

LONG-TERM PERSISTENCE OF TWO-YEAR COLLEGE STUDENTS

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This paper employs a theoretical model to explain the long-term persistence of students who began their postsecondary education in two-year institutions. The model was estimated on a national sample of 825 students who initially enrolled in 85 two-year institutions in the fall of 1971, and who were followed over a nine-year period. Although there were differences in the factors associated with persistence for men and women, the results tend to confirm the importance of person-environment fit as a salient influence on degree persistence and completion in postsecondary education. Measures of academic and social integration had the most consistent pattern of positive direct effects, and much of the influence of student precollege traits was indirect.

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Student persistence/withdrawal behavior in postsecondary education has become an issue of considerable scholarly interest (e.g., Astin, 1975; Cope and Hannah, 1975; Lenning et al., 1980; Pantages and Creedon, 1978; Ramist, 1981; Spady, 1970; Tinto, 1975). Recently, the National Institute of Education-sponsored Study Group on the Conditions of Excellence in American Higher Education (Mortimer et al., 1984) further underscored the importance of this area for future inquiry by suggesting that student persistence in postsecondary institutions may be one salient indicator of educational impact or excellence.

The research literature on persistence/withdrawal behavior is voluminous (e.g., Pantages and Creedon, 1978; Tinto, 1975). Literally hundreds of studies have been conducted. The vast preponderance of this research, however, has been atheoretical and descriptive. The result has been a body of literature that lacked the cohesion and focus necessary to develop valid generalizations about those factors influencing the phenomenon. Tinto (1975), building on the earlier work of Spady (1970), developed a theoretical, ex-

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planatory model of the student persistence/withdrawal process. This model, which assumes that persistence/withdrawal behavior is largely determined by the student's integration into the social and academic systems of the institution, has been a major theoretical advance in attrition research. It has brought theoretical direction to an area of inquiry sorely in need of focus.

Not surprisingly, Tinto's (1975) model has itself been the focus of considerable research over the past decade (e.g., Aitken, 1982; Baumgart and Johnstone, 1977; Bean, 1980, 1982, 1983, 1985; Munro, 1981; Pascarella and Chapman, 1983; Pascarella and Terenzini, 1979, 1980, 1983; Terenzini and Pascarella, 1977, 1978; Terenzini et al., 1983). The results of this research have generally supported the predictive validity of Tinto's model and the importance of the two core concepts of academic and social integration.

At the same time, however, the literature on the Tinto model is limited in a number of ways. First, with the exception of Pascarella and Chapman (1983), nearly all of the research guided by Tinto's model has been conducted at four-year, largely residential institutions. Consistent with the total body of existing research on persistence, those estimating Tinto's model have essentially ignored the large and growing population of students who begin their careers in postsecondary education in two-year or community colleges. As a result, beyond the fact that students who begin college in two-year institutions are significantly less likely to persist in higher education or to obtain the bachelor's degree than students who start at four-year institutions (Astin, 1982; Kohen et al., 1978), we know little or nothing about the factors that influence the persistence/withdrawal behavior of this important group of students.

A second limitation of existing research on the Tinto model is that it is largely confined to studies of student persistence/withdrawal behavior at single institutions and over a relatively short period of time (typically one or two years). This approach creates a particularly insidious methodological problem in the form of an ambiguous operational definition of persistence/withdrawal behavior. Students who withdraw from an institution before receiving a bachelor's degree may or may not be withdrawing from postsecondary education generally. Some may be leaving the system permanently, others may be transferring to another institution, and still others may be "stopping out" (Cope and Hannah, 1975) for a period of time before returning to the original institution or to another institution to complete a degree. It is essentially impossible to distinguish permanent withdrawal (or dropout) from institutional transfer or stop-out behavior in the absence of multi-institutional samples that trace a student cohort well beyond a one-, two-, or even four-year period.

This consideration is particularly important in studying the persistence/withdrawal behavior of students who begin college at two-year institutions,

as persistence to the bachelor's degree requires transfer to another institution. If not followed over a sufficient period of time, such transfer behavior could be confused with dropping out of higher education permanently. Unfortunately, studies that trace two-year college students over a sufficient period of time to determine the various individual and institutional influences on their persistence/withdrawal behavior with reasonable accuracy are essentially absent from the attrition literature.

This paper seeks to address these weaknesses in the literature by employing Tinto's (1975) model to explain the long-term persistence/withdrawal behavior of students who began higher education in two-year institutions. The model was estimated on a national sample of 825 students who initially enrolled in 85 two-year institutions in the fall of 1971. The sample was followed for a nine-year period, from 1971 to 1980.

CAUSAL MODEL

Tinto's (1975) explanatory, causal model of student persistence/withdrawal behavior in postsecondary education is both longitudinal and complex. It posits that students come to postsecondary institutions with a range of different background characteristics and secondary-school experiences (e.g., race; sex; family social, educational, and financial context; and secondary-school academic and social accomplishments). These background characteristics and secondary-school experiences lead to initial student commitments to the institution to be attended and to the goal of graduation from college. Together with background characteristics and secondary-school experiences, initial commitments influence the student's interactions with, and eventual integration into, the institution's academic and social systems. Other things being equal, the greater the individual student's levels of integration into the social and academic systems of the college, the greater his or her subsequent commitment to the college and to the goal of college graduation, respectively. In turn, these subsequent commitments are seen, along with levels of social and academic integration, as having a direct, positive influence on persistence. Figure 1 shows a conceptual schema of Tinto's (1975) model.

Tinto's (1975) model is largely based on the concept of the fit between the individual and the environment of the institution attended. Of all the constructs in the model, the most salient to this core notion of person-environment fit are those of academic and social integration. It is through these two constructs that the model assesses the nature of the student's institutional experience and the relationship of this experience to subsequent commitments and to persistence/withdrawal behavior. As Tinto (1975) himself suggested, "given individual characteristics, prior experiences and commit-

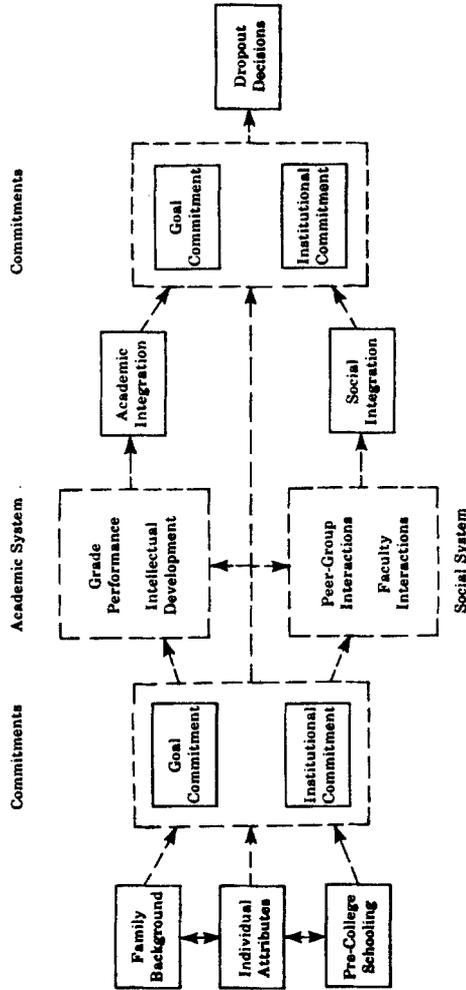


FIG. 1. A conceptual schema for dropout from college. (From Tinto, p. 95. Copyright 1975 by the American Educational Research Association. Reprinted by permission.)

ments, . . . it is the individual's integration into the academic and social systems of the college that most directly relates to his continuance at that college" (p. 96).

METHOD

The data were drawn from the 1971–1980 Cooperative Institutional Research Program (CIRP) surveys. The overall sample was 10,326 students attending 487 colleges and universities varying in type and control. The 10,326 students completed an initial survey on entering college in the fall of 1971, which collected a broad array of student background information, aspirations, and expectations of college. During the winter of 1980, approximately nine years later, the same students completed a follow-up instrument that collected extensive information about the student's actual collegiate experience. Details on the sampling scheme and design are discussed in Astin (1982).

The study sample was initially defined as those respondents who entered a two-year institution in 1971 as first-time students and who at that time aspired to a bachelor's degree or above. Respondents were excluded if they had missing data on any of the model's constructs (operationally defined in the next section of the paper). This yielded a sample of 825 students (418 men and 407 women) who had enrolled in 1971 in 85 two-year institutions.

Variables

As indicated by Figure 1, Tinto's conceptual schema portrays five different constructs or variable sets in a causal sequence: (1) *background characteristics* (i.e., family background, individual attributes, and precollege schooling); (2) *initial commitments* (i.e., precollege commitment to the goal of college graduation and commitment to the initial institution attended); (3) *academic and social integration*; (4) *subsequent goal and institutional commitments*; and (5) *persistence/withdrawal behavior*.

Each background characteristic was operationally defined as follows:

Family Background

Three variables were used to operationalize this characteristic. The first was termed *socioeconomic status* (SES), which was the sum of the parents' combined level of education (6 categories from "grammar school or less" to "postgraduate degree") and combined parental income (12 categories from "less than \$4,000" to "\$40,000 or more"). The second was degree of concern about financing college. This was coded as follows: 3 = major concern;

2 = some concern; 1 = no concern. The third family background variable also reflected economic status. It was the student's expectation that he or she would have to work during college (termed *work expectations*). The variable was coded as follows: 4 = very good chance to 1 = no chance.

Individual Attributes

These were operationalized according to sex (1 = male; 2 = female); age (eight categories from "16 or younger" to "26 or older"); ethnicity (1 = non-minority/Caucasian; 0 = minority); expected major (1 = liberal arts/sciences; 0 = preprofessional); and marital status (2 = married in 1971; 1 = not married in 1971).

Precollege Schooling

Precollege schooling was measured by two variables: secondary-school achievement and secondary-school social accomplishments. Secondary-school achievement was the sum of secondary-school grades (1 = D to 8 = A or A+) and secondary-school rank (1 = fourth quarter to 4 = top quarter). Secondary-school social accomplishments were the sum of five secondary-school social/leadership activities (e.g., president of a student organization, won a varsity letter, or participated in a play); coded 1 = no; 2 = yes.¹

As with all background characteristics, the initial commitment items were collected on the 1971 preenrollment survey and were termed *goal commitment I* and *institutional commitment I*. These two variables were operationally defined as follows:

Goal Commitment I

This was a single item: highest expected academic degree (coded: 3 = bachelor's [BA], to 5 = Ph.D., M.D., J.D., DDS, or their equivalent).

Institutional Commitment I

This was the sum of two items: (1) the expectation that the student would be satisfied with the college in which he or she was about to enroll and (2) the expectation that the student would transfer from that college before enrollment. Each item was coded as follows: 1 = no chance to 4 = very good chance, with the transfer item coded in reverse.

According to the Tinto model, academic integration is determined primarily by the student's academic performance and intellectual development, whereas social integration is primarily a function of student interactions

with faculty and peers. In the present study the integration variables were defined as follows:

Academic Integration

This was the sum of two items: (1) average undergraduate grades, coded 1 = "D or less" to 6 = "A- or more"; and (2) membership in a scholastic honor society, coded 1 = no, 2 = yes (see note 1).

Social Integration

This was the sum of five items assessing the student's involvement with peers and faculty ("knew a professor or administrator," "president of one or more student organizations," "had a major part in a play," "won a varsity letter," and "edited a school publication"; coded: 1 = no; 2 = yes).²

As hypothesized by the Tinto model, academic and social integration have a direct influence on subsequent levels of commitment to graduation and to the institution. In a number of extant studies, subsequent goal commitment is measured largely by degree aspiration (e.g., Pascarella et al., 1983; Munro, 1981). In the present study, however, the dependent variables were largely defined by degree completion. Thus, including a measure of degree aspiration assessed on the 1980 follow-up as an operational definition of subsequent goal commitment was essentially redundant with the dependent measure. Consequently, subsequent goal commitment was not represented in the present estimation of the model.

As it has been operationally defined in previous studies of the Tinto model, the concept of *subsequent institutional commitment* reflects, to a large extent, overall satisfaction with the institution attended (e.g., Munro, 1981; Pascarella et al., 1983; Pascarella and Terenzini, 1983). Consistent with previous research, the present study also operationally defined subsequent commitment in terms of satisfaction with college.

Institutional Commitment/Satisfaction II

This variable was operationally defined as the student's response to a single item: "Overall, how satisfied were you with the last undergraduate college attended?" (coded: 3 = very satisfied; 2 = somewhat satisfied; 1 = not at all satisfied).

Responses to the items constituting academic integration, social integration, and institutional commitment/satisfaction II were all collected on the 1980 follow-up survey. They refer to the student's experience in the last undergraduate college attended.

There were two dependent measures of persistence/withdrawal behavior in the study: (1) degree persistence and (2) degree completion. The first persistence measure, degree persistence, was operationally defined as completion of at least a bachelor's (B.A.) degree within the nine-year period 1971–1980 or currently working toward a bachelor's degree as of the 1980 follow-up. Conversely, dropout or withdrawal was defined as failing to complete a bachelor's degree within the nine-year period 1971–1980 and not actively working toward a bachelor's degree as of 1980. The second persistence measure, degree completion, was operationally defined as completion of at least a bachelor's degree within the nine-year period 1971–1980. Withdrawal or dropout was defined as failure to complete a bachelor's degree within the 1971–1980 period.

Although it is acknowledged that these two dependent measures are likely to be highly correlated, it is nevertheless possible that they may tap somewhat different aspects of persistence in the system of postsecondary education. Completion of the bachelor's degree over a specified period by two-year college students who initially aspired to that degree is a seemingly unambiguous measure of persistence in postsecondary education. Regarding actual degree completion alone as a comprehensive measure of persistence, however, would classify those still actively working toward the bachelor's degree as dropouts or withdrawals. It is not immediately apparent that such a classification is inherently accurate. One could argue, for example, that an individual who initially enrolled in a two-year college in 1971 but didn't receive his or her bachelor's degree until 1991 was still a persister in the postsecondary education system.

Clearly, there may be no ideal solution to the problems involved in defining persistence in postsecondary education. Any single definition of persistence/withdrawal is unlikely to be completely satisfactory. Consequently, we judged it most appropriate to estimate the model for both operational definitions of persistence/withdrawal behavior.

Data Analysis

Findings reported by Pascarella and Terenzini (1983) suggested the possibility of significant sex differences in the factors influencing persistence/withdrawal behavior. Accordingly, a series of preliminary analyses was conducted to determine if sex interacts with any of the model's constructs in the prediction of persistence. This analysis was accomplished by a regression of each persistence measure on an equation consisting of all independent variables plus a set of terms that cross-multiplied sex with each independent variable. In both equations, the set of cross-product terms was associated with a significant ($p < .05$) increase in R^2 . Significant individual interactions

were indicated for sex \times secondary-school social accomplishment and sex \times institutional commitment/satisfaction II. Such findings suggest the appropriateness of estimating the model separately for men and women.

Coefficients in the causal model were estimated separately for men and women with ordinary least-squares regression. According to the model, student background characteristics were considered exogenous variables (determined by influences outside the model), whereas initial commitments, social/academic integration, subsequent commitment, and the persistence measures were considered endogenous (determined within the model). The analysis required the solution of seven structural equations in which each endogenous variable was regressed on all exogenous variables and all causally antecedent endogenous variables in the model. The results of these structural equations yielded standardized regression (beta) weights that can be interpreted as "direct effects" (Kerlinger and Pedhazur, 1973). The size and sign of the standardized regression weight indicate the amount of change in the dependent measure associated with every unit standard-deviation increase in the predictor variable, when the influence of all other predictors is held constant.^{3,4}

RESULTS

Table 1 shows for men and women the means, standard deviations, and intercorrelations for all variables. Nearly all subsequent analyses are based on these statistics. As Table 1 shows, 53% of both samples had completed their B.A. degree within the nine-year period. An additional 15% of the men were still actively pursuing their undergraduate degrees (53% + 15% = 68%), and an additional 17% of the women were still actively seeking the B.A.

Table 2 summarizes the results of the structural equations for men, and the corresponding set of structural equations for women is shown in Table 3. As equations 15 and 16 in the tables show, the variables in the model, regarded as direct effects, explained 19.9% of the variance in degree persistence and 25.4% of the variance in degree completion for men. For women, the model accounted for 15.3% of the variance in degree persistence and 22.8% of the variance in degree completion. Although modest, these percentages compare favorably with other multi-institutional validations of Tinto's (1975) model, which trace student persistence/withdrawal behavior over a substantially shorter period of time than the present investigation (e.g., Munro, 1981; Pascarella and Chapman, 1983).

As Tables 2 and 3 further show, for both men and women only three variables had significant direct effects on degree persistence, when controlling for the influence of all other variables in the model. For men, the three

TABLE 1. Means, Standard Deviations, and Intercorrelations Among Variables^a

Variable	Men		Women		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
	M	SD	M	SD																	
1. Age	3.53	1.14	3.32	.97	-.13	-.06	-.12	-.11	-.09	-.11	-.03	-.03	-.05	-.06	-.06	-.01	-.01	-.01	-.01	-.01	-.01
2. Secondary-school achievement	18.63	1.81	19.65	1.76	-.05																
3. Secondary-school social accomplishment	5.84	.89	5.61	.89	-.00	-.16	-.14	-.14	-.05	-.02	-.07	-.04	-.00	-.00	-.04	-.04	-.04	-.03	-.05	-.06	-.06
4. SES	19.39	1.50	19.44	1.50	-.23	-.04	-.38	-.38	-.11	-.11	-.38	-.07	-.09	-.09	-.05	-.21	-.10	-.01	-.00	-.00	-.05
5. Financial concerns	1.87	.61	1.89	.59	-.02	-.04	-.38	-.38	-.27	-.15	-.15	-.05	-.12	-.09	-.05	-.06	-.08	-.01	-.01	-.01	-.01
6. Work expectations	3.16	.83	3.03	.94	-.19	-.06	-.09	-.09	-.33	-.06	-.06	-.10	-.08	-.09	-.17	-.02	-.02	-.10	-.00	-.02	-.02
7. Ethnicity	.68	.47	.69	.46	-.12	-.35	-.36	-.36	-.19	-.01	-.06	-.06	-.09	-.04	-.13	-.02	-.02	-.12	-.15	-.03	-.06
8. Expected major	.20	.40	.30	.46	-.14	-.10	-.05	-.08	-.02	-.01	-.09	-.01	-.01	-.07	-.04	-.07	-.02	-.03	-.03	-.03	-.01
9. Marital status	1.03	.17	1.05	.21	.65	.06	-.05	-.07	-.04	-.18	-.06	-.11	-.01	-.01	-.01	-.07	-.07	-.06	-.05	-.04	-.04
10. Goal commitment I	3.69	.75	3.44	.62	-.07	.03	-.01	.01	.02	.03	-.05	.16	-.00	-.01	-.01	.10	.10	.01	.11	.06	.06
11. Institutional commitment I	1.04	1.28	1.15	1.39	.12	-.16	-.01	-.18	-.04	-.22	-.14	-.01	-.01	-.08	-.00	-.03	-.03	-.08	-.03	-.09	-.16
12. Social integration	5.85	.78	5.80	.74	-.10	.04	.21	.05	-.04	.01	.04	-.01	-.03	-.01	.02	.15	.14	.22	.23	.23	.23
13. Academic integration	19.40	1.50	20.09	1.72	-.02	.44	.04	.12	-.09	-.04	.29	.13	.09	-.02	-.08	.22	.29	.34	.38	.38	.38
14. Institutional commitment/satisfaction II	2.44	.61	2.44	.62	.14	.11	-.02	-.10	.01	.00	.07	.00	.06	-.06	.02	.07	.10	.06	.28	.31	.31
15. Degree persistence	.68	.47	.70	.46	-.04	.13	.12	.13	-.01	-.03	.09	.09	.05	.07	-.06	.23	.31	.31	.06	.74	.74
16. Degree completion	.53	.50	.53	.50	-.05	.28	.15	.14	-.01	-.06	.23	.10	.07	.06	-.09	.20	.39	.05	.70	.70	.70

^aMatrix above the diagonal for men, below the diagonal for women, decimals omitted from correlations.

TABLE 2. Structural Equations for Men^a

Variable	10	11	12	13	14	15	16
1. Age	-.039 (-.026)	.039 (.044)	.064 (.043)	.033 (.044)	-.016 (-.009)	.006 (.003)	.011 (.005)
2. Secondary-school academic achievement	.200** (.083)	-.156** (-.111)	.049 (.021)	.452** (.374)	.011 (.004)	.056 (.015)	.156** (.043)
3. Secondary-school social accomplishment	.145** (.123)	.029 (.042)	.316** (.278)	.032 (.053)	-.017 (-.012)	-.037 (-.020)	-.051 (-.029)
4. SES	.114* (.057)	-.196** (-.169)	-.083 (-.043)	-.006 (-.006)	-.041 (-.017)	.080 (.025)	.051 (.017)
5. Financial concern	.055 (.067)	.071 (.149)	.036 (.046)	.041 (.099)	-.009 (-.009)	-.021 (-.016)	-.043 (-.035)
6. Work expectations	.065 (.059)	-.200** (-.308)	-.049 (-.046)	-.066 (-.118)	-.087 (-.064)	.016 (.009)	-.010 (-.006)
7. Ethnicity	-.092 (-.148)	-.029 (-.080)	.018 (.030)	.081 (.259)	.136** (.178)	-.065 (-.065)	-.050 (-.054)
8. Expected major	.053 (.099)	-.001 (-.004)	.079 (.153)	.000 (.000)	.021 (.033)	-.062 (-.073)	-.038 (-.047)
9. Marital status	-.005 (-.022)	-.022 (-.162)	-.108* (-.483)	.049 (.418)	.074 (.259)	.038 (.103)	.020 (.058)

TABLE 2. (Continued)

Variable	10	11	12	13	14	15	16
10. Goal commitment I			.042 (.043)	.001 (.003)	-.009 (-.007)	.063 (.039)	-.014 (-.009)
11. Institutional commitment I			-.062 (-.037)	-.016 (-.018)	.049 (.023)	-.047 (-.017)	-.116* (-.045)
12. Social integration					.114* (.089)	.168** (.101)	.176** (.113)
13. Academic integration					.246** (.101)	.231** (.072)	.223** (.074)
14. Institutional commitment/ satisfaction II						.196** (.150)	.211** (.172)
15. Degree persistence							
16. Degree completion	.096	.111	.142	.234	.122	.197	.254
R^2							

^aN = 418; top number is the standardized weight; number in parentheses is the metric or unstandardized weight.

* $p < .05$; ** $p < .01$.

TABLE 3. Structural Equations for Women^a

Variable	10	11	12	13	14	15	16
1. Age	-.108 (-.069)	.009 (.012)	-.151* (-.116)	-.036 (-.063)	.192** (.123)	-.034 (-.016)	-.083 (-.043)
2. Secondary-school academic achievement	.030 (.010)	-.133* (-.105)	.000 (.000)	.382** (.373)	.084 (.030)	-.007 (-.002)	.085 (.024)
3. Secondary-school social accomplishment	.010 (.007)	.002 (.003)	.214** (.180)	-.036 (-.069)	-.067 (-.047)	.087 (.045)	.094* (.053)
4. SES	.012 (.005)	-.200** (-.186)	.021 (.010)	.043 (.049)	-.106 (-.044)	.121* (.037)	.067 (.022)
5. Financial concern	-.003 (-.003)	-.056 (-.132)	-.039 (-.049)	-.009 (-.026)	-.014 (-.015)	.073 (.057)	.093 (.079)
6. Work expectations	.020 (.014)	-.205** (-.303)	.045 (.036)	-.056 (-.102)	.012 (.008)	-.029 (-.014)	-.080 (-.043)
7. Ethnicity	-.090 (-.120)	-.032 (-.095)	-.012 (-.020)	.137** (.508)	.081 (.109)	-.034 (-.034)	.089 (.096)
8. Expected major	.162** (.220)	.029 (.089)	-.007 (-.011)	.083 (.313)	.014 (.018)	.043 (.043)	.033 (.037)
9. Marital status	.084 (.250)	.035 (.230)	.082 (.292)	.097 (.797)	-.077 (-.228)	.064 (.141)	.112 (.268)

TABLE 3. (Continued)

Variable	10	11	12	13	14	15	16
10. Goal commitment I			-.016 (-.020)	-.035 (-.097)	-.047 (-.047)	.065 (.048)	.061 (.050)
11. Institutional commitment I			.047 (.025)	-.006 (-.008)	.012 (.005)	-.032 (-.010)	-.046 (-.016)
12. Social integration					.091 (.076)	.149** (.091)	.103* (.069)
13. Academic integration					.041 (.015)	.257** (.069)	.280** (.082)
14. Institutional commitment/ satisfaction II						.043 (.032)	.021 (.017)
15. Degree persistence							
16. Degree completion	.040	.113	.061	.236	.063	.153	.228
R^2							

^aN = 407; top number is the standardized weight; number in parentheses is the metric or unstandardized weight
* $p < .05$; ** $p < .01$.

variables with significant, positive, direct effects were academic integration, institutional commitment/satisfaction II, and social integration. For women, the variables with significant, positive direct effects on degree persistence were academic integration, social integration, and socioeconomic status.

A quite similar pattern of significant direct effects was shown for the prediction of degree completion. For both sexes, academic and social integration each had significant positive direct effects on degree completion. For men, the other positive direct effects were institutional commitment/satisfaction II and secondary-school academic accomplishment, whereas level of commitment to the initial two-year institution of enrollment was negatively associated with degree completion. Aside from academic and social integration, the only other variable to have a significant, positive direct effect on completion of the B.A. degree for women was secondary-school social accomplishment.

As indicated previously, the magnitude of the direct effects on each measure of persistence for secondary-school social accomplishment and institutional commitment/satisfaction II differed for men and women. Structural equations 16 and 17 in Tables 2 and 3 show that institutional commitment/satisfaction II had a substantially stronger positive influence on both measures of persistence for men than for women. Conversely, the influence on degree completion of secondary-school social accomplishment was more strongly positive for women than for men.

Aside from secondary-school academic achievement, secondary-school social involvement, and socioeconomic status, none of the other student background characteristics had a significant direct effect on either persistence measure for either sex. Similarly, initial goal commitment failed to have a significant direct influence on degree persistence or degree completion. Because a number of background and initial commitment variables did, however, significantly influence variables that, in turn, had nonzero direct effects on persistence, it is important to examine indirect as well as the direct effects.

Table 4 presents by sex the indirect effects of all variables in the model on the two persistence measures. (Based on Tinto's model, institutional commitment/satisfaction II has only a direct effect.) Indirect causal effects are estimated by the sum of the products of causal effects through intervening variables (Wolfe, 1985). Based on the work of Sobel (1982), Wolfe and Ethington (1984) developed a computer algorithm for the calculation of standard errors for indirect effects. Once these standard errors are calculated, the computation of significance tests (t ratios) for indirect effects is relatively easy. With the use of this computer algorithm, the statistical reliability of the indirect effect of each predictor variable was computed. Thus,

TABLE 4. Standardized (SIE) and Metric (MIE) Indirect Effects on Degree Persistence and Degree Completion

Variable	Degree persistence						Degree completion					
	Men			Women			Men			Women		
	SIE	MIE	t	SIE	MIE	t	SIE	MIE	t	SIE	MIE	t
Age	.014	.006	.61	-.030	-.014	-1.28	.014	.006	.60	-.028	-.014	-1.22
Secondary-school academic achievement	.160	.041	4.97**	.108	.028	3.95**	.154	.043	4.82**	.117	.033	4.44**
Secondary-school social accomplishment	.074	.039	2.97**	.021	.011	1.13	.064	.036	2.52*	.012	.006	.63
SES	-.007	-.002	-.32	.015	.005	.77	-.004	-.001	-.16	.021	.007	1.07
Financial concern	.017	.013	.83	-.008	-.006	-.46	.008	.006	.36	-.005	-.004	-.29
Work expectations	-.030	-.017	-1.34	-.001	-.000	-.04	-.022	-.013	-.98	-.001	-.001	-.06
Ethnicity	.048	.048	2.20*	.033	.033	1.76	.059	.063	2.61**	.036	.039	1.95
Expected major	.023	.027	1.22	.029	.029	1.69	.020	.025	1.02	.030	.032	1.79
Marital status	.008	.022	.37	.038	.083	1.83	.010	.029	.43	.037	.088	1.83
Goal commitment I	.007	.004	.36	-.014	-.010	-.95	.007	.005	.36	-.013	-.010	-.90
Institutional commitment I	-.007	-.002	-.35	.006	.002	.41	-.006	-.003	-.33	.003	.001	.23
Social integration	.022	.013	1.97*	.004	.002	.80	.024	.016	2.02*	.002	.001	.45
Academic integration	.048	.015	3.07*	.002	.001	.56	.052	.017	3.25**	.001	.000	.39
Institutional commitment/satisfaction II	—	—	—	—	—	—	—	—	—	—	—	—

* $p < .05$; ** $p < .01$.

Table 4 not only shows the standardized and unstandardized indirect effects of each variable on persistence but also indicates their statistical significance.

As Table 4 shows, five variables had significant indirect effects on both persistence measures for men, whereas only one variable had a significant indirect effect for women. For both sexes, secondary-school academic achievement had significant positive indirect effects on degree persistence and degree completion, primarily through its significant, direct influence on academic integration at the last institution attended. For men, the positive indirect effects of secondary-school social involvement on both persistence measures were transmitted primarily through collegiate social integration. Being a white male had a positive indirect influence on persistence, largely through institutional commitment/satisfaction II and academic integration. Finally, in addition to significant direct effects, male social and academic integration had significant positive indirect effects on persistence through their influence on institutional commitment/satisfaction II.

Because of the significance of social integration as a positive influence on both measures of persistence, an additional analysis was conducted that disaggregated the overall scale by specific type of social integration. In the first part of this analysis, partial correlations were computed between each persistence measure and each of the five types of integration constituting the social integration scale. These partial correlations controlled for every other predictor in the causal model with the exception, of course, of social integration. Subsequently, the five types of integration were substituted for the social integration scale in the direct effects equation, and the regression weights with each persistence measure were computed, controlling for all other predictors and each of the other types of social integration.

The results of these analyses are summarized in Table 5. As the table indicates, knowing a faculty member or an administrator personally had the strongest significant partial associations with both degree completion and degree persistence for men. This variable was also the only one to have a significant positive regression weight with each persistence measure. For women, a somewhat different pattern emerged. Editing school publications had significant, positive partial correlations with each persistence measure. Being president of a student organization had a positive partial correlation for female degree persistence and a marginally significant ($p < .06$) partial correlation with degree completion.

CONCLUSIONS AND DISCUSSION

This paper proposes a causal model, based on the work of Tinto (1975), to explain the long-term persistence/withdrawal behavior of students who

TABLE 5. Simple Correlations (*r*), Partial Correlations (*pr*), and Regression Weights (Beta, *b*) with Degree Persistence and Completion for Each Type of Social Integration^a

	Degree persistence				Degree completion							
	Men		Women		Men		Women					
	<i>r</i>	<i>pr</i>	Beta (<i>b</i>)	<i>r</i>	<i>pr</i>	Beta (<i>b</i>)	<i>r</i>	<i>pr</i>	Beta (<i>b</i>)			
1. Know at least one professor or administrator personally	.231	.165**	.150** (.142)	.164	.091	.073 (.068)	.268	.200**	.174** (.177)	.117	.041	.026 (.026)
2. President of one or more student organizations	.100	.046	.018 (.027)	.191	.120*	.089 (.152)	.157	.111*	.076 (.122)	.172	.098	.068 (.126)
3. Major part in a play	.059	.056	.039 (.118)	.077	.049	.031 (.069)	-.032	-.031	-.044 (-.143)	.032	.004	-.002 (-.006)
4. Win a varsity letter	.056	.074	.068 (.104)	.017	-.000	.002 (.005)	.019	.033	.026 (.043)	.070	.041	.038 (.095)
5. Edit the school paper, yearbook, or literary magazine	-.001	-.003	-.006 (-.019)	.093	.099*	.072 (.158)	.001	-.004	-.009 (-.032)	.104	.113*	.087 (.208)

^aPartial correlations (*pr*) control for all other main-effects variables in the model; beta (and *b*) control for all other variables in the model plus each of the other types of social integration.

p* < .05; *p* < .01.

initially enrolled in two-year institutions. The term *persistence/withdrawal behavior*, as used in the study, is essentially a measure of the student's persistence in or withdrawal from the system of higher education. It was operationally defined in terms of completing, or persisting in the pursuit of, the bachelor's degree. Degree completion was the completion of a bachelor's degree within the nine-year period 1971–1980. Degree persistence was operationally defined as completing a bachelor's degree within the nine-year period or actively working toward the bachelor's degree as of 1980. A 14-variable model accounted for 19.7% of the variance in persistence in pursuing the bachelor's degree for men and for 15.3% of the variance in the corresponding persistence measure for women. The same model accounted for 25.4% of the variance in male bachelor's degree completion and for 22.8% of the variance in female degree completion.

Although these percentages are quite modest, they nevertheless compare favorably with those in other multi-institutional studies (e.g., Munro, 1981; Pascarella and Chapman, 1983) that trace persistence/withdrawal behavior over a substantially shorter period of time than the nine-year period covered by this investigation. Previous research has generally supported the predictive validity of Tinto's model for samples of students initially enrolling in four-year institutions. The present study suggests that the model is also reasonably useful in accounting for the long-term persistence/withdrawal behavior of individuals who begin their postsecondary education careers in two-year institutions.

Perhaps more significant than the overall variance percentages explained by the model, however, are the patterns of direct and indirect effects of variables in the model. Only four student background characteristics and initial commitments had significant direct effects on the two persistence measures, when all other variables in the model are controlled for. For men, secondary-school achievement had a positive direct effect on degree completion, whereas male degree completion was negatively influenced by commitment to the initial institution of enrollment. For women, socioeconomic status had a positive direct effect on degree persistence, and secondary school social involvement positively influenced degree completion. None of the background characteristics or initial commitments, however, had a consistent pattern of significant direct effects across both persistence measures and for each sex.

In line with theoretical expectations based on the model, the two variables with the most consistent pattern of significant positive effects on degree persistence and degree completion were academic and social integration. Indeed these two core concepts in Tinto's (1975) model were the only predictors to have significant direct effects on both persistence measures for men and women. Additional significant indirect effects were found for these

variables on both male degree completion and male degree persistence. Such findings tend to further underscore the concept of person-environment fit as an important determinant of persistence in postsecondary education. In this study, students who initially enrolled in two-year institutions were significantly more likely either to obtain or to persist in the pursuit of the bachelor's degree if they became successfully integrated into the academic and social systems of the last institution attended. Conversely, students less successfully integrated into these components of the institutional environment were less likely to persist.

Previous research has suggested the salience of social and academic integration in predicting what is essentially the short-term institutional-persistence/withdrawal behavior of students initially enrolling in traditional four-year institutions (e.g., Munro, 1981; Pascarella and Terenzini, 1983; Terenzini and Pascarella, 1977, 1978). The present findings extend this work by suggesting the importance of these two core concepts in accounting for the long-term postsecondary-education persistence of students initially enrolling in two-year institutions.

Aside from providing further support for the saliency of person-environment fit as an influence on student persistence/withdrawal behavior, the findings may also have potential policy implications. The relative importance of academic and social integration in predicting persistence suggests that what happens to a student after he or she enrolls at an institution may be as important to ultimate persistence in postsecondary education as the influence of precollege variables.⁵ In short, the student's experience of college may have an important, unique influence on system persistence beyond that of differences in family background, secondary-school experiences, individual attributes, and the initial commitments with which he or she enters college. Thus, it may be possible to enhance student persistence in postsecondary education through purposeful institutional policies and practices designed to enhance student social and academic integration.

Consistent with the findings of Pascarella and Terenzini (1983), the results of this study suggest significant differences in the factors influencing persistence for men and for women. Subsequent institutional commitment had a significantly stronger positive influence on both persistence measures for men than it did for women. Conversely, level of secondary-school social involvement was a significantly more important positive influence on both persistence measures for women than for men. Such findings suggest the importance of conducting separate analyses for men and women in future investigations of the factors influencing student persistence/withdrawal behavior. Pooling male and female samples may mask important differences in the patterns of effects on persistence.

The finding that the degree of commitment to the last undergraduate

institution attended had a significant, positive direct effect on persistence for men but not for women is of some interest. For men, of course, the results are quite consistent with theoretical expectations based on the model. Not only did subsequent institutional commitment/satisfaction positively and directly influence male persistence, but it also transmitted the positive indirect effects of male social and academic integration on persistence. For women, none of the corresponding direct or indirect effects were significant, a finding that is inconsistent with the model's expectations.

It is somewhat difficult to compare these results with those of previous research because no existing studies have disaggregated men and women in two-year college samples. Pascarella and Chapman (1983) found that subsequent institutional commitment played a significant role in the persistence of two-year college freshmen, but their study is of little help because it traces persistence/withdrawal only over a single year. Tentatively, what can be concluded from the present findings is that the long-term degree completion and persistence of women initially enrolling in two-year institutions are generally independent of their degree of commitment/satisfaction with the last undergraduate institution attended. Conversely, corresponding institutional commitment/satisfaction would appear to play a substantially more positive role in male degree persistence and completion. Because such differential findings are so at odds with the theoretical expectations of the model, however, their validity would be enhanced through replication.

Although only a few student background characteristics had significant direct effects on student persistence, several of these variables (e.g., ethnicity and secondary-school social and academic accomplishment) significantly influenced subsequent variables in the model, which, in turn, directly influenced persistence. Thus, a substantial part of their influence on persistence was indirect, transmitted through intervening variables in the model such as academic integration, social integration, and subsequent institutional commitment/satisfaction. This trend, however, was somewhat more pronounced for men than for women.

Because the core concept of social integration had consistently significant direct effects on both measures of persistence for men and women, an additional analysis was conducted to determine which specific types of social integration were most important. When the influence of all other predictors in the model was controlled for statistically, the types of social integration with significant positive associations with persistence differed somewhat by sex. For men, knowing a faculty member or administrator personally had by far the strongest positive associations with both persistence measures. This finding is consistent with earlier research using single institution samples, which indicates that the frequency and the quality of informal interaction with faculty have a unique, positive influence on stu-

dent persistence (Pascarella and Terenzini, 1979, 1980; Spady, 1971; Terenzini and Pascarella, 1977, 1978). The present study thus provides additional evidence that the personal relationships that students develop with faculty and staff are a potentially significant factor in their persistence/withdrawal behavior.

For women, knowing a faculty member or administrator had significant zero-order correlations with each persistence measure, but these became nonsignificant when the influence of other variables in the model was taken into account. The types of social integration with the strongest significant partial associations with the two persistence measures for women represented leadership activities (i.e., editing school publications or being the president of student organization). Thus, it would appear that the types of institutional social integration that most enhance the degree persistence and completion of women are those that permit the exercise of their leadership skills. This trend, however, is not as pronounced as the importance of knowing faculty and staff was for the male sample.⁶

NOTES

1. On all scales where the individual items were on a different metric (i.e., socioeconomic status, secondary-school achievement, and academic integration), a two-step procedure was used to develop scores. First, all items were standardized, and second, the score for each person was obtained by summing across standardized items. A constant of 20 was added to eliminate negative scores. Thus, the mean score on these variables is a reflection more of the constant added than of the raw score.
2. Clearly these two key measures in Tinto's model suffer from brevity and a degree of superficiality, dictated in large measure by the available data. For example, the operational definition of academic integration is essentially academic performance. Tinto's concept of academic integration included grades but also encompassed the fuller notion of student intellectual development. Similarly, the social integration measure assessed a number of activities that, with one exception ("knew a professor"), occur quite rarely (e.g., editor of a publication or president of a student organization). Absent from this measure were assessments of the quality and impact of interactions with peers and faculty. Although the terms *academic integration* and *social integration* were used in the study for purposes of consistency with the nomenclature of the model, it is recognized that these are incomplete assessments of Tinto's concepts.
3. Because of the possibility of a selective, nonrepresentative response on the follow-up survey, the Cooperative Institutional Research Program data contain a weighting algorithm to adjust for response bias. All analyses reported in this paper are based on weighted sample estimates adjusted to the actual sample size to obtain correct degrees of freedom. Parallel sets of analyses were conducted with weighted and unweighted samples. Although there were only trivial differences in the results, the weighted estimates are reported. It should be further pointed out that initial oversampling of minority students in the 1980 follow-up means that minority students are somewhat overrepresented in the sample analyzed in the study. A series of analyses conducted to determine if there were substantive differences in the variables influencing persistence or degree completion across ethnic categories, however,

yielded generally non-significant results. Thus, the overrepresentation of minorities in the sample would not appear to appreciably bias the results.

4. 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 multiple-regression results are quite robust with respect to a skewed, dichotomous dependent variable, particularly when the percentages are as nearly equal as in this study (i.e., 70% to 30% or more).
5. Additional evidence for this assumption is suggested by the relative variance increments in persistence associated with precollege variables (i.e., background traits and initial commitments) and college experience variables (i.e., academic integration, social integration, and institutional commitment/satisfaction II). A series of hierarchical analyses conducted according to the causal sequence of the model entered these variables in sets. The 11 precollege measures were entered first, followed by the 3 college experience measures. For degree persistence, precollege traits alone were associated with an R^2 of .063 for men and .062 for women. The corresponding R^2 increases associated with the addition of the college experience variables to the equations were .134 for men and .091 for women. For degree completion, the R^2 increments for precollege variables were .113 for men and .144 for women, and the R^2 increases associated with the college experience measures were .141 for men and .084 for women.
6. This study is limited in several ways that should be kept in mind when one is interpreting the findings. First, it has the basic limitation of nearly all secondary analyses. Specifically, the original data may have been collected for purposes quite different from those of the individual conducting secondary analyses. In this sense, we were limited in our operational definitions of the constructs in Tinto's model by the actual data existing on the CIRP tapes. Although a valuable database in their own right, the CIRP data permitted operational definitions of constructs in Tinto's model that should be considered only the best available approximations from the existing data of what Tinto had in mind. More extensive, in-depth, operational definitions may have provided for a better estimation of the predictive validity of Tinto's constructs.

A second, and related, limitation of the study derives from the fact that the CIRP data had only one follow-up over the nine-year period of the study. Thus, elements of a number of the model's constructs relating to the student's experience of college (e.g., social integration, academic integration, and institutional commitment/satisfaction II) were recalled retrospectively. Obviously, such retrospective assessments may weaken the reliability of the constructs measured and may increase the *ex post facto* nature of the investigation.

An additional, related limitation of the study is that the CIRP data assessed the student's experience of college only for the last institution attended. For some students, this was a four-year institution to which they had transferred, whereas for others, it was the two-year college in which they had initially enrolled. For such concepts as social integration, the mere fact of transferring from a two-year to a more traditional four-year college may have provided substantially greater opportunities for social involvement. Thus, one alternative hypothesis for the findings is that social integration was positively associated with student persistence in this study primarily because it reflected the fact that students who persisted after, or completed, the bachelor's degree had to transfer from two-year colleges to institutions with increased opportunities for social involvement and participation.

To test this hypothesis, we conducted an additional analysis that selected only those students who had attended at least two institutions. This analysis eliminated students who had dropped out of postsecondary education without progressing beyond the two-year college in which they had initially enrolled. Regression of the two persistence measures on

the variables of the model yielded results that differed little from those shown in equations 15 and 16 in Tables 2 and 3. The significant direct effects of academic integration remained unchanged, and the direct effects of social integration were essentially unchanged in significance and magnitude in three of the four equations. Only in the prediction of male degree persistence was the alpha level for social integration greater than .05 ($p < .07$). Such evidence suggests that the positive influence of social integration on degree persistence and degree completion is not simply a function of transfer from two-year institutions to more traditional institutions characterized by increased opportunities for social involvement.

REFERENCES

- Aitken, N. (1982). College student performance, satisfaction and retention: Specification and estimation of a structural model. *Journal of Higher Education* 53: 32-50.
- Astin, A. (1975). *Preventing Students from Dropping Out*. San Francisco: Jossey-Bass.
- Astin, A. (1982). *Minorities in American Higher Education*. San Francisco: Jossey-Bass.
- Baumgart, N., and Johnstone, J. (1977). Attrition at an Australian university: a case study. *Journal of Higher Education* 48: 553-570.
- Bean, J. (1980). Dropouts and turnover: the synthesis and test of a causal mode of student attrition. *Research in Higher Education* 12: 155-187.
- Bean, J. (1982). Student attrition, intentions and confidence: interaction effects in a path model. *Research in Higher Education* 17: 291-320.
- Bean, J. (1983). The application of a model of turnover in work organizations to the student attrition process. *Review of Higher Education* 6: 129-148.
- Bean, J. (1985). Interaction effects based on class level in an explanatory model of college student dropout syndrome. *American Educational Research Journal* 22: 35-64.
- Cope, R., and Hannah, W. (1975). *Revolving College Doors: The Causes and Consequences of Dropping Out, Stopping Out and Transferring*. New York: Wiley-Interscience.
- Goodman, L. (1976). The relationship between the modified and more usual multiple regression approaches to the analysis of dichotomous variables. In D. Heise (Ed.), *Sociological Methodology, 1976*, pp. 83-110. San Francisco: Jossey-Bass.
- Kerlinger, F., and Pedhazur, E. (1973). *Multiple Regression in Behavioral Research*. New York: Holt, Rinehart and Winston.
- Kohen, A., Nestel, G., and Karmas, C. (1978). Factors affecting individual persistence rates in undergraduate college programs. *American Educational Research Journal* 15: 233-252.
- Lenning, O., Sauer, K., and Beal, P. (1980). *Student Retention Strategies*, AAHE-ERIC/Higher Education Research Report No. 8. Washington, DC: American Association for Higher Education.
- Mortimer, K., et al. (1984). *Involvement in Learning: Realizing the Potential of American Higher Education*, Report of the Study Group on the Conditions of Excellence in American Higher Education. Washington, DC: National Institute of Education.

- Munro, B. (1981). Dropouts from higher education: path analysis of a national sample. *American Educational Research Journal* 18: 133-141.
- Pantages, T., and Creedon, C. (1978). Studies of college student attrition: 1950-1975. *Review of Educational Research* 48: 49-101.
- Pascarella, E., and Chapman, D. (1983). A multiinstitutional, path analytic validation of Tinto's model of college withdrawal. *American Educational Research Journal* 20: 87-102.
- Pascarella, E., Duby, P., and Iverson, B. (1983). A test and reconceptualization of a theoretical model of college withdrawal in a commuter-institution setting. *Sociology of Education* 56: 88-100.
- Pascarella, E., and Terenzini, P. (1979). Interaction effects in Spady's and Tinto's conceptual models of college dropout. *Sociology of Education* 52: 197-210.
- Pascarella, E., and Terenzini, P. (1980). Predicting persistence and voluntary dropout decisions from a theoretical model. *Journal of Higher Education* 61: 60-75.
- Pascarella, E., and Terenzini, P. (1983). Predicting voluntary freshman year persistence/withdrawal behavior in a residential university: a path analytic validation of Tinto's model. *Journal of Educational Psychology* 75: 215-226.
- Ramist, L. (1981). *College student attrition and retention*, College Board Report No. 81-1. New York: College Entrance Examination Board.
- Sobel, M. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. In S. Leinhardt (ed.), *Sociological Methodology 1982*, pp. San Francisco: Jossey-Bass.
- Spady, W. (1970). Dropouts from higher education: an interdisciplinary review and synthesis. *Interchange* 1: 109-121.
- Spady, W. (1971). Dropouts from higher education: toward an empirical model. *Interchange* 2: 38-62.
- Terenzini, P., and Pascarella, E. (1977). Voluntary freshman attrition and patterns of social and academic integration in a university: a test of a conceptual model. *Research in Higher Education* 6: 25-43.
- Terenzini, P., and Pascarella, E. (1978). The relation of students' precollege characteristics and freshman year experience to voluntary attrition. *Research in Higher Education* 9: 347-366.
- Terenzini, P., Pascarella, E., Theophilides, C., and Lorang, W. (1983, May). A replication of a path analytic validation of Tinto's theory of college student attrition. Paper presented at the annual meeting of the American Educational Research Association, Montreal.
- Tinto, V. (1975). Dropout from higher education: a theoretical synthesis of recent research. *Review of Educational Research* 45: 89-125.
- Wolffe, L. (1985). Applications of causal models in higher education. In J. Smart (ed.), *Higher Education: Handbook of Theory and Research, Vol 1*, pp. 381-414. New York: Agathon Press.
- Wolffe, L., and Ethington, C. (1984). A program for standard errors of indirect effects in recursive causal models. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.