the spring 1989 semester.

Social Integration was measured by two items: (1) "Since coming to this university I have developed close personal relationships with other students" and (2) "It has been easy for me to meet and make friends with other students at (institution)." These two items were drawn from the Peer-Group Interactions scale [37, 38] after a series of confirmatory factor analyses indicated that these two items were the most representative and valid indicators [18].

Two indicators were used to measure Institutional Commitment: (1) "I am confident I have made the right decision in choosing to attend (institution)" and (2) a composite score averaged across four items representing the Student Attrition's construct Institutional Fit and Quality ("It is very important for me to graduate from (institution) as opposed from

some other school"; "I feel I belong at (institution)"; "My education at (institution) will help me secure future employment"; and "My close friends rate (institution) as a quality institution)." The reliability coefficient for the scale was 0.75. The first item was selected from the Institutional/Goal commitment scale developed by Pascarella and Terenzini [37, 38], while the remaining four items were adapted from sample items identified by Bean [3, 4] and Bean and Vesper [10]. Cabrera et al. [18] demonstrated that these five items converged into a single construct.

Two items were employed to provide a measure of Goal Commitment. These two indicators were: (1) "It is important for me to get a college degree," and (2) "It is important for me to finish my program of study." These two items were adapted from the Institutional/Goal Commitment Scale [38]. Intent to Persist was measured by a single item: "It is likely that I will re-enroll at (institution) next fall." This item was drawn from Bean [4]. Persistence, a dichotomous variable, reflected the student's enrollment status in the fall 1989 semester (2 = re-enrolled; 1 = voluntary withdrawal).

### Results

Figure 2 displays the structural coefficients for the integrated model. Hypothesized effects that were found to be significant are represented by a solid line. Dotted lines represent hypothesized effects found to be nonsignificant. Standardized coefficients for the measurement model are displayed in table 1.

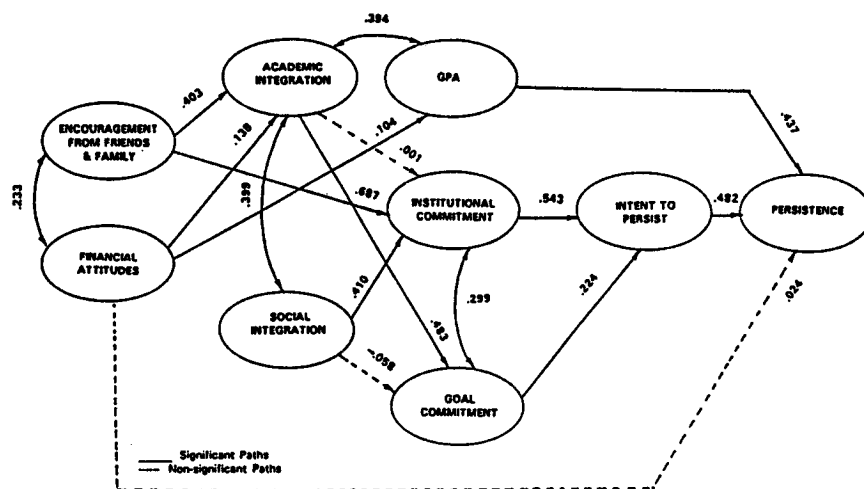


FIG. 2. Baseline Model

TABLE 1  
Factor-Standardized Parameter Estimates: Measurement Model

Factor and Variables	Factor Loadings	Unique Variance
Finance Attitudes	1.000	0.000
Encouragement from Friends and Family		
Family approval of institutional choice.	0.695	0.516
Family encouragement to continue enrollment at the institution	1.000	0.000
Friends' encouragement to continue enrollment at the institution.	0.540	0.708
Academic Integration		
Anticipation of academic performance.	0.540	0.708
Satisfaction with academic experiences.	0.883	0.010
Satisfaction with course curriculum.	0.667	0.556
Academic Performance (GPA)	0.991	0.010
Social Integration		
Developed close personal relationships	0.772	0.479
Ease of meeting and making friends.	0.965	0.010
Institutional Commitment		
Confidence on institutional choice.	0.914	0.010
Institutional Fit and Quality.	0.954	0.090
Goal Commitment		
Importance of college degree.	0.734	0.462
Importance of completing program of study.	0.966	0.010
Intent to Persist		
Likely to re-enroll.	1.000	0.000
Persistence		
Re-enrollment at the institution.	0.995	0.010

The integrated model (see table 2, model 1) accounted for 45 percent of the variance observed in persistence and for 42 percent of the variance observed in Intent to Persist. The chi-square for the overall model was 368.84 ( $df = 96$ ). The GFI was 0.945, the AGFI 0.923, and the RMR 0.099. The Total Coefficient of Determination (TCD) for the overall model was 0.644 (64 percent). Although the chi-square was significant ( $p = 0.001$ ), all other measures of goodness of fit provided support for the hypothesized causal model. Measures of goodness of fit were also supported by the stem-leaf plot, the Q-plot, and the standardized residuals. In addition, 82 percent of the hypothesized relations among the constructs were upheld.

Results overall support the propositions embedded in the hypothesized integrated model. The structural relations among academic and social integration factors, as well as those among commitment factors, are consistent with both Tinto's and Bean's theoretical frameworks. Furthermore, support was found for the presumed role of external factors in facilitating the transition of the student into the academic component of

TABLE 2  
Comparisons across Models

Models	$R^2$		TCD	GFI	AGFI	RMR	$\chi^2$	df	$\Delta\chi^2$	p-value	NFI
	Intent	Persist									
Model 1	0.418	0.450	0.644	0.945	0.923	0.099	368.84	96	—	—	0.96
Model 2	0.431	0.467	0.518	0.963	0.946	0.082	252.68	95	116.16	< 0.05	0.98
Model 3	0.427	0.470	0.521	0.970	0.957	0.072	201.18	94	51.50	< 0.05	0.99

the institution, as well as the effect of encouragement from friends and family on commitments to the institution. Those structural paths not found to be statistically significant included the direct effect of Finance Attitudes on persistence behavior ( $\gamma = 0.024$ ), the effect of Academic Experiences on Institutional Commitments ( $\beta = 0.001$ ), and the effect of Social Integration on Goal Commitment ( $\beta = -0.058$ ). In examining parameter estimates for the integrated model, the modification indices revealed that a large reduction in the chi-square (99.31) could be expected if the structural path between Encouragement from Friends and Family and Social Integration was freed.

In testing the first alternative model (see table 2, model 2), a statistically significant improvement in the chi-square value was observed. With only a reduction of one degree of freedom, the chi-square value declined from 368.84 to 252.68, a difference of 116.16 ( $p < 0.05$ ). The NFI also indicates a better fit of this model relative to the null or unconstrained model (see table 2). The proportion of variance explained in Persistence was 47 percent and 43 percent for Intent to Persist. The Total Coefficient of Determination for the overall model was 0.518 (52 percent). The GFI (0.963), the AGFI (0.946), and the RMR (0.082) provide support for this model. Results indicate that Encouragement from Friends and Family does exert a positive effect on Social Integration ( $\gamma = 0.375$ ). While a reduction in the total variance explained was noted (64 percent versus 52 percent), the effect of Social Integration on Goal Commitment ( $\beta = 0.127$ ) and the effect of Academic Experiences on Institutional Commitment ( $\beta = 0.153$ ) were found to be statistically significant in contrast to parameter estimates found for the integrated model. An examination of the modification indices (49.43) for the first alternative model provided support for freeing the structural path linking Encouragement from Friends and Family to Goal Commitment.

A significant improvement of fit relative to the first alternative model was observed when the second alternative model (see table 2, model 3) was tested as evidenced by statistically significant changes in the chi-

square and by an NFI value close to 1. The proportion of variance explained in Persistence was 0.47 (47 percent) and 43 percent for Intent to Persist. The Total Coefficient of Determination for the overall model was 0.52, the GFI 0.97, the AGFI 0.957, and the RMR 0.072. Two changes were observed in the structural model (see fig. 3). The reciprocal effect between Institutional and Goal commitments was found not to be statistically significant while the effect of Social Integration on Goal Commitment remained nonsignificant. Modification indices were examined and none exceeded a value of 20; thus, no further expansion of the model seemed justified from an empirical point of view.

#### *Total Direct Effects on Persistence*

Table 3 displays the total effects (direct + indirect effects) of all variables in the final model on persistence decisions (model 3). All significant paths were estimated in computing the effect coefficients. The largest total effect on Persistence was accounted by Intent to Persist (0.485), followed by GPA (0.463), Institutional Commitment (0.273), Encouragement from Friends and Family (0.217), Goal Commitment (0.133), Academic integration (0.083), Finance Attitudes (0.054), and Social Integration (0.046). The largest total effect on Intent to Persist was accounted for by Institutional Commitment (0.562), followed by Encouragement from Friends and Family (0.447), Goal Commitment (0.274), Academic Integration (0.171), Social Integration (0.094), and Finance Attitudes (0.026).

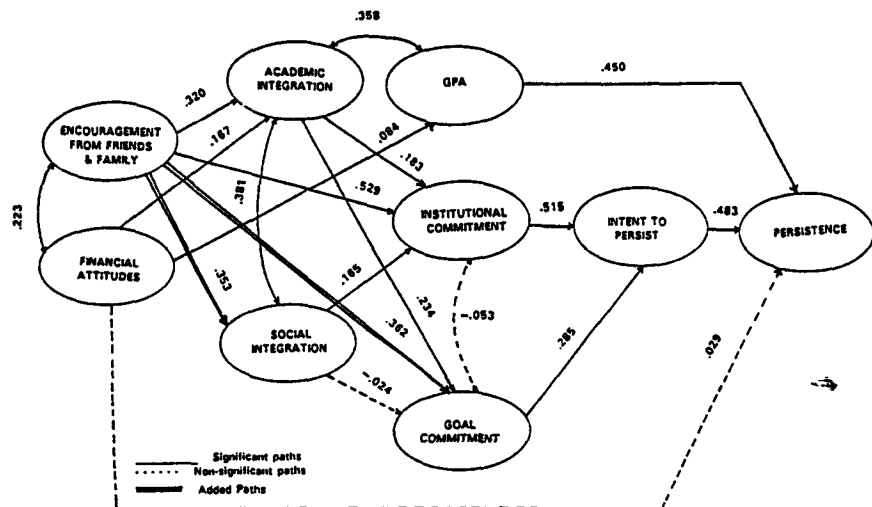


FIG. 3. Final Structural Model

TABLE 3  
Total Effects on Persistence and Intent to Persist

Variable	Persistence Behavior		Intent to Persist	
	Total Effect	Rank	Total	Rank
Finance Attitudes	0.054	7	0.026	6
Encouragement	0.217	4	0.447	2
Academic Integration	0.083	6	0.171	4
GPA	0.463	2	0.000	
Social Integration	0.046	8	0.094	5
Institutional Commitment	0.273	3	0.562	1
Goal Commitment	0.133	5	0.274	3
Intent to Persist	0.485	1	0.000	

### Discussion

Findings from the present study have implications for future theoretical work in the area of student persistence. The results of this study indicate that a better understanding of the persistence process can be derived in combining the two major theories of college persistence. As noted by Bean [7], the central value of competing theories on college persistence is to ascertain the role of relevant factors. However, the value of each theory as opposing theoretical frameworks decreases to the extent each theory is found to yield complementary explanations. Results indicated that when these two theories were merged into one integrated model, a more comprehensive understanding of the complex interplay among individual, environmental, and institutional factors was achieved. In this respect, the effect of environmental factors was by far more complex than the one envisioned by the Student Integration Model. Whereas Tinto [52] constrained the role of environmental factors to merely shaping commitments, the present study suggests that these factors exert an influence in the socialization and academic experiences of the students. From this perspective, findings support Bean's [7] propositions that environmental factors should be taken into account in explaining persistence processes.

However, findings suggest that the relationship between Encouragement from Friends and Family and Academic Experiences should not represent the only effects of environmental factors in the model. The resultant structural patterns in the final model linking Encouragement from Friends and Family with measures of Social Integration and Goal Commitment is quite consistent with Nora and associates' research [30, 35, 33, 34]. Moreover, the results of the present study support Nora's view that encouragement and support from significant others as well as

other environmental factors should be considered and incorporated into conceptual frameworks examining student persistence.

Finally, from a practitioner perspective, the study offers an integrative framework in understanding the interplay among individual, institutional, and environmental variables in the college persistence process. The results also stress the need for college administrators to focus on variables which are highly predictive of students' intents to re-enroll as the target variables to address intervention strategies. Focusing on past behavior (actual withdrawal decisions) is futile. It stands to reason that intervention strategies must address those variables that can be manipulated and which have been found to be the strongest predictors of predispositions to leave. In this context, the results suggest that enrollment management strategies are to be patterned after the complexity of the relationships among those variables more predictive of predispositions. In other words, financial aid, academic advising, counseling and other support services, per se, are not likely to improve retention efforts. Rather, a concerted effort on the part of the institution in bringing together the different student support services to address student attrition is needed. It is also suggested that institutional research units should constantly monitor whether an institution's intervention plan is having an effect on the persistence process.

The generalizability of the findings to other institutions is to be approached cautiously. As indicated by Tinto [52], the patterns underlying the college persistence process may vary by type of institution, the setting, and the composition of the student enrollment. The findings, however, are consistent with underlying structural patterns found in previous research among community college students [30, 33, 35]. Institutions may use this study as a starting point in investigating student retention at their respective campuses.

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