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ABSTRACT

This study tested the convergent and discriminant validity between two theories of college persistence: the Student Attrition Model and the Student Integration Model. The study examined conceptual similarities for each theory to explain departure decisions and examined how both theoretical frameworks enhanced the understanding of the processes affecting departure decisions when tested simultaneously on the persistence criterion. A longitudinal research design was used, and the student population was drawn from the fall 1988 entering freshman class of a large southwestern comprehensive urban institution. An initial survey and a follow-up survey yielded 466 useable responses. The Student Attrition Model accounted for 44% of the variance observed in Persistence and for 60.3% of the variance observed in Intent to Persist. The Student Integration Model accounted for 38% of the variance observed in Persistence and for 36% of the variance observed in Intent to Persist. The Student Integration Model appeared to be more robust when judged in terms of the number of hypotheses validated. While results were largely supportive for both the Student Integration Model and the Student Attrition Model, findings indicated that a considerable amount of overlap between the two theories existed. (50 references) (JDD)

THE CONVERGENCE BETWEEN TWO THEORIES OF COLLEGE PERSISTENCE

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ABSTRACT

This study tested the convergent validity between two theories of college persistence: the Student Attrition Model (Bean, 1982) and the Student Integration Model (Tinto, 1987). More specifically, the present study examined conceptual similarities for each of the two theories in explaining departure decisions and how both theoretical frameworks enhanced the understanding of the processes affecting departure decisions when tested simultaneously on the persistence criterion. The research design was longitudinal, and analyses were conducted upon a sample of 466 college students who were attending a large southwestern comprehensive urban institution in the Spring of 1989. While results are largely supportive for both the Student Integration Model and the Student Attrition Model, the findings also indicated that a considerable amount of overlap between the two theories existed.

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Introduction

Although several theories have been advanced to explain the college persistence process (Bean, 1983; Spady, 1970; Tinto, 1975, 1987), the two theories that provide a more comprehensive theoretical framework on college departure decisions are Tinto's (1975,1987) Student Integration Model and Bean's (1982) Model of Student Departure (Hossler, 1984). These two theories have received considerable attention in the literature. However, no research exists on the extent to which these two theories converge and diverge on explaining decisions to leave college. The purpose of this paper was to empirically examine the convergent and discriminant validity between these two theories and document the extent to which the two theories could be merged to better illuminate an understanding of the college persistence process.

THEORETICAL FRAMEWORK

To date, the most cited and tested theories of college persistence are the Student Integration Model (Tinto, 1975, 1987) and the Model of Student Attrition (Bean, 1980, 1982; Bean & Vesper, 1990).

Student Integration Theory

Building on Spady's (1971, 1970) work and Durheim's (1951) Theory of Suicide, Tinto (1975, 1982, 1987) formulated a theory explaining the process that motivates individuals to leave colleges and universities before graduating. According to Tinto's theory, attrition results from interactions between a student and his/her educational environment during a student's stay in a higher education institution. Basically, the theory hypothesizes that

persistence is determined by the match between an individual's motivation and academic ability and the institution's academic and social characteristics. The theory asserts that, other factors being equal, the match between an individual's characteristics and those of the institution shape two underlying individual commitments, a commitment to completing college (goal commitment) and a commitment to his/her respective institution (institutional commitment). Accordingly, the higher the goal of college completion and/or the level of institutional commitment is, the greater the probability of persistence.

The Student Integration Model has served as the conceptual framework for considerable studies. However, results have been mixed when the underlying structural patterns among academic integration, social integration, institutional and goal commitments are subjected to empirical testing (Bers & Smith, 1989; Munro, 1981; Nora, 1987; Nora & Rendon, 1988; Pascarella & Terenzini, 1983; Pascarella, Duby & Iverson, 1983; Pascarella & Chapman, 1983; Pascarella, Smart & Ethington, 1986; Stage, 1987, 1989; Voorhees, 1987). Although contradictory findings on the impact of precollege, commitment, and integration factors on persistence have been attributed to type of institution, gender, ethnicity, and inconsistencies in the measurement of the constructs, mixed results can also be attributed to the lack of control for external variables.

A major gap in Tinto's (1975, 1987) theory and allied research is the role of external factors in shaping perceptions,

commitments, and preferences (Bean, 1985). This topic is particularly relevant from both policy and institutional perspectives, given the different social and institutional programs aimed at stimulating enrollment and preventing attrition by addressing variables other than institutional ones (i.e., ability to pay, parental support). In spite of this limitation, researchers have found the Student Integration Model useful in exploring the influence of such external factors as significant other's influence (Nora, 1987; Cabrera, Stampen & Hansen, 1990; Nora, Attinasi & Matonak, 1990), finances (Braxton, Brier & Hossler, 1988; Cabrera, Stampen & Hansen, 1990; Mallete & Cabrera, 1990) and getting ready (Nora, Attinasi & Matonak, 1990) on persistence.

Student Attrition Model

Over the years, Bean (1980, 1982a, 1982b, 1983, 1985) and Bean and associates (Metzner & Bean, 1987; Bean & Vesper, 1990) have advanced an alternative model to explain the college persistence process. Their work builds upon process models of organizational turnover (March & Simon, 1958) and models of attitude-behavior interactions (Bentler & Speckart, 1979, 1981). Accordingly, Bean has argued that student attrition is analogous to turnover in work organizations, and stresses 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 "cyclical process" whereby beliefs shape attitudes and, attitudes, in turn, shape behavioral intents.

Beliefs are presumed to be affected by a student's experiences with the different components of an institution (i.e., institutional quality, courses and friends). The Student Attrition Model also recognizes that external factors to the institution can play a major role in affecting both attitudes and decisions (Bean & Vesper, 1990).

Bean and associates have tested different variations of the Student Attrition Model and results have been largely supportive of organizational, personal and environmental variables in shaping both attitudes and intents as well as the effect of intent to persist on dropout behavior. Recently, Bean and Vesper (1990) found that only six of fifty environmental, personal and organizational variables accounted for most of the variance in the dropout criterion among the freshman class enrolled in a midwestern college. Their results suggested that non-intellectual factors played a major role in dropout decisions and that family approval, an environmental factor, exerted both direct and indirect effects on persistence.

Comparison between Models

As noticed by Hossler (1984), the two models have several communalities. 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 students subsequently adjust to their institution. Further, the two models argue that persistence is affected by the successful match between the student and his/her institution. A close examination of the

two theories, for instance, reveals that what the Student Integration Model refers to Institutional Commitment, the Student Attrition Model identifies as Institutional Fit.

Unlike the Student Integration Model, the Student Attrition Model emphasizes the role factors external to the institution play in affecting both attitudes and decisions (Bean, 1982, 1983; Bean & Vesper, 1990). While the Student Integration Model regards academic performance as an indicator of academic integration, the Student Attrition Model regards college grades as an outcome variable resulting from social-psychological processes (Bean, 1985).

As indicated by Hossler (1984), research on the two models has resulted in bringing about different perspectives regarding what variables have the strongest effects on college persistence. While 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 retention (Pascarella & Terenzini, 1980; Terenzini, Lorang & Pascarella, 1981; Pascarella & Chapman, 1983; Anderson, 1981; Munro; 1981), research on the Student Attrition Model emphasizes the role of intent to persist, attitudes, institutional fit and external factors (e.g., family approval, encouragement of friends, finances and perceptions about opportunity to transfer to other institutions) on persisting behavior (Bean, 1982; Bean & Vesper, 1990). To date, however, comparisons across the models have been

deterred by the lack of studies aimed at simultaneously testing the predictive validity of the two models.

METHOD

A three stage strategy was employed to test the convergent validity between the two theories. Prior to testing the structural models for each theory, the measurement properties for each major construct were assessed as suggested by Anderson and Gerbing (1988). Examining the factor loadings and unique variances in the measurement models for each persistence model made it possible to: (1) control for nuisance variance and (2) determine the extent to which the observed variables actually constituted reliable and valid indicators of the constructs in a manner consistent with each persistence theory. In the second stage, the predictive validity of each model was assessed independently as originally stated by the authors (Tinto, 1987; Bean & Vesper, 1990). Lastly, the convergence between each construct across theories was evaluated employing Widaman's (1985) strategy. Widaman's strategy is based on the specification and testing of series of hierarchically nested models, which, although not theoretically exhaustive, permit a rigorous examination of the convergence between constructs across theories based on confirmatory factor analysis techniques. Widaman's technique is considered as the most comprehensive strategy in analyzing multitrait-multimethod data available to date (see Schmitt & Stults, 1986; Vance, MacCallum, Coovert, & Hedge, 1988).

The data were analyzed using Linear Structural Equation Models (LISREL VII) for categorical and ordinal data (see Joreskog & Sorbom, 1989). Following recommendations by Joreskog and Sorbom (1988), the PRELIS program was employed to produce the polyserial correlation, and to assess the extent to which violations to the assumption of bivariate normal distribution were present in the data. To correct for these violations, the asymptotic variance-covariance matrix was estimated and used as input in the estimation of both measurement and structural models. Joreskog and Soborm (1989) recommend using a Weighted Least Squares Solution (WLS), rather than a Maximum Likelihood Solution (MLS), for it provides better estimates of the Chi-square goodness-of-fit measures and standard errors whenever categorical and ordinal data are involved and departures from normality are observed.

Sample

A longitudinal research design was used. The student population was drawn from the fall 1988 entering freshman class at a large southwestern urban institution. Since the student integration model deals with traditional students, only full time, first time freshman who were United States citizens, under twenty four years of age and not married were selected. The number of freshmen meeting these criteria was 2,453.

In April of 1989, freshmen at a commuter institution were mailed a questionnaire containing 79 items. These items were selected from several instruments developed by Bean (1982a, 1982b, 1983, 1985), Metzner and Bean (1987), Pascarella and Terenzini

(1979, 1981) to measure the constructs: (1) Intent to Persist, (2) Family Approval, (3) Institutional Fit, (4) Courses, (5) Encouragement of Friends, (6) Opportunity to Transfer, (7) Academic Integration, (8) Social Integration, (9) Institutional Commitment and (10) Goal Commitment. Organizational behavior literature was also consulted to derive additional items to measure Institutional Commitment (Mowday, Steers & Porter, 1979; Pierce & Dunham, 1987) and Goal Commitment (Dunham, 1984). In order to improve the content validity of the items, the wording of the original items was reviewed and modified by institutional academic advisors and counselors. A pilot study was also conducted on a representative sample of undergraduate students to help in refining the items. Student college transcripts were accessed at the end of the 1989 Spring semester to determine the student's grade point average (GPA). Fall 1989 institutional transcripts were consulted to determine the academic status of students at the beginning of the 1989 Fall semester.

An initial survey and a follow up survey yielded 466 usable surveys. The sample was almost equally divided between males (43.3%) and females (56.7%). The average age for the entire sample was 19. Approximately 63.9 percent of the respondents were white, while the second largest ethnic group was Hispanics with 11.2 percent. Afro-Americans, Asian-Americans and Native-Americans comprised the remaining 24.9 percent of the respondents. About half of the students were employed (53%), and leaved off-campus (69%). College transcripts indicated that 33 percent of the

respondents had graduated from the top quartile of their high school class and that their combined SAT scores averaged 1028. The students' mean GPA at the end of the Spring semester was 2.54 on a 4.0 scale. Comparisons of the sample with the target population revealed that the sample slightly over-represented the proportion of whites (63.9% vs 58.6%), slightly under-represented the proportion of Hispanics (11.2% vs 12.6%), slightly over-represented the average SAT scores (1028 vs 995), and slightly under-represented the Spring attrition rate (15.5% vs 17%).

Measurement Properties.

Student Attrition Model

Fourteen items were selected from the original 79 to measure constructs identified in the Student Attrition Model (Bean, 1982, 1985; Metzner & Bean, 1987; Bean & Vesper, 1990). The fourteen items were employed to measure: (1) Loyalty (one item), (2) Fit Here (one item), (3) Practical Value (two items), (4) Family Approval (two items), (5) Institutional Quality (two items), (6) Courses (three items), (7) Opportunity to Transfer (two items), and (8) Encouragement of Friends (one item). In addition, two more items, selected from Nettles et al.'s (1985) finance attitudes scale, were employed to measure Finance Attitudes. Confirmatory factor analyses by Mallette (1988) indicate that the two finance items have the highest loadings within the respective scale (.80 and .78). Further, Mallette and Cabrera (1990) reported that the Nettles et al.'s scale discriminated between persisters and non-persisters for the 1984 entering freshman class at a large southern

institution. All non-cognitive items were measured using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Negatively stated items were recoded to maintain consistency across the instrument.

A principal component factor analysis with a varimax rotation was performed to estimate the construct validity of scales derived from the fourteen items. The factor solution accounted for 61.4 percent of the variance observed. Table 1 presents the factor loadings and reliabilities of scales measuring the different constructs in the Student Attrition Model. The factor composition of the items was consistent with all but two dimensions specified in the Student Attrition Model. Indicators of Family Approval and Encouragement of Friends loaded in a single construct. Moreover, a general factor grouping indicators of Institutional Quality and Institutional Fit together was found.

Because items loading on a factor may indicate not only structural effects among different variables but also the hypothesis that those indicators could constitute manifestations of a single underlying construct, a series of confirmatory factor analysis were performed to differentiate between factors measured by multiple indicators versus items loading on a factor that were causally related. For Family Approval and Encouragement of Friends, results indicated that a model specifying a structural effect of Family Approval on Encouragement of Friends fits the data (χ^2_1 =2.68, p=.101) as well as a model where both variables constitute indicators of a single latent construct (χ^2_1 =2.68,

Table 1. Factor Loadings and Alpha Reliabilities for Variables in the Student Attrition Model

Variable	Number of Items	Range of Loadings	Cronbach's Alpha
1. Institutional Quality & Fit	6	.46 to .79	.81
2. Courses	3	.69 to .76	.61
3. Family Approval & Friends Encouragement	3	.60 to .82	.68
4. Opportunity to transfer	2	.62 to .89	.54
5. Finance Attitudes	2	.74 to .85	.53

p=.101). Although both theoretical perspectives were substantiated, the former was retained because it more conceptually reflected the Student Attrition Model framework. The hypothesis concerning the structural effect of Institutional Quality on Institutional Fit, based on the Student Attrition Model, was not supported. As shown in Table 2, a model hypothesizing that all indicators were measures of a single latent construct (Institutional Fit & Quality) fit the data better than a model presuming a causal relationship between Institutional Quality and Institutional Fit. Due to methodological restrictions in computing the listwise polyserial correlation (the sample size required to test the full quantitative model far exceeding the number of observations available in the study), only the most reliable (in terms of factor loadings) and predictive items (in terms of correlations) were employed in estimating the structural model. Accordingly, eleven items were used to measure all factors in the causal model: (1) Family Approval - parental approval of institutional choice (X1) and parental encouragement to continue enrollment (X2), (2) Finances - satisfaction with financial support received (X3), (3) Opportunity to Transfer -perceived difficulty to transfer to another institution (X4), (4) Courses -satisfaction with course curriculum (X5), (5) Encouragement of Friends - encouragement of friends to continue attending the institution (X7), and (6) Institutional Quality and Fit -importance of graduating from respective institution (X8), feeling of belonging at the institution (X9), practical value of education to secure

Table 2. Institutional Quality & Institutional Fit

Model	Chi-square	df	Change df	Change Chi-square	p-value
1. Causation Model	19.62	3	--	--	--
2. Single Construct Model	0.42	2	1	19.2	$p < 0.001$

future employment (X10), rating of the institution as a quality institution by friends (X11). Absenteeism (X6) was measured in terms of number of classes students reported to have voluntarily missed during the Spring semester. This variable was categorized as (1) None, (2) less than 20, and (3) 20 or more.

Student Integration Model

The study utilized items developed by Pascarella and Terenzini (1979, 1980) in testing the Student Integration Model. Selection of items was based on results of factor analyses results by Pascarella and Terenzini (1981). Item selection, for nclusion in the survey instrument, was based on the highest loadings within the corresponding scale as reported by Pascarella and Terenzini (1981). These items were employed to measure the constructs of Frequency of Contacts with Faculty, Interactions with Faculty, Faculty and Staff Concern for Student Development, Academic and Intellectual Development, Peer Relations, Institutional Commitment and Goal Commitment. In order to verify the content validity of the items, items were reviewed and modified by institutional academic advisors a counselors. As a by-product of the item review, two additional items, assessing overall satisfaction with the social and academic life of the institution, were added. Moreover, two other additional items, affinities of values with students and faculty-academic advisors were included to measure the construct Values. Although the literature on institutional commitment indicates that affinity of values is a component of Institutional Commitment (see Mowday, Steers & Porter, 1979; Pierce & Dunham, 1987), this

dimension was not represented in the original Pascarella and Terenzini's instrument. Lastly, review of the literature on organizational behavior (Dunham, 1984) suggested that a measure of goal importance be incorporated in the quantitative model.

An exploratory factor analysis utilizing a varimax solution on items developed by Pascarella and Terenzini (1979, 1980) yielded eight factors, seven of which were similar in structure and item composition to those later reported by Pascarella and Terenzini (1981). The eight factor solution accounted for 63.4 percent of the variance observed. The exploratory factor analysis results were replicated by a series of confirmatory factor analyses performed on each construct. Table 3 presents the scales, factor loadings and reliabilities for each factor. Out of four scales available to measure Academic Integration, only one scale (Academic and Intellectual Development) correlated with GPA, the cognitive indicator of Academic Integration.

In order to maintain consistency with the analyses performed on the Student Attrition Model, single item multiple indicators, rather than scales, were employed to measure each construct. Because of restrictions in the computation of the listwise polyserial correlation matrix, only the most reliable and predictive items were employed to test the quantitative model. Consequently, two items provided a measure of a non-cognitive component for Academic Integration - anticipation of academic performance (X12), and satisfaction with academic experiences (X13). Social Integration was assessed via indicators of

Table 3. Factor Loadings and Alpha Reliabilities for variables in the Student Integration Model

Construct	Variable	Number of Items	Range of Loadings	Cronbach's Alpha
Academic Integration	Frequency of Contacts with Faculty & Academic Staff	6	.55 to .77	0.80
	Interactions with Faculty & Academic Staff	5	.30 to .81	0.78
	Faculty & Academic Staff Concern	4	.54 to .77	0.78
	Academic & Intellectual Development	4	.39 to .76	0.72
Social Integration	Peer relations	4	.74 to .84	0.85
Institutional Commitment	Values	2	.77 to .79	0.60
	Certainty of Institutional Choice	3	.73 to .74	0.70
Goal Commitment	Goal Importance	2	.79 to .82	0.69

developing close personal relationships (X15) and ease in meeting and making friends (X16). Confidence of making the right institutional choice (X17) provided a measure of Institutional Commitment. Goal Commitment was measured via two items - importance of getting a college degree (X18) and importance of finishing program of study (X19). Intent to re-enroll in the Fall of 1989 (X20) was employed to measure Intent to Persist.

Predictive Validity of Models.

Student Attrition Model

Figure 1 displays the structural coefficients for the Student Attrition Model. Hypothesized effects that were found to be significant are represented with a straight line. Double lines are employed to represent effects not hypothesized in the model but found to be significant. Dotted lines represent hypothesized effects found to be non-significant. Standardized estimates for the measurement models are displayed in Table 4.

The structural model accounted for 44 percent of the variance observed in Persistence and for 60.3 percent of the variance observed in Intent to Persist. The Chi-square for the overall model was 88.17 (df=54). The Goodness of Fit Index was .981, the Adjusted Goodness of Fit was .963 and the Root Mean Square Residual was .056. The total coefficient of determination for the overall model was .868 (87%). Although the Chi-square was not significant (p=.002), all other measures of goodness of fit provided support for the hypothesized model. Measures of the goodness of fit of the

Figure 1 – Student Attrition Model

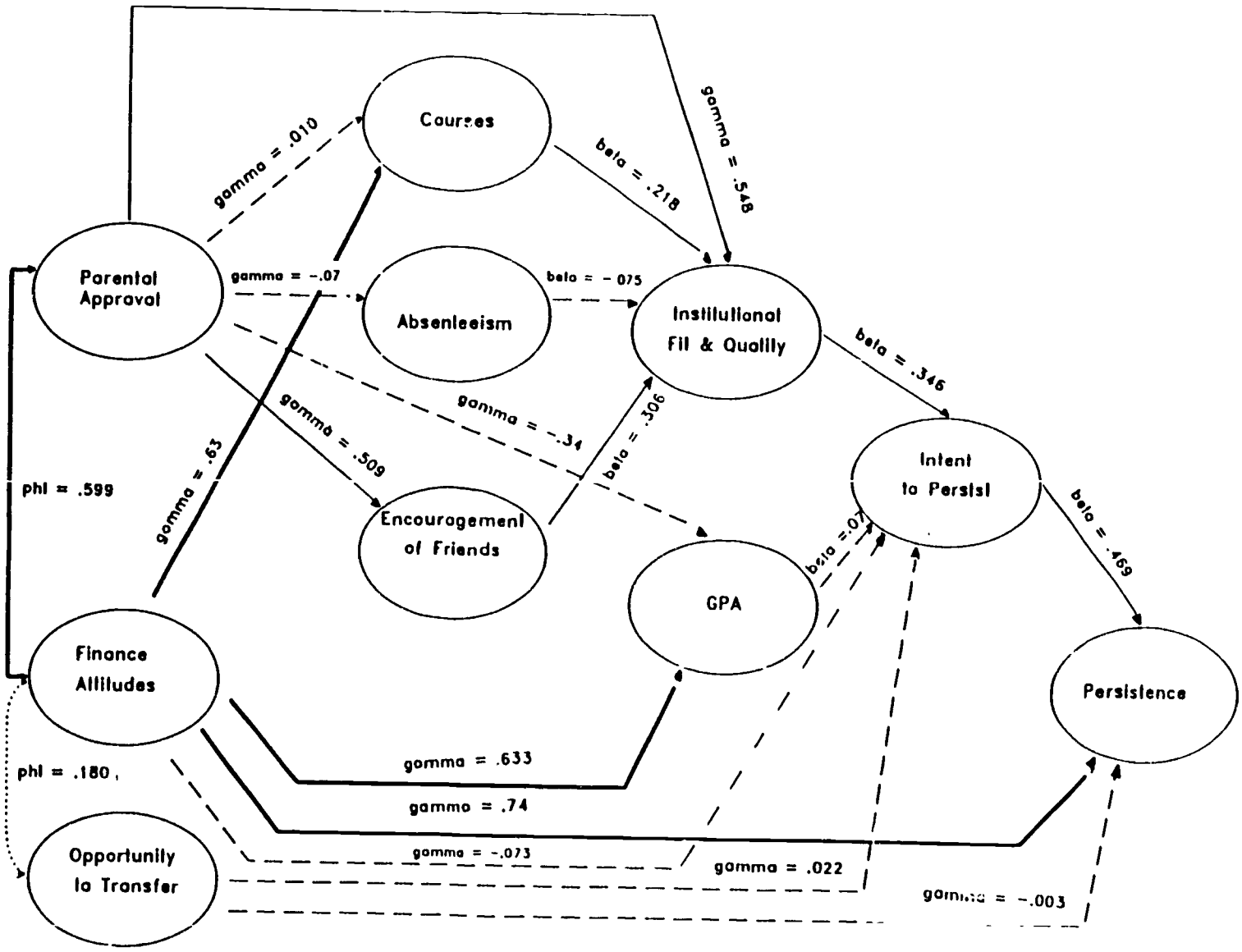

Table 4. Factor-Standardized Parameter Estimates: Measurement. Student Attrition Model

Factor and Variables	Factor Loadings	Unique Variance
Parental Approval		
Approval of institutional choice	.758	.426
Encouragement to continue enrollment at the institution	.898	.194
Finance Attitudes		
Satisfaction with financial support	.331	.891
Opportunity to Transfer		
Opportunity to transfer	.490	.760
Courses		
Satisfaction with course curriculum	.995	.010
Absenteeism		
Absenteeism	.995	.010
Encouragement of Friends		
Encouragement to continue	.995	.010
Institutional Fit & Quality		
Importance to graduate from the institution	.685	.531
Feeling of belonging	.857	.010
Secure future employment	.687	.538
Friends rating of institutional quality	.660	.565
Academic Performance		
GPA	.995	.010
Intent to Persist		
Likely to re-enroll	.995	.010
Persistence		
Re-enrollment at institution	.995	.010

model were supported by the stemleaf plot and the Q plot of standardized residuals (see Figure 2).

An examination of Figure 1 reveals that only six of the fifteen structural paths hypothesized in the Student Attrition Model were found to be statistically significant. The analysis on the Student Attrition Model also revealed significant effects not predicted by the model. Structural paths suggested by the modification indices in the study included the direct effects of Finance Attitudes on Courses and on GPA, and a causal relationship between Financial Attitudes and Parental Approval.

As specified in the Student Attrition Model, Parental Approval was found to have effects on Encouragement of Friends, and Institutional Fit and Quality. No support was found for the presumed structural effects of Parental Approval on Courses, Absenteeism and GPA. Finance Attitudes was found to have significant direct effects on both Persistence and GPA.

Student Integration Model

The structural model tested for non-causal relationships between Academic Integration and Social Integration and between Goal Commitment and Institutional Commitment. These hypotheses are consistent with Tinto's (1987) theoretical framework and with Stage's (1989) finding concerning the presence of a reciprocal causation between Academic Integration and Social Integration. Figure 3 displays the structural coefficients for Tinto's Student Integration Model. Standardized estimates for the measurement model are displayed in Table 5.

Figure 2. Stemleaf and Q-Plot for the Student Attrition Model

```
-STEMLEAF PLOT OF STANDARDIZED RESIDUALS
 - 4|40
 - 3|8
 - 2|40
 - 1|999988755420000
 - 0|998887766544443333221110000000000000000
   0|111222333333344555555666678889
   1|123347889
   2|02255
   3|18
   4|
   5|
   6|1
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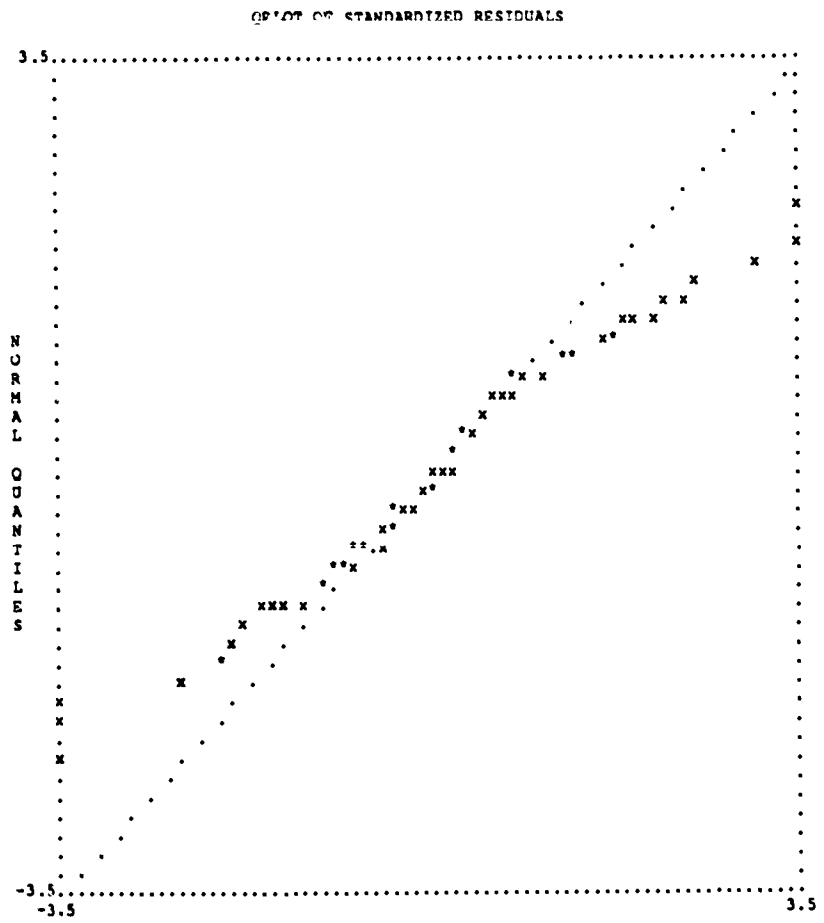


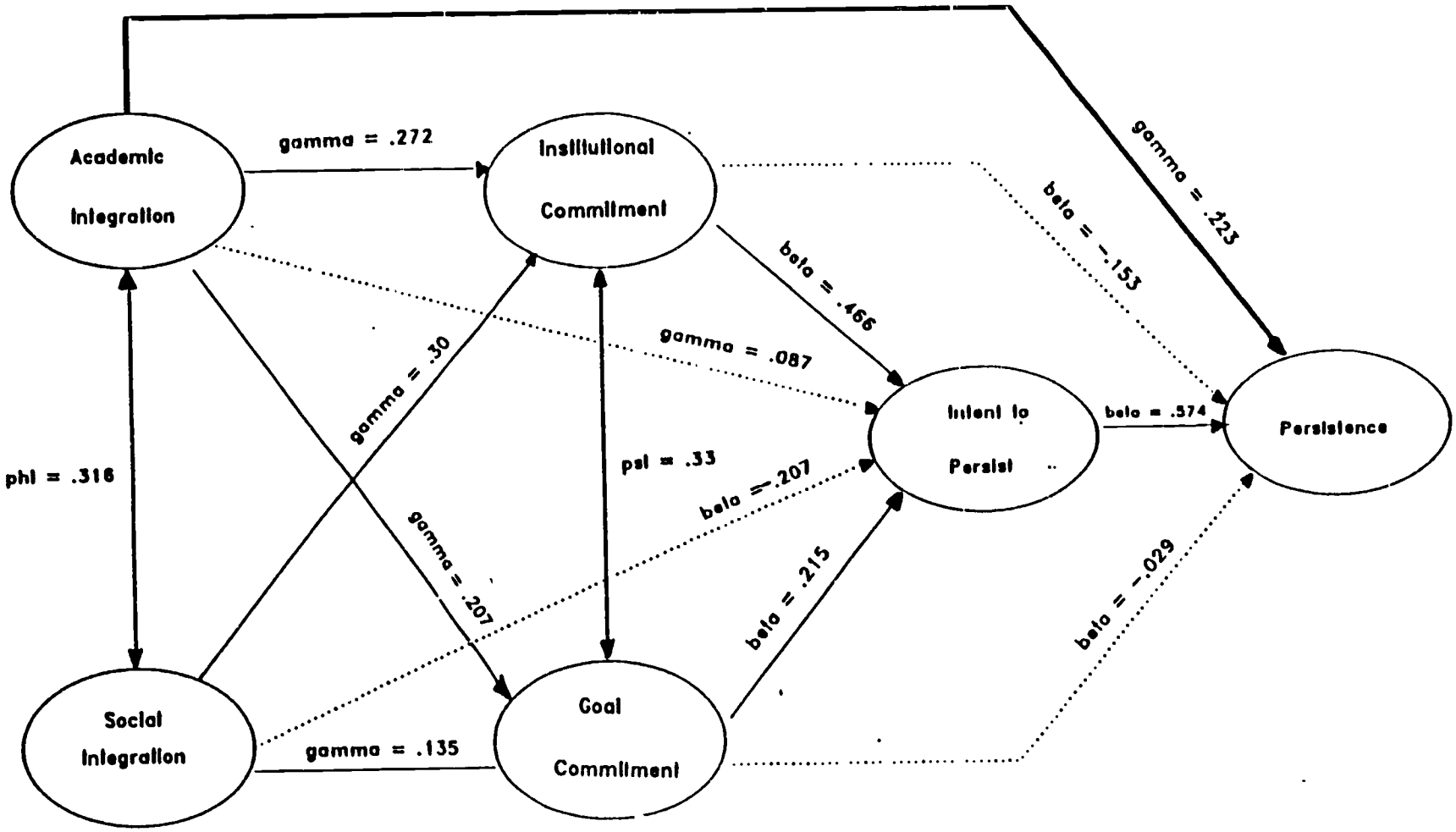
Table 5. Factor-Standardized Parameter Estimates: Measurement. Student Integration Model

Factor and Variables	Factor Loadings	Unique Variance
Academic Integration		
Anticipation of academic performance	.555	.692
Satisfaction with academic experience	.955	.088
Academic Performance	.435	.811
Social Integration		
Developed close personal relations	.778	.395
Ease of meeting and making friends	.927	.140
Institutional Commitment		
Confidence on institutional choice	.995	.010
Goal Commitment		
Importance of college degree	.778	.489
Importance of completing program of study.	.991	.010
Intent to Persist		
Likely to re-enroll	.995	.010
Persistence		
Re-enrollment at the institution	.995	.010

The structural model accounted for 38 percent of the variance observed in Persistence and for 36 percent of the variance observed in Intent to Persist. The Chi-square for the overall model was 43.41 (df=24). The Goodness of Fit Index was .987, the Adjusted Goodness of Fit was .971 and the Root Mean Square Residual was .063. The total coefficient of determination for the overall model was .292 (29%). Although the Chi-square was not significant (p=.002), all other measures of goodness of fit provided support for the hypothesized model. Again, all measures of goodness of fit for the overall model were substantiated by the stemleaf plot and the Q-plot of standardized residuals (see Figure 3).

An examination of Figure 3 reveals that of the thirteen structural relations hypothesized in the Student Integration Model, nine were found to be statistically significant. In addition, Figure 3 indicates the presence of a direct effect of Academic Integration on Persistence not hypothesized by the Student Integration Model. Figure 3 also displays significant and positive relationships between academic and social integration and between goal and institutional commitment. An examination of the underlying structural patterns in the quantitative model indicates that most of the effects of both integration constructs on Persistence are of an indirect nature and are channeled through Intent to Persist, a finding that is consistent with organizational behavior research which indicates that behavioral intents predict actual behaviors (Bentler & Speckart, 1981; Fishbien & Ajzen, 1975).

Figure 3 – Student Integration Model



Convergence between the Two Models

A two step strategy was employed to assess the convergence across the two theories. First, a pairwise polyserial correlation matrix between indicators of factors found in the Student Integration Model and indicators of factors found in the Student Attrition Model across all latent constructs was computed (see Table 6). Secondly, a modification of Widaman's (1985) strategy was utilized to test for the convergence between the following constructs: (1) Courses and Academic Integration, and (2) Institutional Fit & Quality and Institutional Commitment. Following Widaman's strategy, three models were specified for each pair of constructs. The first set of models tested for the hypothesis that the constructs across the two theories were independent of each other. The second set of models tested for the hypothesis that the constructs across the two theories were mutually interdependent. The third set of models tested for the hypothesis that the constructs across both theories represented a single construct.

Polyserial correlation coefficients displayed in Table 6 provide evidence for both causal effects between the constructs across both theories and the convergence between the constructs used by both theories to portray the role of institutional and individual factors. More specifically, it was believed that Courses and Academic Integration might be indicators of the same construct, and likewise for Institutional Commitment and Institutional Fit & Quality. As suggested in Table 6, Courses, a

Table 6. Pairwise Polyserial Correlat ons Between Indicators of the Student Attrition Model and Indicators of the Student Integration Model.

		Academic Integration			Social Integration		Institutional Commitment	Goal Commitment		Intent to Persist	Persist
		x12	x13	x14	x15	x16	x17	x18	x19	x20	x21
Parental Approval	x1	0.104	0.224	0.054	0.241	0.323	0.477	0.380	0.211	0.398	0.059
	x2	0.162	0.266	0.051	0.204	0.196	0.506	0.430	0.323	0.555	0.304
Finances	x3	0.157	0.135	0.112	0.118	0.089	0.214	0.051	0.118	0.206	0.137
Opportunnity to Transfer	x4	-0.131	-0.127	-0.065	0.044	-0.064	-0.041	-0.020	-0.073	0.149	0.165
Courses	x5	0 453	0.521	0.225	0.123	0.240	0.371	0.269	0.331	0.279	0.285
Absenteism	x6	-0.055	-0.095	0.019	0.139	-0.015	-0.139	-0.126	-0.100	-0.076	-0.080
Encouragement of Friends	x7	0.089	0.126	-0.039	0.351	0.224	0.396	0.150	0.210	0.337	0.098
Institutional Quality & Fit	x8	0.085	0.238	-0.105	0.229	0.209	0.602	0.232	0.286	0.422	0.198
	x9	0.233	0.388	0.036	0.526	0.497	0.653	0.277	0.263	0.532	0.340
	x10	0.152	0.300	0.038	0.266	0.249	0.536	0.345	0.330	0.412	0.135
	x11	0.126	0.228	-0.091	0.170	0.248	0.442	0.098	0.079	0.287	0.125
GPA	x14	0.461	0.289	1.000	0.065	0.076	0.018	0.015	0.058	0.155	0.369
Persistence	x21	0.125	0.303	0.369	0.165	0.141	0.282	0.197	0.265	0.639	1.000

Coefficients > .10 are significant at p<.05

factor in the Student Attrition Model, had the highest correlations across the two non-cognitive indicators of Academic Integration, a factor in the Student Integration Model. These correlations were .453 and .521. Likewise, the indicator for Institutional Commitment had the highest correlations with the different indicators of Institutional Quality & Fit (see column 6 in Table 6). These correlations ranged from .44 to .65.

Convergence between Courses and Academic Integration.

Three models were tested. Only non-cognitive components of academic integration were used. The first model tested for the orthogonality between the constructs and was rejected. The model yielded a non-significant Chi-square of 261.89 (df=2). The Chi-square, coupled with the Goodness of Fit Index (.749), the Adjusted Goodness of Fit Index (.246), and the Root Mean Square Residual (.286) indicated that the model was a poor representation of the data. The second model hypothesized a correlation between the two constructs and yielded a significant Chi-square of 12.48 (df=1). The Goodness of Fit Index (.988), the Adjusted Goodness of Fit Index (.928) and the Root Mean Square Residual (.068) all indicated that the model represented a plausible model. Furthermore, the second model represented an improvement of fit relative to the first model (see Table 7). The third model hypothesized that Courses and Academic Integration were measures of the same construct and provided a perfect fit for the data. The model reproduced the observed correlation matrix and yielded a zero Chi-square (df=0) with a p-value equal to 1.00, a Goodness of Fit Index

Table 7. Convergence between Courses & Academic Integration

Model	Chi-square	df	Change df	Change Chi-square	p-value
1. Orthogonal Model	261.89	2	--	--	--
2. Correlation Model	12.48	1	1	249.41	$p < .001$
3. Single Construct Model	0.00	0	1	12.48	$p < .001$

equal to 1.00, and a Root Mean Square Residual equal to 0.00. A significant improvement of fit relative to the second model was also observed (see Table 7).

Convergence between Institutional Quality and Fit and Institutional Commitment.

Three models, again, were tested. The first model, testing for the orthogonality between the constructs, was rejected. The model yielded a non-significant Chi-square of 782.96 (df=7). All measures of goodness of fit (GFI=.653, AGFI=.257, RMSR=.308) indicated that the model did not fit the data. The second model, although yielding a non-significant Chi-square of 19.46 (df=6), provided a good representation of the data as evidenced by the Goodness of Fit Index (.991), the Adjusted Goodness of Fit (.978) and the Root Mean Square Residual (.064). The model further revealed a significant and strong correlation between the two constructs (.789). This model also represented a significant improvement of fit relative to the orthogonal model (see Table 8). The third model, that tested the hypothesis that Institutional Commitment and Institutional Fit & Quality represented the same construct yielded a significant Chi-square of 1.15 with five degrees of freedom (p=.95). The Goodness of Fit Index was .99, the Adjusted Goodness of Fit Index was .998, the Root Mean Square Residual was .011. A significant improvement of fit relative to the second model was also observed (see Table 8).

DISCUSSION

Table 8. Convergence between Institutional Fit & Quality and Institutional Commitment

Model	Chi-square	df	Change df	Change Chi-square	p-value
1. Orthogonal Model	782.96	7	--	--	--
2. Correlation Model	19.46	6	1	763.50	$p < .001$
3. Single Construct Model	1.15	5	1	18.31	$p < .001$

The findings indicated that both theories, Bean's (1982) Student Attrition Model and Tinto's (1987) Student Integration Model, are correct in presuming that college persistence is the product of a complex set of interactions among personal and institutional factors, as well as in presuming that Intent to Persist is the outcome of the successful match between the student and the institution. As to the question of what model portrays the best representation of the college persistence process, the answer depends on the specific criterion under consideration.

The Student Integration Model (Tinto, 1975, 1987) appears to be more robust than the Student Attrition Model when judged in terms of the number of hypotheses validated. Almost 70 percent of the Student Integration Model's hypotheses were confirmed, while only 40 percent of the hypotheses underlying the Student Attrition Model were supported.

The Student Attrition Model, however, accounts for more variance in both Intent to Persist (60.3% vs 36%) and Persistence (44% vs 38%), a finding that can be attributed to the significant effects of external factors in the form of Parental Encouragement, Support from Friends and Finances. This finding also supports Bean's (1982) proposition that the role factors, external to the institution, play on the college persistence process is by far more complex and comprehensive than the one portrayed by the Student Integration Model. This finding is also consistent with results by Nora (1987), Nora, Attinasi and Matonak (1990), who examined the role of Significant Others on measures of retention and by Cabrera,

Stampen and Hansen (1990), who studied the effect of Ability to Pay and Significant Others on Persistence.

The results also support Bean's (1982) assertion that the influence of environmental, organizational and personal variables on persistence is more likely to be indirect, mediated through behavioral intentions to stay or remain at the institution. This proposition holds not only for the Student Attrition Model, but for the Student Integration Model as well. Most of the effects of institutional and personal factors (Academic Integration, Social Integration, Institutional Commitment and Goal Commitment) were found to be channeled through Intent to Persist.

With respect to the issue of convergence, the results indicated that the two theories were not mutually exclusive; rather, they were complementary to one another as far as the presumed role of organizational and students' commitments to the institution was concerned. Results indicated the construct Courses, a factor in the Student Attrition Model, could be regarded as a measure of Academic Integration, a construct in the Student Integration Model. Likewise, there is a significant amount of overlap between Institutional Commitment (Student Integration Model) and Institutional Fit & Quality (Student Attrition Model). However, results also suggest that the main contribution of the Student Attrition Model is to bring and make explicit the role of external factors on the college persistence process.

Limitations

Although the sample was relatively large, not all of the items were used in the specification and testing of the structural models. PRELIS requires large sample sizes with valid information across all variables in order to estimate both the polyserial correlation and the asymptotic variance-covariance matrices, needed to correct for violations of the assumption of bivariate normal distributions (see Joreskog & Sorbom, 1988). Despite this limitation, the study was strengthened by relying on the most reliable and valid items representing constructs in both theoretical frameworks. Joreskog and Soborm (1988) provide tables that can help researchers to determine, a priori, the minimum sample size needed to test models which include all relevant items and variables.

Characteristics specific to the institution in the present study could restrict the generalizability of the findings. The sample was drawn from a large urban, commuter institution. Thus, replication of the findings in other types of institutions is necessary to enhance the external validity of this study. It is important to note, however, that the findings parallel previous efforts to validate these theories with students from traditional institutions (Terenzini, Lorang, & Pascarella, 1981; Pascarella & Terenzini, 1980; Theophilides & Terenzini, 1981; Bean, 1980, 1985; Bean & Vesper, 1990). All the findings indicated that both the Student Integration Model and the Student Attrition model are appropriate models for understanding attrition in both urban and traditional institutions.

Conclusions and Implications

The present study has implications for theory, research and practice. From a theoretical perspective, the results indicated that a more comprehensive understanding of the persistence process can be achieved when combining the two major theories of college persistence. As indicated by Bean (1985), the main value of competing theories on college persistence is to uncover the role of relevant factors. However, the value of each theory as a rival conceptual framework decreases in the extent to which each theory is found to yield complementary explanations. The results of this study suggest that both the Student Integration Model (Tinto, 1975, 1987) and the Student Attrition Model (Bean, 1982) add relevant knowledge to the understanding of the college persistence process, but that a model integrating the leading factors in each theory may contribute to better explain this process. Future research may profit by testing models that incorporate the major propositions embedded into these two theories.

From a research perspective, this study uses an improved methodology which may help future research in testing for both the predictive validity and the convergence between theories. The use of confirmatory factor analysis techniques was helpful in uncovering the degree of overlap between the Student Attrition Model and the Student Integration Model. In addition, the research design enhanced the internal validity of the findings. Data collection, as suggested by Cabrera et al. (1990), was undertaken during the period in which the highest dropout rates are reported

by the institution. The internal validity of the study was further enhanced by having academic advisors and students involved during the instrument development phase.

From a practical perspective, this study offers an integrative framework that may help understand the role of institutional and non-institutional variables in the college persistence process. The findings suggest that institutional researchers and policy makers consider the interplay between institutional, personal and external factors when developing and assessing programs aimed at preventing college attrition. Perhaps, monitoring those factors that were more predictive of Intent to Persist could help policy makers identify, early on, students who are at risk of dropping out of college and, subsequently, help in developing early prevention strategies.

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Appendix 16

END

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