

VALIDATION OF A THEORETICAL MODEL OF COLLEGE WITHDRAWAL: Interaction Effects in a Multi-Institutional Sample

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This study investigated the validity of Tinto's (1975) model of college withdrawal in four different types of institutions: residential universities, liberal arts colleges, two-year commuter institutions, and four-year commuter institutions. Analyses were conducted on a sample of 2,326 freshmen from 11 postsecondary institutions. The results generally supported the predictive validity of the model but suggested: (1) that the main-effects influence on persistence of measures of social and academic integration is modest, and (2) that the magnitude of the influence of particular aspects of social and academic integration depended to a significant degree on the characteristics of those students being considered. The theoretical and policy implications of the findings are discussed.

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In an attempt to bring some coherence to the research on the college dropout, as well as providing a conceptual framework to guide future inquiry, Tinto (1975) has built on Spady's (1970) work to develop an explanatory, predictive theory of the persistence/withdrawal process, which has as its core the concepts of academic and social integration in the institution. The theory is longitudinal and regards persistence primarily as a function of the quality of a student's interactions with the academic and social systems of the institution. Students come to a particular institution with a range of background traits (e.g., sex, secondary school performance, family background, personality orientations). These background traits influence, not only how the student will perform in college, but also how he or she will interact with, and subsequently become integrated into, an institution's social and academic systems. Other things being equal, the greater the student's level of social and academic integration, the more likely he or she is to continue at that particular institution.

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Because the Tinto model provides a parsimonious, explanatory framework for guiding inquiry aimed at understanding persistence/withdrawal behavior as a function of student-institutional fit, it is a particularly important contribution to the literature on attrition. Recently, a few studies have tested the predictive validity of the Tinto model (Baumgart and Johnstone, 1977; Bean, 1980; Terenzini and Pascarella, 1977, 1978; Pascarella and Terenzini, 1977, 1979, 1980). While their results generally support the predictive utility of the model, these investigations suffer from a number of sampling and methodological problems which undermine their coherence as a body of knowledge increasing our understanding of student persistence in college. The most serious problem is that each of the investigations is based on a single institution sample with little cross-sample consistency in the operational definitions of the variables in the model. As a consequence, it is nearly impossible to determine if differences in results reflect inconsistent operational definitions of the model components, a lack of generalizable validity of the model across different samples, or simple differences in the pattern of factors influencing persistence in different institutions (Tinto, 1981).

A second, related problem is that nearly all investigations of the validity of the Tinto model have been conducted at large, four-year, residential institutions. As a result, little is known about the predictive validity of the model in two-year community colleges or predominantly commuter institutions; yet it may be in these institutions that attrition represents the largest relative burden on human, financial, and intellectual resources.

Recently notable studies by Munro (1980, 1981) have tested the validity of the Tinto model with the National Longitudinal Sample of the High School Class of 1972. (NLS). The results of these multiinstitutional studies have given general support to Tinto's model. However, there is some question of the extent to which the variables from the NLS provide adequate operational definitions of Tinto's rather complex constructs of academic and social integration. Similarly, the analyses are based on pooled data and do not disaggregate by institutional type. Thus, it is difficult to determine if the results obtained are consistent for different kinds of institutions.

A final problem concerns the analytic procedures used in existing studies. With the exception of the single institution studies by Pascarella and Terenzini (1979) and Bean (1981), validations of the Tinto model have focused almost exclusively on the "main effects" influence of variables operationalizing academic and social integration. For example, they have tended to assess the associations between measures of peer relations and persistence for students in general, or in some investigations, men and women separately. Results of the Pascarella and Terenzini (1979) and Bean (1981) studies, however, suggest that analyses which assess the predictive validity of the Tinto model for students in general fail to capture the complex pattern of factors in-

fluencing different students' decisions to persist or withdraw. In their studies, substantial increases in the explanatory power of the model were realized when attempts were made to determine the specific patterns of social and academic involvement most important in positively influencing persistence for students with different background characteristics. Such findings suggest that the extent of influence of any particular pattern of social or academic involvement on persistence may depend to a significant degree on the particular characteristics and experiences of the students being considered. Analytical approaches focusing on the interaction of student traits and institutional experiences, however, are largely absent from the research literature on student persistence/withdrawal.

The present study addressed these issues in a multiinstitutional validation of Tinto's model of college persistence/withdrawal. Specifically, the study sought answers to the following questions:

1. To what extent does the Tinto model have general predictive validity in different types of postsecondary institutions? (That is, are the concepts of social and academic involvement useful in predicting subsequent freshman year persistence/withdrawal decisions in different types of institutions?)
2. To what extent is it possible to identify specific patterns of freshman year social and academic involvement which are particularly important in positively influencing persistence for different kinds of students in different kinds of institutions?

METHODOLOGY

Design

The general design of the study was longitudinal with data collected during the 1978-1979, and during the 1979-1980 academic years. During April, 1979, 2,410 full time freshman students from 11 institutions completed the Student Involvement Questionnaire (SIQ). The SIQ collected data on student commitment to complete college and student involvement in a variety of activities that Spady (1970), Tinto (1975) and Pantages and Creedon (1978) have suggested as dimensions of social and academic integration. Additional information on student demographic characteristics (e.g., sex, socioeconomic status, age) and personal characteristics (e.g., secondary school achievement, personality orientations) were also obtained for the 2,410 freshmen.

During the subsequent fall semester of 1979, the participating institutions identified those respondents who had reenrolled for their sophomore year (persisters) and those who withdrew voluntarily (withdrawals). Within the

sample, 10 of the 11 institutions did not have an academic dismissal policy which would force students to leave school after their freshman year. (In the one institution where an academic dismissal policy was in force, less than 5% of those who withdrew were asked to do so for academic reasons.) This fact prevented the forming of academic dismissals as a separate group. Thus the present study focused on the prediction of freshman year persistence versus voluntary withdrawal.

While it might be argued that Tinto's model is intended to explain withdrawal during the second, third, and fourth years of college as well as in the first year, evidence from Eckland (1964), Iffert (1958), Marsh (1966), and Pantages and Creedon (1978) indicates that voluntary withdrawal is heaviest at the end of the freshman year. From this evidence it was judged that analyses based on freshman students would provide a reasonable assessment of the predictive validity of the Tinto model.

Sample

The sample for the study consisted of first-time freshman students (entering in fall 1978) randomly selected from freshman populations at 11 post-secondary institutions participating in Project CHOICE.¹ Four of these could be classified as 4-year public or private, primarily residential, universities; three were 2-year, primarily commuter, community colleges; two were primarily commuter 4-year institutions; and two could be classified as private, liberal arts colleges with a mix of residential and commuter students.² For all institutions only those students enrolled full time in degree granting programs were included in the sample.

The SIQ was distributed to the samples of freshmen from each of the 11 participating institutions in early April, 1979. A follow-up mailing or distribution of the instrument to initial nonrespondents was conducted in late April. Subsequent to the follow-up mailing, useable responses were obtained from 2,410 students, representing an overall response rate of 35%. Chi-square goodness-of-fit tests indicated that the overall sample was representative of the population from which it was drawn with respect to sex. Data on student age was provided for only 9 of the 11 colleges, and, of those, a statistically significant underrepresentation of older students (21 years and older) was found in five institutions. However, since the number of older freshmen expected in these institutions was quite small, the slight differences noted were judged to be unimportant.

Despite some evidence of sample representativeness, the low response rate is an obvious limitation of the study. Similarly, while the 11 institutions in the sample are geographically distributed across the United States, it would be incorrect to consider them as a representative national sample. Granting

these limitations, this data set still has the particular advantage, not only of being multiinstitutional, but also of having extensive measures aimed specifically at assessing the dimensions of students' academic and social involvement in college.

Variables

According to the Tinto model, academic and social integration consist of several basic components. Extent of academic integration is determined primarily by the student's academic performance and his or her involvement in the academic/intellectual activities of the institution. Social integration is primarily a function of peer group involvement and interactions with faculty. While the model places interactions with peers and faculty in the domain of social integration, Tinto clearly suggests that, depending on their content, such interactions can also influence academic integration. Levels of social and academic integration lead to an additional component which the model terms "commitment." This component consists of commitments to the institution and to the goal of graduation.

The following variables were used to assess the concept of academic integration:

1. *First semester freshman grade point average.*
2. *Expected grade point average for the second semester of the freshman year.*
3. *Academic/intellectual activity.* A three item scale measuring student academic work effort (hours studying per week), number of unassigned books read for pleasure, and number of cultural events attended.
4. *Honors program participation.* Two items: honors seminars and accelerated classes (2 = yes; 1 = no).
5. *Special skills program participation.* Three items: tutorial programs, reading skill classes, study skill classes (2 = yes; 1 = no).
6. *Informal contact with faculty: academic topics.* Sum of the frequency of nonclassroom interactions with faculty during the academic year of 10 minutes or more for three purposes: academic advising, discussion of career concerns, and discussion of intellectual matters.
7. *Peer conversations: academic topics.* Same as interactions with faculty.
8. *Career planning program participation.* One item (2 = yes; 1 = no).

The following variables were used to assess the concept of social integration:

1. *Residential status:* (1 = living on-campus, 0 = living off-campus).
2. *Average number of dates each month.*

3. *Number of best friends on campus.*

4. *Participation in organized student extracurricular activities.* Ten items (e.g., hobbies or social clubs, residence hall activities, intramural athletics); 1 = yes, 0 = no.

5. *Participation in informal social activity.* Three items (e.g., number of times going out with friends for refreshments).

6. *Number of weekends spent on campus each month.*

7. *Friendships.* Two items: "Is there a person on campus you date regularly?" "Do you spend time with college friends on vacation?" (2 = yes; 1 = no).

8. *Peer conversations: social/personal topics.* Sum of the frequency of nonclassroom interactions with peers during the academic year of 10 minutes or more for three purposes: discuss a campus or social issue, socialize informally, and discuss a personal problem.

9. *Informal contact with faculty: social/personal topics.* Same as interactions with students plus a 3-item measure assessing frequency of contact with faculty to: (1) have dinner in faculty member's home, (2) go out for refreshments with faculty, (3) have a meal on campus with faculty.

Commitment to the institution and to the goal of graduation were measured by the following two scales:

1. *Institutional commitment.* Two items: "It is important for me to graduate from this college" (4 = extremely to 1 = not at all); "How sure are you that you made the right choice in attending this university?" (5 = definitely right choice to 1 = definitely wrong choice).

2. *Commitment to graduation.* One item: "It is important for me to graduate from college" (4 = extremely to 1 = not at all).

In nearly all cases the social and academic involvement items, as well as those tapping institutional and goal commitment, were either suggested directly by the Tinto model or adopted from instruments employed in previous single institution validations of the model (e.g., Terenzini and Pascarella, 1977, 1978; Pascarella and Terenzini, 1979).

A substantial body of research on college impact suggests that students' interactions with the college environment are not independent of their particular background traits and personality orientations (e.g., Astin, 1962, 1968; Centra and Rock, 1971; Rock, Centra, and Linn, 1970; Thistlethwaite and Wheeler, 1966). Thus, an important issue in the study of retention, and Tinto's model, is the extent to which the assessment of differential levels of social and academic integration and institutional/goal commitment contribute to the prediction of persistence/withdrawal decisions when the influence of student background traits is taken into account.

This investigation controlled for the following student background characteristics suggested as potentially important influences on persistence/voluntary withdrawal decisions by various critical reviews of attrition research (Cope and Hannah, 1975; Pantages and Creedon, 1978; Spady, 1970; Tinto, 1975):

1. *Sex*: 1 = female; 2 = male.
2. *Age*: 1 = 18-20; to 6 = 55 or older.
3. *Secondary school grades*: 7 = A to 1 = C -
4. *Academic major*: dummy coded: liberal arts, applied/professional, and other.
5. *Student socioeconomic status*: product of the average of mother's and father's formal education and the average of mother's and father's occupational level. (Occupational categories were coded to six levels consistent with the coding scheme of Trent and Medsker, 1968.)
6. *Student personality orientations*: the *affiliation needs* and *achievement needs* scales from Stern's (1970) Activities Index. The affiliation needs scale estimates the extent to which a person is group-centered, friendly, and participative with others, while the achievement needs scale indicates an individual's enjoyment of surmounting obstacles and successfully completing tasks undertaken.

The dependent variable was freshman to sophomore year persistence versus voluntary withdrawal. Persistence was coded 2 while voluntary withdrawal was coded 1.

Statistical Analysis

Prior to any statistical analysis, each variable was inspected for missing data and extreme outlier cases. Cases with missing data on key variables such as sex, age, or persistence/withdrawal status were excluded from the analysis. There were 84 cases which fell into this category, leaving a total 2,326 students as the data base for subsequent analyses. Table 1 shows the numbers of persisters and withdrawals for each of the four types of institutions in the study.

Because of the differences in institutional size, we were concerned that the pattern of associations found between measures of social and academic involvement and persistence/withdrawal decisions at larger institutions would tend to dominate the results within each institutional category. Thus, we developed an algorithm which weighted each case in a particular institution inversely to the representation of that institution within each of the four categories of institutions. (For example, if there were two institutions in a particular category, with institution A having 200 cases and institution B having 100 cases, each case for institution A would be weighted 0.50 while

TABLE 1. Distribution of Persisters and Withdrawals for Each Institutional Type^a

Institutional Type	Freshman Persisters	Voluntary Freshman Withdrawals	Total
Four-Year Residential Universities	926 (84.3%)	173 (15.7%)	1099
Liberal Arts Colleges	352 (88.9%)	44 (11.1%)	396
Two-Year Commuter Colleges	317 (75.1%)	105 (24.9%)	422
Four-Year Commuter Universities	334 (81.6%)	75 (18.4%)	409
Total Sample	1929 (82.9%)	397 (17.1%)	2326

^aBased on weighted sample estimates, numbers in parenthesis are percentages.

each case for institution B would be weighted 1.00.) The resultant effect on the analyses was to equate the contributions of each institution within a particular category.

Multiple regression analysis was the major analytical procedure employed. The dependent variable was freshman year persistence/voluntary withdrawal decisions. Independent variables were student background characteristics and the measures of social and academic integration, and commitment described above.³

In order to address the questions of the study, several different sets of analyses were conducted. To answer question 1 (concerning the general predictive validity of the Tinto model across different types of institutions), separate analyses were conducted for each type of institution: four-year residential universities, liberal arts colleges, two-year community colleges, and four-year commuter universities. Each analysis was carried out in a setwise manner with the set of student background characteristics entered first, followed, in order, by the set of social/academic involvement measures and the set of commitment variables. Such an analysis permitted the assessment of the contribution of each variable set to the explained variance in persistence/withdrawal decisions, with the variables entered on prior steps held constant.

To answer the second basic question of the study (concerning the interaction of student traits \times levels of social and academic involvement), separate analyses were also conducted for each of the four institutional types. Setwise multiple regression analysis (dependent variable = persistence/voluntary withdrawal decisions) entered variable sets in the following order: (1) student background traits, (2) social involvement, academic involvement and commitment measures, and (3) a series of cross-product terms representing

TABLE 2. Partial Correlations Between Each Independent Variable and Voluntary Persistence/Withdrawal Decisions^a

Variable	Residential Universities	Liberal Arts Colleges	Two-Year Commuter	Four-Year Commuter
First Semester G.P.A.	.061*	-.018	.025	.006
Expected Second Semester G.P.A.	.078*	.061	.014	.166*
Academic/Intellectual Activity	.040	.099	.036	-.016
Honors Program Participation	-.016	.028	.023	-.006
Special Skills Program Participation	-.059	.028	-.046	-.014
Faculty Contact: Academic Topics	.079*	.114*	-.109*	-.013
Peer Conversations: Academic Topics	.033	.013	-.097*	-.022
Career Planning Program Participation	.064*	.073	.002	.076
Residence Status	.146*	.045	.064	.043
Dating Frequency	.021	-.022	-.056	-.152*
Friends on Campus	.056	.093	.088	.120
Organized Extracurricular Activity	.099*	.150*	.045	.063
Informal Social Activity	.104*	.075	-.048	-.095
Weekends Spent on Campus	.131*	.081	.018	.079
Friendships	.102*	.082	.078	-.007
Faculty Contact: Social/Personal	.077*	.108*	-.080	-.030
Peer Conversations: Social/Personal	.035	.016	-.118*	.024
Institutional Commitment	.340*	.316*	.189*	.275*
Commitment to Graduation	.145*	.117*	.359*	.156*

* $p < .05$ ^aWithdrawal Coded 1, Persistence Coded 2. Influence of all student background characteristics held constant.

the interaction of each student background trait and each measure of social and academic involvement, and commitment. Separate analyses were carried out for each background trait.

To reduce the probability of type I errors (i.e., finding speciously significant interactions), individual significant interaction terms were interpreted as statistically reliable only if the following conditions existed (Pascarella and Terenzini, 1979): (1) the entire set of interaction terms made a significant ($p < .05$) contribution to the increase in R^2 (predicting persistence/withdrawal decisions), (2) the interaction term had a significant partial correlation with the criterion with the influence of all main effects held constant, and (3) the regression coefficient for the interaction term was also significant with all main effects and all other interaction terms in the equation. Similar preliminary analyses were carried out with cross-products of social and academic involvement items in order to determine if high levels of academic involvement tended to compensate for low levels of social involvement, and vice versa. In all preliminary analyses investigating interaction terms, only significant interactions meeting all three of the above criteria were entered in the final equation.

RESULTS

Table 2 displays, within each institution type, the partial correlations between each measure of social and academic involvement and freshman with-

drawal with the influence of all background characteristics held constant. As the table indicates, only two variables, goal commitment and institutional commitment, had significant, positive partial correlations with persistence across the different institutional type samples. Only four other variables—expected second semester grade point average; frequency of information contact with faculty, academic topics; extent of participation in organized extra-curricular activity; and frequency of informal contact with faculty, social/personal topics—had significant partial correlations with the criterion measure in at least two institutional samples.

The finding that amount of informal contact with faculty is positively related to persistence is consistent, not only with theoretical expectations from Tinto's (1975) and Spady's (1970) explanatory models, but also with previous research by Pascarella and Terenzini (1977) and Terenzini and Pascarella (1977, 1978). Interestingly, however, while the association is positive for the residential university and liberal arts institutions, it is generally negative for two year commuter institutions. Similarly, informal conversations with students were negatively related to persistence for two-year commuter institutions.

Such a finding would appear to suggest that the influence on voluntary persistence/withdrawal decisions of major dimensions of Tinto's concepts of integration varies significantly by institutional type. To determine whether these notable variations in partial correlations indicated a significantly differential pattern of informal involvement with faculty and peers across different types of institutions, an additional analysis was conducted. With data from all institutions pooled, persistence/withdrawal decisions were regressed in order on: (1) student background characteristics, (2) a dummy coded variable representing institutional type, (3) a composite variable termed "interpersonal involvement" (which was a simple linear combination of frequency of contacts with faculty and students concerning both academic and social/personal topics, and frequency of informal social activity), and (4) a series of cross-product terms representing the institutional type \times interpersonal involvement interaction. With all main effects held constant, the institutional type \times interpersonal involvement interaction had an F -ratio of 8.61 with 3 and 2,310 degrees of freedom ($p < .01$). Thus, it would appear that the observed differential influence on persistence of extent of interaction with faculty and peers is also statistically reliable.

Table 3 summarizes the results of the setwise multiple regression analyses. As the table indicates, the sets of academic/social integration and commitment variables were associated with a statistically significant increase in the explained variance in voluntary persistence/withdrawal decisions regardless of institutional type. In all cases, however, the R^2 increase was modest, ranging from 13.0% to 18.4%. In three of the four samples, the academic and social involvement measures were associated with a significant increase in

TABLE 3. Setwise Regression Analysis Summaries

Variable Set	Residential University			Liberal Arts College			Two-Year Community			Four-Year Community			
	Z	R ²	Increase	F	R ²	Increase	F	R ²	Increase	F	R ²	Increase	F
Background Variables	.025	.025	8/1090	3.44*	.046	8/387	2.35*	.033	8/413	1.75	.026	8/400	1.35
Academic/Social Involvement + Institutional/Goal Commitment Variables	.188	.163	19/1071	10.29*	.176	19/368	3.06*	.217	19/394	4.87*	.175	19/381	3.61*
Academic/Social Involvement	.089	.064	17/1073	4.36*	.098	17/370	1.29	.101	17/396	1.76*	.112	17/383	2.20*
Institutional/Goal Commitment	.188	.099	2/1071	65.13*	.176	2/368	17.72*	.217	2/394	29.00*	.175	2/381	14.32*
Interactions	.291	.103	20/1051	7.63*	.265	10/358	4.24*	.269	5/389	5.47*	a	a	a
R ² Total	.291		47/1051	9.19*	.265	37/358	3.49*	.269	32/389	4.47*	.175	27/381	3.00*
(Adjusted R ²)	.260		47/1051	7.86*	.189	37/358	2.26*	.209	32/389	3.22*	.117	27/381	1.87*

a Interactions not included in equation since the criterion of the entire set of interaction terms being associated with a significant increase in R² was not met.

*p < .05

R^2 . (Only in the liberal arts institution sample was the R^2 increase due to the 17 social and academic involvement variables not significant.) In all four samples the R^2 increase associated with the addition of the institutional and goal commitment variables was statistically significant.

Regression of Persistence/Withdrawal Decisions on the Independent Variables

Table 4 displays the zero-order correlation and direct effect (standardized regression, or beta, weight) of each independent variable on voluntary freshman year persistence/withdrawal decisions. As the table indicates, no one variable had a consistently significant relationship with persistence/withdrawal decisions across all four institutional types. Indeed, institutional commitment was the only variable to have significant direct, positive effects on persistence for three institutional type samples. Commitment to the goal of graduation and friendships (having a friend on campus whom one dates regularly and spending time with friends on vacation) were both positively related to persistence in the residential university and two-year commuter institution samples.

In residential universities participation in special skills programs had a significant negative association with persistence, perhaps suggesting that on these four campuses participation in these programs has a remedial aspect which tends to draw the weakest and, therefore, most dropout-prone freshmen. On the other hand, participation in career planning or career counseling programs was positively associated with persistence for residential university freshmen. Similarly with all other variables in the equation held constant, living on-campus (versus off-campus) was significantly and positively associated with freshman year persistence. This latter finding is quite consistent with those reported by Chickering (1974) in his study of the differential college experiences of residential and commuter students. It further suggests that living on campus may have a direct and unique influence on persistence, even when background characteristics and a wide range of other college involvement measures and commitments are taken into account.

The regression equation for two-year commuter institutions is interesting, if only for the fact that it is the only sample in which a background characteristic (the affiliation needs scale) had a significant regression weight with the dependent variable. Controlling for all other variables in the equation, freshman students who withdrew from two-year commuter institutions had significantly higher levels of affiliation needs than did persisters. Similarly, students who withdrew had significantly higher levels of informal contact with peers to discuss social/personal topics than did persisters.

The Tinto model posits that extent of interaction with other students is

TABLE 4. Zero Order Correlations and Standardized Regression (Beta) Weights for All Main Effects

Variables	Residential Universities		Liberal Arts Colleges		Two-Year Commuter		Four-Year Commuter	
	r	Beta	r	Beta	r	Beta	r	Beta
Sex	.022	.012	.025	.033	.098	-.006	-.004	.018
Age	-.074	-.021	.036	.055	-.009	.021	-.021	.003
Secondary School Grades	.110	.027	.134	.097	.004	.030	.125	.078
Socio-Economic Status	.045	.035	.012	.020	-.075	-.082	.018	-.012
Achievement Needs	.048	.009	-.035	-.077	.040	-.013	-.047	-.081
Affiliation Needs	.010	-.016	.020	-.021	-.116	-.124*	.034	.051
Liberal Arts Major	.072	.022	-.090	-.037	.004	-.061	-.074	-.108
Applied Major	-.045	-.040	.130	.126	-.045	-.055	.055	-.020
First Semester G.P.A.	.107	.048	.035	-.034	.015	.043	.049	-.107
Expected Second Semester G.P.A.	.127	.020	.099	.034	.018	.003	.184	.218*
Academic/Intellectual Activity	.059	.002	.074	.042	.043	.029	-.007	-.051
Honors Program Participation	.029	-.025	.040	-.025	.030	.013	.0001	.004
Special Skills Program Participation	-.078	-.087*	-.036	.020	-.032	-.044	-.042	-.056
Faculty Contact: Academic Topics	.099	.055	.089	.027	-.099	-.073	-.012	-.015
Peer Conversations: Academic Topics	-.004	-.067	-.005	.024	-.094	-.037	.001	.022
Career Planning Program Participation	.068	.075*	.072	.029	.015	.002	.069	.029
Residence Status	.159	.112*	.006	.044	.072	.086	.052	.024
Dating Frequency	-.012	-.015	-.0002	.030	.078	.058	-.154	-.109*
Friends on Campus	.055	.003	.102	.045	-.064	-.019	.123	.093
Organized Extracurricular Activity	.123	.032	.152	.083	.042	.071	.056	.059
Informal Social Activity	.114	.039	.062	.063	-.070	.027	-.078	-.079
Weekends Spent on Campus	.152	.018	.056	.003	.013	.023	.087	.020
Friendships	.106	.071*	.085	.028	.052	.108*	-.002	.029
Faculty Contact: Social/Personal	.100	.014	.062	.017	-.092	-.030	-.027	-.048
Peer Conversations: Social/Personal	.061	.011	-.002	-.094	-.144	-.137*	-.003	-.027
Institutional Commitment	.339	.305*	.323	.291*	.214	.083	.262	.253*
Commitment to Graduation	.170	.070*	.134	.032	.354	.328*	.149	.035

*p < .05

positively associated with institutional persistence. Thus, the significant negative associations found in the two-year commuter sample, when combined with the significant negative weight for affiliation needs, suggest that at least some withdrawal from those institutions may be more a process of

transferring to more interpersonally stimulating institutional environments than a lack of involvement in, or commitment to, the institution. This conclusion is perhaps further supported by the fact that the two-year commuter institution sample is the only one in which commitment to the institution did not have a significant, positive regression weight with persistence.

With the exception of institutional commitment, expected second semester achievement had the strongest, positive association with persistence in the four-year commuter institution sample. The academic achievement variables were unassociated with persistence/withdrawal decisions in the other three institution samples. Aside from commitment to the institution and expected academic achievement, the only other variable significantly associated with persistence/withdrawal decisions was dating frequency. Students who withdrew voluntarily tended to date more frequently than did those who persisted.

Interactions of Independent Variables

A reexamination of Table 3 indicates that selected interaction terms, which met the three criteria for significant interactions outlined in the statistical analysis section, were associated with statistically significant increases in R^2 in three of the four institution samples. Notable was the fact that the R^2 increases associated with the sets of interactions were substantial relative to the variance explained by the total set of student involvement and commitment variables. The 10.3% increase in overall R^2 for the residential university sample represented a 63.2% improvement in explained variance over the R^2 (16.3%) due to the involvement and commitment variables, and was 35.3% of the explained variance (total R^2). Similarly, the 8.9% R^2 increase associated with the interactions in the liberal arts sample was a 68.5% improvement over the variance explained by the involvement and commitment variables, and represented 33.6% of the explained variance. The relative R^2 improvement due to the interactions in the two-year commuter sample was not as pronounced, but still represented nearly 20% (19.3%) of the explained variance. While there were individual interaction terms that were significant in the four-year commuter institution sample, they each failed to meet the criterion of the entire set of interaction terms being associated with a significant increase in R^2 . Thus, these specific interactions were judged to be the result of fortuitous sampling or measurement error and were not interpreted substantively.

Table 5 displays the significant interactions and the equations for those interactions for each institutional sample. Because of substantial colinearity among the interaction terms, not all individual interactions entered in the final set were significant with the influence of all main effects and all other interactions held constant. For the residential university sample, 13 of the

TABLE 5. Significant Interaction Effects for Three Institutional Types

Interaction	F ^a	Equation ^b (unstandardized weights)
<u>Residential Universities</u>		
1. Socioeconomic Status (SES) x Academic/Intellectual Activity (AIA)	5.14*	$Y^c = -.003(SES) + .002(AIA) - .0002(SES \times AIA)$
2. Achievement Needs (ACHN) x Residence (RES)	10.23**	$Y = .0008(ACHN) + .122(RES) - .008(ACHN \times RES)$
3. Special Skills Program Participation (SSPP) x Liberal Arts Major (LAM)	13.49*	$Y = -.033(SSPP) - .645(LAM) + .140(SSPP \times LAM)$
4. Friendships (FDS) x Liberal Arts Major (LAM)	4.40*	$Y = .059(FDS) - .645(LAM) - .060(FDS \times LAM)$
5. Secondary School Grades (SSG) x Dating Frequency (DATE)	7.71**	$Y = .187(SSG) - .050(DATE) - .016(SSG \times DATE)$
6. Commitment to Graduation (CG) x Institutional Commitment (IC)	4.83*	$Y = -.091(CG) + .287(IC) - .020(CG \times IC)$
7. Friends on Campus (FOC) x Institutional Commitment (IC)	6.08*	$Y = -.108(FOC) + .287(IC) - .015(FOC \times IC)$
8. Commitment to Graduation (CG) x Informal Social Activity (ISA)	5.12*	$Y = -.091(CG) + .169(ISA) - .061(CG \times ISA)$
9. First Semester Achievement (ACH) x Institutional Commitment (IC)	9.15**	$Y = .096(ACH) + .287(IC) - .029(ACH \times IC)$
10. Institutional Commitment (IC) x Organized Extracurricular Activity (OEA)	8.76**	$Y = .287(IC) + .249(OEA) - .061(IC \times OEA)$
11. Informal Social Activity (ISA) x Faculty Contact: Academic Topics (FCAT)	9.43**	$Y = +.169(ISA) + .036(FCAT) - .317(ISA \times FCAT)$
12. Institutional Commitment (IC) x Honors Program Participation (HPP)	10.03**	$Y = .287(IC) + .473(HPP) + .050(IC \times HPP)$
13. Peer Conversations: Social/Personal (PCSP) x Honors Program Participation (HPP)	8.28**	$Y = 1.004(PCSP) + .473(HPP) + .253(PCSP \times HPP)$
<u>Liberal Arts Colleges</u>		
14. Institutional Commitment (IC) x Commitment to Graduation (CG)	7.15**	$Y = -.158(IC) + .123(CG) - .036(IC \times CG)$
15. Peer Conversations: Academic Topics (PCAT) x Liberal Arts Major (LAM)	4.20*	$Y = -.097(PCAT) - .267(LAM) + .191(PCAT \times LAM)$
<u>Two-Year Commuter Institutions</u>		
16. Socioeconomic Status (SES) x Institutional Commitment (IC)	10.69**	$Y = .038(SES) + .021(IC) + .011(SES \times IC)$
17. Sex (SEX) x Commitment to Graduation (CG)	7.26**	$Y = -.398(SEX) + .310(CG) - .118(SEX \times CG)$

*p < .05

**p < .01

^aDegrees of freedom: Residential Universities = 1/1051; Liberal Arts Colleges 1/358; Two-Year Commuter Institutions 1/389; all main-effects and other interactions held constant.

^bControlling for all main-effects and all other interactions; Constant: Residential University = +1.42; Liberal Arts College = -2.10; Two-Year Commuter Institution = -1.70.

^cVoluntary Withdrawal (Coded 1) versus Persistence (Coded 2).

final 20 interaction terms were statistically significant. Equations numbered 1–5 in Table 5 describe interactions between student background traits and various measures of social or academic involvement. Interactions 1 and 2 could be described as “compensatory.” That is, both involvement measures, academic/intellectual activity and residing on campus, had their strongest positive relationship with persistence for students who were at the relatively lowest levels of socioeconomic status or affiliation needs, respectively. As level of socioeconomic status or affiliation increased, the magnitude of the positive influence on persistence of involvement in academic/intellectual activity and residing on campus tended to decrease.

Interactions 3, 4, and 5 for the residential university sample are somewhat less consistent. Participation in special skills programs had its most important positive influence on persistence for liberal arts (versus applied or professional) majors, while friendships were most important for the persistence of non-liberal arts majors. Frequency of dating had its most important negative impact on persistence for students with the highest levels of precollege academic achievement. As precollege academic achievement decreased, the negative influence of dating frequency on persistence became less important.

Interactions 6–11 for the residential university sample concerned measures of social and academic involvement, and could be characterized as compensatory in nature. In interactions 6 and 7 commitment to the institution compensated for low commitment to graduation and few friends on campus. That is, institutional commitment had its strongest positive influence on persistence for students with low commitment to the goal of graduation and with few friends on campus. Level of institutional commitment was less important as an influence on persistence for students with high scores on these two variables. A similar interaction (8) suggested that in terms of positive influence on persistence, involvement in informal social activity with peers was most important for students with low levels of commitment to the goal of graduation.

Interactions 9–11 represent a somewhat different pattern in that the variables involved are mutually compensatory. For example, institutional commitment (interactions 9 and 10) had its most important positive influence on persistence for students with low levels of academic achievement and low involvement in organized extracurricular activities. Conversely, both academic achievement and extracurricular involvement had their strongest positive associations with persistence for students with low commitment to the institution. A conceptually similar, mutually compensatory interaction was found for involvement in informal social activity with peers and frequency of informal contact with faculty to discuss academic or intellectual issues. This latter interaction not only supports Tinto’s hypothesis that high levels of social involvement (i.e., informal social interaction with peers) may com-

pensate for low levels of academic involvement (i.e., faculty contact to discuss academic topics) and vice versa, but is also consistent with previous findings by Pascarella and Terenzini (1979).

A somewhat different pattern was found in interactions 12 and 13 for the residential university sample. Both interactions involved extent of participation in honors programs and could be classified as accentuating. In each interaction, participation in honors-type programs had its strongest positive association with persistence, either for students with a high commitment to the institution (interaction 12), or for students with frequent contacts with peers focusing on social/personal problems (interaction 13). Honors program participation was less important a factor in the persistence of students who were low on those two measures.

For the liberal arts college sample, only 2 of the 10 interactions entered in the final regression model were significant with the influence of all main effects and all other interactions held constant. Interaction 14 was generally compensatory, with commitment to graduation having its strongest positive influence on persistence for students with relatively low levels of commitment to the institution. As commitment to the institution increased, commitment to graduation became less important as a factor in persistence. Interaction 15 suggested that frequency of interactions with peers to discuss academic topics had a significantly stronger positive influence on persistence for students majoring in the liberal arts than for students majoring in pre-professional or applied fields.

Finally, for the two-year commuter institution sample, 2 of the 5 interactions entered in the final regression model were significant. Interaction 16 suggested that level of institutional commitment was most positively related to persistence for students from relatively high socioeconomic status backgrounds. As SES level dropped, commitment to the institution became less important as a variable influencing persistence/withdrawal decisions in the two-year commuter sample. Interaction 17 indicated that level of goal commitment had a significantly stronger positive association with persistence for women than for men. This was the only significant interaction effect involving sex in the entire set of analyses. This perhaps suggests that the influence on persistence of most involvement and commitment variables, at least as they are measured in this study, is essentially the same for both sexes.

It is perhaps also worth noting the absence of significant interactions between student age and any of the involvement or commitment variables. As with student sex this suggests that the patterns of involvement and commitment summarized in Table 4 are generally independent of student age. Thus, although there may be some underrepresentation of older students in the overall sample, this fact would appear to have little consequence for the generalizability of the findings.

CONCLUSIONS AND DISCUSSION

If one considers the evidence strictly from the perspective of the residential university and liberal arts college samples, the findings are at least modestly consistent, both with the theoretical expectations of the Tinto model, and previous research focusing on the predictive validity of the model. With differences in background characteristics and personality orientations held constant, freshman persisters (versus voluntary withdrawals) in both residential university and liberal arts samples were significantly more involved in the nonacademic life of the institution and had significantly more nonclassroom interaction with faculty members focusing on both intellectual/academic and social/personal topics. The latter finding is consistent with previous evidence reported by Pascarella and Terenzini (1977), Rossmann (1967); Spady (1970), and Terenzini and Pascarella (1977) concerning the influence of informal contact with faculty on freshman year persistence.

The pattern of freshman persisters being more involved in the life of the institution than voluntary withdrawals was most pronounced at residential institutions. With background traits held constant, residential university persisters (versus withdrawals) were more likely to live on campus, to spend more weekends on campus, and to be involved in more informal social activity with peers.

If the general pattern that emerges from the residential university and liberal arts samples is one of persisters being more involved and integrated into the social/interpersonal fabric of the institution than withdrawals, a notably different pattern emerges when the two-year commuter sample is considered. With background traits and personality orientations held constant, persisters in the two-year commuter sample had significantly less informal contact with both faculty and peers than did the voluntary withdrawals.⁴

This pattern would seem to run counter to intuition as well as to the theoretical expectations of Tinto's model. However, it may simply reflect the fact that withdrawal from two-year commuter colleges is sometimes a matter of transfer to more traditional four-year, residential institutions rather than simply the result of low levels of academic or social commitment. Such institutions, particularly if they are residential, may provide substantially greater opportunities for nonclassroom interaction with both faculty and other students than are afforded in two-year commuter colleges. The fact that voluntary withdrawals from the two-year college sample had significantly higher levels of affiliation needs than did persisters is consistent with this conclusion. Furthermore, as might be expected, level of affiliation needs had substantial positive correlations, not only with frequency of informal contact with faculty, but also with frequency of informal contact with peers to discuss academic/intellectual and social/personal topics. (The correlations ranged from .18 and .26, and were all significant at $p < .05$).

At first glance the above differences in patterns of interactions with faculty and peers suggest a significant level of interpersonal involvement \times institutional type interaction in the Tinto model. One is tempted to conclude that the influence on persistence of a major component of Tinto's model (extent of informal interaction with faculty and other students) varies significantly, and perhaps even in direction, across different institutional types. Such a conclusion, however, may not be justified given the fact that for the two-year institution, the dependent variable may reflect substantial transfer as well as withdrawal behavior. Unfortunately, it was not possible to separate these two categories in the CHOICE data. Had it been possible, it is likely that the findings for persisters versus those withdrawing completely (rather than transferring) would have been more consistent with Tinto's theoretical expectations.

Results of the setwise multiple regression analyses indicated that the R^2 increase due to the set of involvement and commitment variables varied from 13.0% to 18.4%. These results seem quite consistent with those reported in other multiinstitutional validations of the Tinto model (e.g., Munro, 1981). Only a very few of the involvement or commitment variables had a unique or direct influence on voluntary persistence/withdrawal decisions, when the influence of background characteristics and all other involvement or commitment measures was taken into account. Of these, institutional commitment had the most consistent positive influence on persistence across samples. Only in the two-year commuter institution sample did institutional commitment fail to have a significant positive regression weight with persistence. This perhaps suggests that degree of commitment to the institution plays a significantly less important role in the persistence/withdrawal decisions of two-year commuter students than of students in four-year institutions.

In terms of identifying potentially manipulable variables which have direct, unique effects on voluntary persistence/withdrawal decisions, the results of the main-effects multiple regression analysis (Table 4) are generally disappointing. Only in the residential university sample were variables found with significant positive regression weights with freshman persistence which are also potentially manipulable: participation in career counseling programs and residing on-campus (versus living off-campus).

Chickering (1969) has argued that forming a sense of "career identity" is a significant developmental task for undergraduate students. The findings of this study suggest, further, that providing institutionally sponsored programs which may assist students in addressing this important developmental task is a potentially significant means by which a student's level of institutional integration may be enhanced.

Given Chickering's (1974) finding that residential students are significantly more involved in the intellectual, social, and cultural life of an institution than are commuters, the present finding that living on campus has a unique,

positive association with persistence is perhaps not surprising. In the primarily residential university sample, residing on campus may, in fact, function to some extent as a proxy variable for level of social and academic involvement. For example, residing on-campus had correlations of .18 and .32 with participation in extracurricular programs and extent of informal social activity with peers, respectively.

The fact that residential students were significantly more likely to persist than commuters, even when differences in their levels of involvement and commitment were held constant, however, suggests that living on-campus may have a positive influence on persistence not totally explainable by the higher levels of social or academic involvement linked with residential living. Just what influence residential living may have beyond the extent to which it fosters increased participation in the social or academic systems of the institution is not clear from the present data. (One possible explanation, however, is that the measures employed to assess social and academic involvement may not adequately tap Tinto's constructs). Nevertheless, it would seem that residential living (in its various forms) is a potentially powerful mechanism whereby universities may be able to positively influence not only levels of involvement in the social and cultural life of the institution, but also persistence at the institution.

Perhaps the most interesting and important results of this study are the findings which suggest that the influence on persistence of individual involvement and commitment variables is not independent of student background characteristics or of other social and academic experiences during the freshman year. The addition to the prediction equation of cross-product terms which assessed the differential influence of various dimensions of social and academic integration increased the explained variance 10.3% for the residential university sample, 8.9% for the liberal arts samples, and 5.2% for the two-year commuter sample. For the residential university and liberal arts samples, this represented over a third of the total explained variance, and approximately two-thirds of that explained by the individual involvement and commitment variables.

These results are generally consistent with previous single institution validations of the Tinto model by Bean (1981) and Pascarella and Terenzini (1979). They clearly suggest that institutional persistence/withdrawal decisions during the freshman year are the result of a complex interaction of different influences. Attempting to fully understand this complexity with the simple main-effects or additive model may conceal nearly as much as it reveals. In short, future investigations which attempt to validate the Tinto model on either single or multiple institutional samples may well need to consider interactions among various components of the model if they are to fully capture what may be a particularly complex pattern of social-psychological relationships.

The most consistent pattern of interaction effects was found in the residential university sample. Eight of 13 significant interactions could be generally described as compensatory. Residing on-campus and involvement in academic/intellectual activities, for example, had their most pronounced, positive influence on persistence for students at the lowest levels of affiliation needs and socioeconomic status, respectively. As the levels of these last two variables increased, living on campus and involvement in academic/intellectual activities, respectively, became less important considerations in voluntary persistence/withdrawal decisions.

A similar pattern was found for six interactions among different measures of involvement and commitment. Of those, perhaps the most interesting in terms of potential policy variables were the interactions involving relationships with peers and faculty. Two general measures of social involvement with peers, participation in extracurricular activity and extent of informal social activity with peers, had their strongest positive influence on persistence for students at the relatively lowest levels of commitment to the institution and commitment to the goal of graduation, respectively. It would appear that extensive social interactions with peers during the freshman year tended to compensate for both low levels of commitment to the institution and to the goal of college graduation in increasing persistence.

Similarly it would appear that high levels of social integration (as indicated by extent of informal social interaction with peers) tended to compensate for low levels of academic integration (as indicated by extent of informal contact with faculty focusing on academic/intellectual issues), and vice versa. This latter finding, in particular, replicated the earlier findings of Pascarella and Terenzini (1979) and provides reasonably clear support for Tinto's hypothesis of a mutually compensatory relationship between social and academic integration.

If a student's levels of involvement with peers and faculty are important compensatory influences on freshman persistence, then an important consideration would be those institutional programs and policies which increase the likelihood that such involvement will occur. It would seem that such policies fall largely within the domain of the student affairs staff. How student affairs professionals fashion the various activities and programs they administer to increase the likelihood of informal interaction with peers and faculty may, thus, have an important influence on the persistence of students who might otherwise withdraw from the institution.

While informal relationships with peers and faculty may have a significant compensatory influence on freshman persistence in the residential institution sample, an accentuating influence was indicated for interactions involving participation in academic honors programs. Participation in such programs was most important in positively influencing the persistence of students with relatively high levels of institutional commitment. Thus, while

participation in academic honors programs was not significantly associated with persistence for students in general, it nevertheless became an important factor which even further reinforced the likelihood of persistence for those students with high levels of institutional commitment.

Limitations

Clearly there are sample problems (e.g., low response rate) and potential measurement errors in the assessment of Tinto's constructs which limit the findings of the present study. The study is also limited by the fact that it focused solely on end of freshman year withdrawal. The patterns of influences on sophomore, junior, and senior withdrawal may be substantially different than those indicated in this study. Similarly the data base analyzed prevented us from distinguishing among withdrawals, transfers, and stopouts. As suggested by the findings of Pascarella et al. (1981), such distinctions may yield important variations in the clusters of variables which discriminate among criterion groups.

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NOTES

1. The three smallest of the 11 institutions included their entire freshman population in the study. Project CHOICE, supported by the Fund for the Improvement of Post-Secondary Education, worked with colleges and universities to help them improve the information they provided to prospective students.
2. Participating institutions: Ball State University, Ohio University, American University, University of South Dakota, California State University at Long Beach, Indiana State University at Evansville, Iona College, Ramapo College, Southside Virginia Community College, Joliet Junior College, and Austin Community College.
3. Multiple regression requires the equivalence of variances for the dependent variable for various levels of an independent variable (i.e., homoscedasticity). Because the dependent variable is a dichotomy (persists and withdrawals), this assumption is violated. However, recent literature (Goodman, 1976) suggests that the multiple regression results are quite robust with respect to a skewed, dichotomous dependent variable.
4. For the four-year commuter sample, social involvement or integration was generally unrelated to persistence/withdrawal decisions.

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