Persist/Dropout Differences In Pre-matriculation Attitudes Of Freshman Towards College Attrition: A Longitudinal Multiple Group Structural Equations Model

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ABSTRACT

This study proposes a structural equations model of college student attrition based on pre-matriculation freshman attitudes. The study uses a survey administered annually from 1995 to 1999 and tracks persistence and dropout behavior for five years until the last cohort graduated. It discusses seven constructs of pre-matriculation freshman attitudes that resemble the Cabrera, Nora, and Castañeda (1993) model of College Persistence that was based on attitudes of first-to-second year enrolled college students. We applied our survey to a Northeastern sectarian private college. Our model includes external factors such as financial attitude, and endogenous variables such as academic reputation, social integration, institutional commitment, goal commitment, academic performance, and intent to persist. In addition to the variables related to the Cabrera model, we added two measures of social integration, "political interests" and "concern-for the disadvantaged" because these were suitable to the type of college which hosted the study. Results provide a multiple group comparative and predictive model of student attrition for annual use by the Dean of Student Affairs in designing proactive plans and implementing intervention strategies to enhance student retention.

INTRODUCTION

*W*hat pre-matriculation attitudes of entering freshman could be valid for predicting college student attrition? There is a solid theoretical foundation that addresses factors affecting student enrollment persistence and degree completion (Astin, 1975; Bean, 1982; Pascarella & Terenzini, 1980; Tinto, 1975). The theory of college persistence has validated models of interactive and causal links between student background, educational and institutional commitment, and academic and social integration (Cabrera, Casteneda, Nora, & Hengstler, 1992; Cabrera, Nora, & Casteneda, 1993). A central interest of college persistence studies has been to determine the validity of such models across different groups within an institutions and across institutions (Bordes, Sand, Arredondo, Kurpius, & Rayle, 2006; Leppel, 2002; Mannan, 2007; Marsh & Grayson, 1990; Newman & Newman, 1999). Though most authors study retention at the first-to-second year stage, when students often dropout, there is a growing literature on longitudinal studies of retention beyond the freshman year (DesJardins, Ahlburg, & McCall, 2002). In addition, a central concern in college administration is to anticipate, and if possible mitigate the rate of dropouts, by using predictive student attrition models (Glynn, Sauer, & Miller, 2003; Glynn, Sauer, & Miller, 2005; Hoffman & Lowitzki, 2005; Parker, Hogan, Eastabrook, Oke, & Wood, 2006; Quimby & O'Brien, 2004; Strauss & Volkwein, 2004).

This paper contributes to the literature on evaluation of pre-matriculation surveys to establish early warning systems of potential dropout students (Beck & Davidson, 2001; Glynn et al., 2003; Porter & Umbach, 2006). In order to do so, it is first necessary to test a model of pre-matriculation attitudes towards college student persistence. The purpose of this study is to work toward that model test by testing for time measurement invariance and for mean differences of constructs across attrition cohorts.

This study used a measurement instrument that included items taken from the Cooperative Institutional Research Program (CIRP) Survey plus items from in-house survey instruments utilized internally in the past. The CIRP Survey is a national study of freshmen that originated at UCLA (Astin, 1975). Recent published research has provided preliminary indications that the factor structure is highly consistent over time having established evidence of configural invariance (Glynn et al., 2005) yet no formal statistical tests were used to evaluate the metric or scalar invariance of the factor structure.

We begin by reviewing the retention model literature as this is the basis for incorporating the constructs that are included in any valid model of student retention. We next review the literature on measurement equivalence / invariance (ME/I) then proceed to a discussion of recent findings in the literature regarding the application of our freshman survey data to empirical application of a model of student retention. This is followed by application of structural equation analysis designed to test ME/I, the interactive and causal links between the constructs of the model, the mean differences between constructs, and the comparison between these variables on students who persisted until graduation and those that who at some point dropped out of college. We conclude with a discussion of our results.

THEORETICAL BACKGROUND

The bulk of published research on student retention revolves around three theoretical models: Bean's (1982) Student Attrition Model (SAM), Tinto's (1975) Student Integration Model (SIM) (Tinto, 1975) and Astin's (1975) Theory of Involvement. Because these models are all designed to provide an understanding of the causes or correlates of student attrition, in some ways they are duplicative and in others they are unique. These distinctions and similarities provide the basis for development of as well as variations and extensions of the integrated forms of the models (Cabrera, et. al. 1993). To better understand the integrated model, it is worthwhile to examine these models on which the integrated model is based. Toward this end we focus on the SIM and SAM models as they have recently been integrated into a single structural equation model (Cabrera et al 1993).

The SIM model theorizes that as students are integrated into both the academic and social elements of a college or university, the probability of a student leaving the university declines. In other words, persistence is a direct function of the congruency between the student and the institution. Studies show that this congruency is positively related to the time spent at the institution but it's development is most critical during the freshman year (Pascarella & Terenzini, 1980). This congruency is captured in SIM by the constructs representing the compatibility between a student's motivation, drive and academic ability (academic performance) and the academic (academic integration) and social (social integration) characteristics of the college or university. Furthermore, a student's commitment to an educational goal (goal commitment), to stay at the school (intent to persist) and to institutional values (institutional commitment) are essential determinants of college persistence.

In contrast, the SAM model (Bean 1982) was theoretically based on both process models of organizational turnover and the Fishbein-Ajzen model of attitude - behavior relationships (Fishbein & Ajzen, 1975). Though SAM is driven by these theoretical relationships, many constructs in the model appear to be the same as those in the SIM model and thus a major contribution is the inclusion of external factors as antecedent constructs. External factors include attitude constructs which affect intent both directly such as finances (financial attitude) and indirectly such as the influence of parents and friends mediated by institutional fits (encouragement from friends and family). In addition, some constructs (e.g., financial attitude) have both a direct and indirect effect on behavior, mediated by intent.

Integration Of The Theories And Models

Efforts to integrate the SIM and SAM models (Cabrera et al., 1993) using comprehensive tests with structural equation modeling techniques indicate that the two models are to some degree the same and in other ways complementary. In their initial effort Cabrera et al. (1992) found empirical evidence that the models (i.e., theories) were both complementary and similar. They were similar in that persistence was mediated through intent for both and two constructs were equivalent across models: "Courses" (SAM) was equivalent to "Academic Integration" (SIM); and, "Institutional Fit and Quality" (SAM) was equivalent to "Institutional Commitment" (SIM). They were complimentary in that SAM included external factors that had a significant effect on persistence while SIM had not.

In a more comprehensive test of the nomological validity of SAM and SIM Cabrera et al. (1993) design a single baseline model that integrates the structural relationships of the constructs in the two models. To evaluate similarities they perform confirmatory factor analysis on the measurement properties of the two sets of constructs that were found to be equivalent in the Cabrera et al. (1992) study. Confirming this identity facilitated integration of the two models and determination of complimentary contributions of each. Furthermore Cabrera, et al added a "significant other" construct not found in either SIM or SAM, but evident from other research, that had significant effect on persistence, thereby further expanding the integrated model. The main results of the statistical test of this expanded integrated model revealed that the effects of external or background variables were stronger and more complex than portrayed and confirmed in empirical tests of the SAM model alone.

While the development and refinement of the SAM and SIM models has taken a descriptive approach and at times a normative one and thus contributed much to our understanding of the attrition process and its antecedents, there is, nevertheless, a need to be able to predict which students might be most prone to premature departure from the university based upon data collected prior to and during matriculation. As such we will next compare the indicator variables and constructs in our model with those of the comprehensive model of Cabrera et al. (1993).

Our Model

The received view illustrated above, in particular by the Cabrera et al. (1993) model, supports the inclusion of external and endogenous variables. The model includes external factors that affect student attrition directly, such as "Financial Attitude," and other complex background constructs. In addition, the model includes endogenous variables such as "Academic integration," "Social integration," "Institutional Commitment," "Goal Commitment," and "Intent to Persist"-- (perceived probability of academic success). A measure of academic performance is included-- (GPA). The main dependent variable is "Persistence" – a variable indicating whether a student remained enrolled from matriculation to graduation (not necessarily in four years), or at some point dropped out of college usually by the second year.

Our constructs follow closely those in Cabrera et al. (1993) model. However, the Cabrera et al. (1993) model uses first-to-second year freshman attitudes. Our model instead employs pre-matriculation attitudes of entering freshmen, which indicates pre-college attitudes towards possible college student attrition. We use items that have been tested in previous research (Glynn et al., 2003). In addition, previous research had established configural invariance for the latent variables used here (Glynn et al., 2005). Brief descriptions of this study's constructs are summarized as follows. First, our model includes an external factor of "Financial Attitude." Perception of tuition costs and other college expenses suggests that "Financial Attitude" is an important factor in choosing a college and may play a role in decisions to withdraw. We include in our model various endogenous variables. Perceived "Academic Reputation" is a belief influencing the attitude regarding a student's eagerness to participate in the college's academic experience. Academic reputation is indicative of the likelihood of academic integration and is a factor in improving student retention (Tinto, 1993).

We include two constructs related to social integration, "Concern for the Disadvantaged" and "Political Interest." These constructs measure important aspects of student social integration in a sectarian private college. "Concern for the Disadvantaged" is a means to participate in extracurricular activities and for social integration. In like manner, "Political Interests" may serve as the catalyst for social integration. Both could result in extracurricular

activities that contribute to social integration, an important factor in student retention (Cabrera et al., 1993; Tinto, 1993). Moral or religious attitudes signal the student "Institutional Commitment" to the mission of our sectarian private school. "Goal UN-Commitment" reveals the ex-ante uncertainty of maintaining the career goals stated by the student, which is indicative of the probability of academic failure in college. Goal Commitment has been shown to be related to retention (Cabrera et al., 1993).

We added correlations between constructs in our model that the Cabrera et al. (1993) model suggests that are affected by other background variables not included in this study. We included a correlation between "Academic reputation" and "Financial Attitude" because Cabrera et al (1993) indicates a direct relationship of financial attitude on academic integration. We did not use a direct relationship because academic integration has not materialized at the pre-matriculation stage, hence the correlation between financial attitude and academic reputation might be present whereas a direct effect is questionable. In addition, we added correlations between "Financial Attitude" and the two constructs of "Social Integration" namely "Concern for the Disadvantaged" and "Political Interest" to control for the interactions of other possible external variables suggested by the Cabrera et al. (1993) model.

We departed from Cabrera et al. (1993) by not including the "Persistence" construct. Instead, we divided the sample into two mutually exclusive groups of dropout students (Dropout) and students who persisted (Persist). We did not include "Academic Performance" because in the Cabrera et al. (1993) model it was measured only with one item namely GPA. This population of pre-matriculation freshman has not taken a college course so there is no evidence of academic performance measured by grade point average (GPA). We did not use other pre-college GPA because there are serious limitations of using high-school grades to predict college persistence (Hoffman & Lowitzki, 2005).

Figure 1 shows a stylized model of first-to-second year college student attrition based on freshman attitudes (Bean, 1982; Cabrera et al., 1993; Tinto, 1993) compared against our hypothesized model of pre-matriculation attitudes of entering freshman toward college student attrition.

Figure 1
Pre-matriculation Attitudes model compared to a Stylized model of College Student Attrition
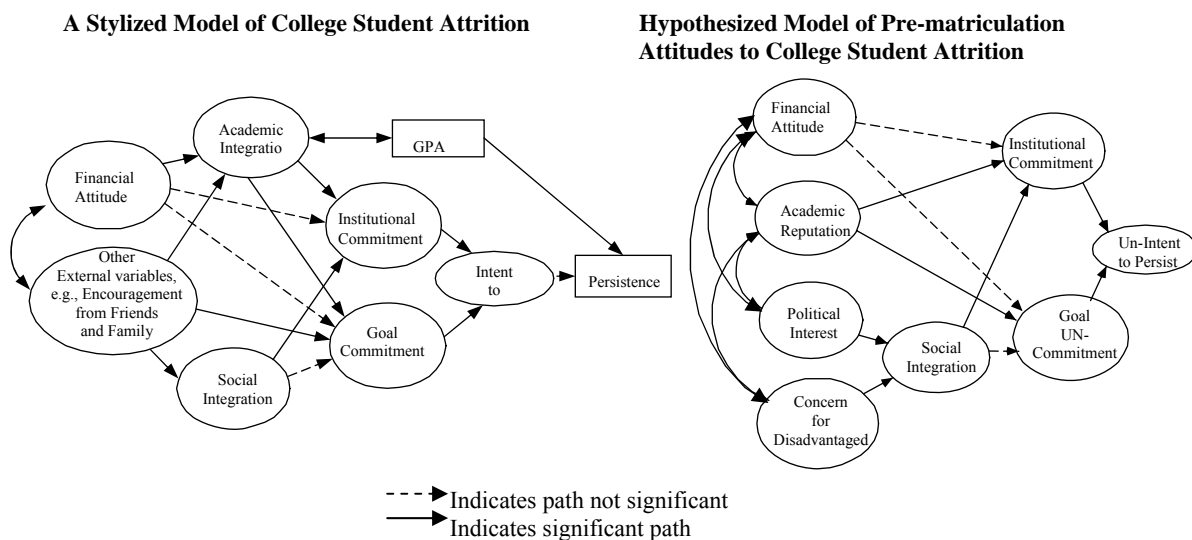
While there have been excellent empirical tests of these models that help to qualify the results according to characteristics such as type of institution, there has not been an effort made to assess the temporal invariance of the measurement and structural parameters that constitute the construct relationships. Such invariance is essential if the model is to be applied in a normative way from school year to school year. We proceed to review the literature on measurement invariance.

Measurement Invariance

Though psychometric properties of scales are sometimes reported, tests for measurement equivalence/invariance (ME/I) are rarely performed. Establishing ME/I is most critical when a scale is to be employed to measure characteristics of different demographic groups or temporal cohorts. Measurement invariance is the equality or equivalence of estimated parameters of a model when applied to data across different population groups (e.g., cross-cultural invariance) or over time (e.g., longitudinal or temporal invariance). Measurement invariance is achieved when operations yield measures of the same attribute under different conditions (Meade & Lautenschlager, 2004). In our study the "condition" across which we wish to assess invariance is caused by the passage of time and by different outcome of persistence namely "dropout" or "persist". Specifically, we are interested in determining if metric invariance is observed for freshman students matriculating in the year 1995 will be the same as for freshman matriculating in years 1996, 1997, 1998, and 1999; as well as for dropout students in comparison to students that persist until graduation following uninterrupted continuing enrollment for up to five years after admission.

The literature on ME/I has tended to focus on factor analytic structures where multiple indicators are used to measure latent constructs (Vandenberg & Lance, 2000). Equivalence in dimensions of constructs and invariance in correlation between constructs and manifest indicator variables are key concerns. The relevant ME/I tests are designed to measure if factor loadings are invariant across years and across groups (metric invariance), and if the intercepts of variables for corresponding items across groups are invariant (scalar invariance) (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). Specifically we are concerned with establishing longitudinal or time invariance across freshman cohorts from 1995 to 1999. The reason for concern is twofold. First, before any model can be empirically employed to statistically test differences in responses leading to norms for decision making, the invariance of constructs must first be established (Vandenberg & Lance, 2000). Second, concern is heightened that the constructs may not be consistent over time because of cultural changes that have occurred in our society (Guiffrida, 2006; Thornburgh, 2006) resulting in probable lack of invariance in constructs across time. It is therefore important that time invariance be established and consistently evaluated over time.

Recent literature on measurement equivalence/invariance has focused on hierarchies for testing invariance (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). The recommended testing hierarchy begins with a test for equivalence of covariance structures for all variables in the model. Debate exists, however, over whether this covariance structure test should be the first test conducted. Positive test results may erroneously lead researchers to conclude invariance exists and not follow up with more specific tests that may indicate otherwise. Steenkamp and Baumgartner (1998) propose beginning with a test for configural invariance. The choice of which tests to perform also depends upon the goals of the research. "If the purpose is to explore the basic meaning and structure of the construct … the minimum requirement is that the same pattern of (zero and nonzero) factor loadings is found" (Steenkamp and Baumgartner, 1998, p. 82). This minimum requirement is satisfied by a test for configural invariance.

First, we evaluated configural invariance as proposed by Steenkamp and Baumgartner (1998). Configural invariance requires that the pattern of salient and non-salient factor loadings be the same across freshman cohorts (time), that the data fit the factor model well for all freshman cohorts and that the correlation between factors be small to non-significant (Steenkamp & Baumgartner, 1998). For purposes of this research we define a salient loading as one whose absolute value exceeds 0.5.

Second, we evaluated metric invariance, which requires that the values of the factor loading be statistically equal (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). This can be tested using confirmatory factor analysis (CFA) in which the parameters of the factor loadings are constrained to be equal across groups and the same manifest indicators are specified to load on the same factors across cohorts (Arbuckle & Wothke, 1999). The third test of scalar invariance requires that the intercept term for each observed variable for each construct be invariant across groups (Steenkamp and Baumgartner 1998; Vandenberg and Lance 2000). However, scalar invariance need not be tested if there is reason to expect that the latent constructs means are different across groups, such as would be expected across the two groups of dropout versus persist students. Vandenberg and Lance (2000) indicate that "intercept differences may not reflect biases (undesirable) but response threshold differences that might be predicted based on known group differences (desirable), for example, between inexperienced versus highly experienced employees. Thus, whether this invariance test should be undertaken depends greatly on the substantive context underlying the study." (p. 38).

Finally, we tested the structural equation model based on our hypothesized model of Pre-matriculation entering freshman attitudes to college student attrition presented on Figure 1. We proceeded to compare the causal relationships for three groups with pooled, dropout, and persist samples. We constrained the three groups to have equal factor loadings (i.e., full metric invariance).

METHOD

Data

Our college administers its freshman attitude and opinion survey (FAOS) annually to incoming freshman students prior to the beginning of classes. A combination of items from the CIRP plus other items from past in-house studies provided the final set of seventy nine items in our FAOS instrument. This FAOS instrument consists of five sections measuring both high school experiences and anticipated college and post-college experiences and career plans. It spans a variety of topics from family values to politics, religion and social responsibility to financial considerations and social relationships, and attributes of the college included in the decision to enroll. All of the seventy nine items in the survey can serve as potential indicator variables in a structural equation model. A subset of these variables has been employed as indicators of twelve latent constructs that are used in the predictive model of Glynn et al. (2003). We take items from this subset that are suitable for assessing the indirect and causal relationships among constructs expressed in our structural equations model.

Variables

We are using a set of constructs measuring aspects of pre-matriculation attitudes of entering freshman toward college student attrition.

External factors

As measures of external factors we included "Financial Attitude." In addition, we included correlations between financial attitudes and both constructs of social integration to control for the influence other external constructs.

Endogenous factors

We measured "Academic Reputation", "Social Integration", "Institutional Commitment", "Goal UN-commitment", and "UN-intent to persist". We included two constructs related to social integration, "Concern for the Disadvantaged" and "Political Interest". We divided the sample in two groups, dropout and persist. This allows us to compare factor means and test for differences in structural relations among constructs across groups, thus avoiding the necessity of including a dichotomous single indicator variable in the model to represent the endogenous attrition construct and measurement difficulties associated with it.

Sample

The samples are taken from incoming freshman population at admission. Our samples consist of about 95% of the freshman entry population for every year. In this study we use the samples of freshman students from 1995 to 1999 with the year of matriculation defining the cohort for that year. This study uses a sample of convenience given by privileged access to our college data. To mitigate the lack of random sampling, we calculated bootstrap means for the factor loadings of the measurement model. We calculated bootstrap means using one thousand random sub-samples and maximum likelihood. Bootstrapping allows calculating ranges of 95% of confidence for each parameter (Arbuckle, 2003a; Efron, 1987). Both means and confidence ranges are indicators that permit generalization to the undergraduate population of a typical Northeastern sectarian private college.

Multiple Group Data Analysis

In employing AMOS 6.0 to test for metric invariance, we constrained the factor loadings in both the confirmatory factor analysis (CFA) and the structural equations model to be equal across the freshman cohorts from 1995 to 1999. An unconstrained model is estimated and serves as the base model against which constrained models are evaluated. The difference between two χ^2 statistics representing two nested models is itself χ^2 distributed with degrees of freedom equal to the difference between the degrees of freedom of the unconstrained and constrained models. A significance level in the χ^2 difference statistics higher than 0.05 indicates that there is full metric invariance (Arbuckle, 2003b).

In addition to using the χ^2 difference test, other measures of fit are recommended to verify that the metric and scalar invariant models do indeed fit well. These fit measures include the Comparative Fit Index (CFI) -- Acceptance Level $\geq$ 0.95; the Delta 2 or Incremental Fit Index (IFI) -- Acceptance Level $\geq$ 0.95; the Normed Fit Index (NFI) -- Acceptance Level $\geq$ 0.95; the Tucker Lewis Index (TLI) -- Acceptance Level $\geq$ 0.95; and, RMSEA – Acceptance Level < 0.06 (Hu & Bentler, 1999). The CFI, IFI, NFI, TLI, and RMSEA indices are recommended for comparative fit analyses in educational research (Schreiber, Nora, Stage, Barlow, & King, 2006). The CFI, IFI and RMSEA indices have been found more robust in previous organizational research (Shook, Ketchen-Jr., Hult, & Kacmar, 2004).

RESULTS

Measurement Properties And ME/I Tests

Table 1 shows the ME/I tests for full metric invariance of the samples from 1995 to 1999, and Pooled, Dropout and Persist samples. The Pooled sample has full metric invariance from 1995 to 1999 (^{2} differences p = 0.08 > 0.05) which is indicative that these yearly cohorts of students respond to our survey items with the same metric scale. In addition, tests that compare the three groups Pooled, Persist and Dropout samples (^{2} differences p = 0.85 > 0.05), or separately the two groups Persist versus Dropout samples (^{2} differences p = 0.30 > 0.05) also indicate full metric invariance.

Table 1
Measurement Equivalence/ Invariance tests

	df	χ^2 diff[a]	P	NFI[b]	TLI[b]	IFI[b]	CFI[b]	RMSEA[b]
Time invariance 1995-1998 versus 1999	8	14.04	0.08	0.98	0.98	0.98	0.98	0.02
Pooled, Persist and Dropout[c]	16	10.31	0.85	0.98	0.98	0.99	0.99	0.02
Persist and Dropout[c]	8	9.48	0.30	0.98	0.98	0.99	0.99	0.02

[a] χ^2 differences with p>0.05 indicates that the groups compared have the same factor loadings (full metric invariance).
[b] Good fit is indicated by NFI, TLI, IFI, and CFI > 0.95 and RMSEA <0.06.
[c] Pooled= Pooled Sample 1995-1999. Persist=Split sample: graduating students from the 1995-1999 cohorts. Dropout=Split sample: dropout students from the 1995-1999 cohorts.

Table 2 shows tests for reliability, convergent validity, and discriminant validity for the pooled sample 1995-1999. The main criterion for construct reliability is the index of composite reliability (CR ≥ 0.7) (Fornell & Larcker, 1981). An additional criterion for reliability is Cronbach alpha (α ≥ 0.6). Composite reliability is more robust than Cronbach alpha (Fornell & Larcker, 1981). Table 2 shows that all the latent constructs had good reliability except one. "Concern for the Disadvantaged" had a composite reliability below the recommended level of 0.7 (CR = 0.67). The same construct had a Cronbach alpha above the recommended level of 0.6 (α = 0.64).

All the latent constructs passed the test of convergence validity and discriminant validity. A latent construct has convergence validity when the average extracted variance (AVE) is larger than 0.5 (Fornell & Larcker, 1981). A latent construct has discriminant validity if the construct's AVE is larger than any of its squared correlation with other constructs (Fornell & Larcker, 1981). On Table 2, numbers on the diagonal are the AVE for each construct. Off diagonal elements are the square values of correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Table 2
Reliability, Convergent Validity, and Discriminant Validity- Pooled sample 1995-1999

Construct Name	α	CR	AVE	FA	IC	GC	AR	EP	CD	UP
Financial Attitude	0.78	0.75	0.61	**0.61**[1]						
Institutional Commitment	0.83	0.78	0.64	0.01	**0.64**					
Goal UN-Commitment	0.90	0.88	0.79	0.00	0.00	**0.79**				
Academic Reputation	0.75	0.82	0.68	0.05	0.13	0.03	**0.68**			
Political Interest	0.79	0.76	0.52	0.00	0.08	0.00	0.05	**0.52**		
Concern for Disadvantaged	0.64	0.67	0.51	0.03	0.13	0.00	0.18	0.18	**0.51**	
UN-Intent to Persist	0.56	0.78	0.64	0.01	0.01	0.07	0.06	0.00	0.03	**0.64**

[1] The shaded numbers on the diagonal are the Average Extracted Variance. Off diagonal elements are the square values of correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements. See Fornell and Larcker (1981).

Abbreviations: Cronbach alpha (α), Composite Reliability (CR), Average Extracted Variance (AVE), Financial Attitude (FA), Institutional Commitment (IC), Goal UN-Commitment (GC), Academic Reputation (AR), Enjoy Politics (EP), Concern for Disadvantaged (CD), UN-Intent to Persist (UP).

Results in Table 3 shows standardized factor loadings of our measurement model calculated for the Pooled, Persist and Dropout samples using bootstrapping with maximum likelihood. In addition, Table 3 shows a lower and upper 95 percent confidence bias-corrected interval for the parameters of the Pooled sample. Table 3 shows that the standardized factor loadings for three items are below the recommended level of 0.7 (Bentler, 1992; Byrne, 2001), namely "I enjoy discussing political issues" corresponding to the construct "Political Interest," "Helping to promote racial understanding" loading on "Concern for the Disadvantaged," and "Believe will Drop out temporarily" loading on "UN-Intent to Persist."

Table 3
Factor Loadings Bootstrapping Estimates[1]: Measurement Model

Construct and Item Name [5]	Lower[2]	Upper[2]	Pooled[3,4]	Persist[3,4]	Dropout[3,4]
Financial Attitude					
Tuition, room, and expenses	0.62	0.78	0.70	0.73	0.71
Expected cost to you and your family	0.83	1.00	0.92	0.88	0.91
Institutional Commitment					
Jesuit academic tradition	0.83	0.92	0.87	0.88	0.83
Religious tradition	0.77	0.85	0.82	0.81	0.84
Goal UN-Commitment					
Change major field of study *	0.87	0.96	0.92	0.91	0.89
Change career plans *	0.86	0.95	0.90	0.90	0.94
Academic Reputation					
Quality of faculty	0.71	0.78	0.75	0.77	0.70
Teaching reputation	0.77	0.84	0.80	0.78	0.83
Political Interest					
I enjoy discussing political issues	0.63	0.69	0.66	0.68	0.65
Influencing the political structure **	0.69	0.75	0.72	0.74	0.70
Keeping up to date with political affairs **	0.84	0.89	0.87	0.87	0.85
Concern for Disadvantaged					
Helping people who are in need *	0.70	0.79	0.74	0.74	0.80
Helping to promote racial understanding **	0.58	0.67	0.63	0.66	0.53
Un-Intent to Persist					
Believe will Fail one or more courses **	0.66	0.85	0.74	0.72	0.76
Believe will Drop out temporarily *	0.46	0.60	0.53	0.56	0.45

[1] All parameters were significant at 0.001 level

[2] Lower and Upper boundaries of a 95% confidence interval with the bias-corrected percentile method estimated using Maximum Likelihood and 1,000 Bootsrap sub-samples from the Pooled data 1995-1999

[3] Factor loadings calculated from Means of Bootstrap sub-samples. Maximum Likelihood and 1,000 Bootstrap sub-samples were generated from each corresponding sample (Pooled, Persist and Dropout) to calculate parameters, standard errors, and significance levels.

[4] Pooled= Pooled Sample 1995-1999. Persist=Split sample: graduating students from the 1995-1999 cohorts. Dropout=Split sample: dropout students from the 1995-1999 cohorts.

[5] Some of the items on the college's Attrition Survey instrument were borrowed directly from the CIRP Values instrument – these items are signified with **. Items denoted by a single * are very close to items on the CIRP instrument – only minor changes in wording were made on these items.

Parameter Differences Between Dropouts And Persistors

Table 4 shows the test for mean differences between the Dropout and Persist groups. Two latent variables had significantly different means: "Un-Intent to Persist," and "Institutional Commitment." The mean of "UN-Intent to Persist" was higher for the Dropout group than for the Persist group (mean difference= 0.13, p< 0.001). In addition, the mean of "Institutional Commitment" was lower for the "Dropout" group than for the "Persist" group (mean difference = -0.14, p< 0.001).

Table 4
Latent Factor Mean of Dropout sample relative to Persist sample

Latent Factor Name	Factor Mean Difference[2,3]	Significance[1]
Financial Attitude	-0.02	ns
	(0.03)	
Institutional Commitment	-0.14	***
	(0.04)	
Goal UN-Commitment	-0.07	ns
	(0.04)	
Academic Reputation	-0.01	ns
	(0.03)	
Political Interest	0.02	ns
	(0.03)	
Concern for Disadvantaged	0.06	ns
	(0.03)	
UN-Intent to Persist	0.13	***
	(0.03)	

[1] *** Significance level at $p<0.001$, ns = not-significant

[2] Standard errors in parentheses

[3] Latent Factor Mean (Dropout sample) = Latent Factor Mean (Persist sample) + Factor Mean difference. Factor Mean of Latent variables of Persist sample were set equal to 0 for multiple group comparison.

Figure 2 shows the parameters of the final structural model of Pre-matriculation Attitudes toward College Student Attrition. The parameters are arranged to indicate the effects in each of the groups (Pooled/Persist/Dropout). The model was fitted for multiple group comparisons constrained for groups with the same un-standardized factor loadings (full metric invariance). The multiple group model had good fit (NFI=.95, TLI=.95, CFI=.96, IFI=.96, RMSEA=.03), which is indicated by fit indices NFI, TLI, CFI, IFI ≥ 0.95 and RMSEA < 0.06. Finally, Table 5 shows a comparison of the Persist versus Dropout standardized total effects on UN-Intent to Persist, Goal UN-Commitment, and Institutional Commitment. We show only the significant total effects.

Table 5
Comparison of Persist/ Dropout Standardized Total Effects

	UN-Intent to Persist		Goal UN-Commitment		Institutional Commitment	
	Persist	**Dropout**	**Persist**	**Dropout**	**Persist**	**Dropout**
Financial Attitude	0.02		0.08			
Institutional Commitment		-0.12				
Goal UN-Commitment	0.27	0.25				
Academic Reputation	-0.06	-0.07	-0.23	-0.17	0.27	0.19
Social Integration		-0.04			0.25	0.33
Political Interest		-0.03			0.16	0.23
Concern for Disadvantaged		-0.03			0.19	0.23

Figure 2
Final Structural Model
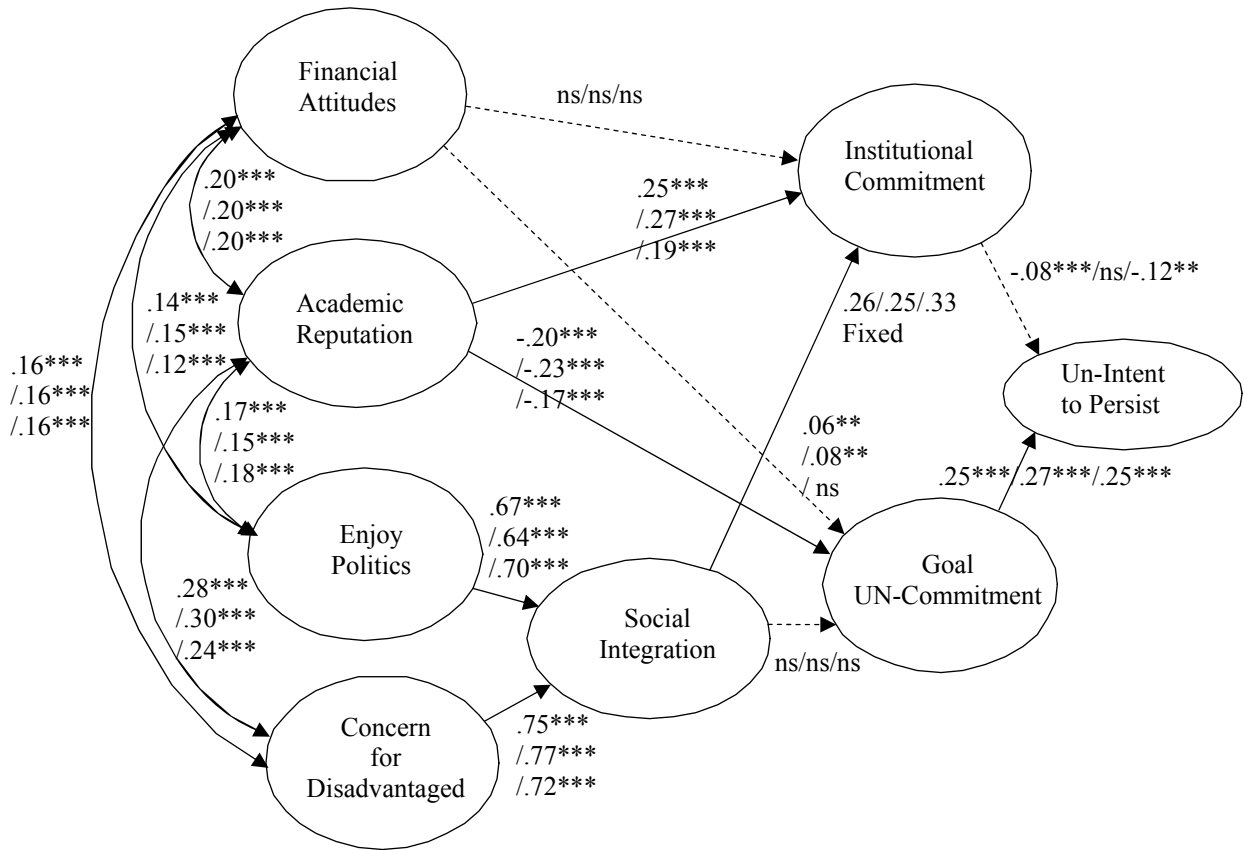
Standardized estimated parameters for Pooled/Persist/Dropout samples (multiple group comparison constrained for groups with same factor loadings). Fit indices: NFI = 0.95, TLI = 0.95, CFI = 0.96, IFI = 0.96, RMSEA = 0.03.
*Significant at 0.05 level; **Significant at 0.01 level, *** Significant at 0.001 level, (ns) not significant.
Fixed= fixed parameter for SEM estimation.

DISCUSSION

We began this study aiming to test whether college pre-matriculation attitudes towards student attrition were different between students that persisted until graduation (Persist) and students that dropped out from college (Dropout). The results of the study largely support the thesis that there are significant differences in pre-matriculation attitudes between students that eventually will either persist until graduation or dropout from college. Student pre-matriculation attitudes had indirect and causal relationships that resemble the structure of attitudes of first-to-second year college students indicative of college persistence (Cabrera et al., 1993).

The results show that both groups of Persist and Dropout students respond to our survey items with the same metric scale. Full metric invariance is relevant for the generalization of our findings to other years. In addition, we calculated bootstrapping parameters of the measurement model. Bootstrapping parameters are useful to generalize our findings to the undergraduate student population of a typical sectarian private college of the Northeast.

Our measurement model shows reliability for all the constructs except one namely "Concern for the Disadvantaged." The constructs also passed the Fornell and Larker (1981) tests for convergence validity and discriminant validity. We found that the item "Helping to promote racial understanding" had weak factor loadings and was responsible for the weak reliability of "Concern for the Disadvantaged." This construct had other item namely "Helping people who are in need." The weak factor loading of "Helping to promote racial understanding" suggests that students either perceived that "people in need" are not necessarily racial minorities, or that "promoting racial understanding" does not necessarily imply that people from a different racial background are "in need." These items are either from the CIRP values instrument or with minor changes in wording, and have been validated in previous studies.

We found in our measurement model two other items with weak factor loadings. The first item, "I enjoy discussing political issues" corresponds to the construct "Political Interest." The location of this item in the survey might explain the weak correlation with other items of the construct. We created this item and placed it in a different section from the other two items corresponding to the construct "Political Interest." The other two items of the construct namely "Influencing the political structure" and "Keeping up to date with political affairs" are items from the CIRP values instrument, and have been validated and used in previous research.

The second item with a weak factor loading is "Believe will Drop out temporarily" is an indicator of the construct "UN-Intent to Persist." This construct has a second indicator, namely "Believe will fail one or more course." Our findings suggest that even though students might fear for their academic success, they enter college without intending to dropout temporarily. These items are also either from the CIRP values instrument or with minor changes in wording and therefore have been validated and used in previous research.

While the measurement properties are interesting in and of themselves, the ultimate intent of establishing measurement properties is to enable unbiased testing of differences in means and structural parameters between groups. We found significant differences between two latent constructs means. As expected, the mean of "UN-Intent to Persist" was larger in the Dropout group than in the Persist group. This finding suggests that entering freshman students who would eventually dropout from college begin with fear of failing courses. This syndrome is indicative of the students' lack of confidence in their academic skills. Interestingly, the mean for "Institutional Commitment" was smaller in the Dropout group than in the Persist group. This finding suggests that students who would eventually dropout of college enter less devoted to the institutional values of the college than those who will eventually graduate.

We also found differences in estimated parameters of structural paths between the Persist and Dropout groups (See Figure 2). The final multi-group SEM shows two structural paths that are not significant for both Dropout and Persist groups, namely the direct effect of "Financial Attitude" on "Institutional Commitment" and the direct effect of "Social Integration" on "Goal UN-Commitment". In addition, two other structural paths are not significant for at least one group. The direct effect of "Financial Attitude" on "Goal UN-Commitment" is not significant for the Dropout group; and the direct effect of "Institutional Commitment" on "UN-Intent to Persist" is not significant for the Persist group.

Pre-matriculation commitment to career goals is the top factor affecting intent to persist in both Persist and Dropout groups. However, institutional commitment has no effect in the Persist group (see Table 5 and Figure 2). We have noted before that the Persist group had higher pre-matriculation institutional commitment than the Dropout group. These findings suggest that freshman students that graduated had already committed themselves to the college institutional values before starting. Possibly the decision to commit to the college values preceded the decision to commit to career goals. In other words, Persist students first commit to the values of this institution. Once admitted, the only remaining factor determining their continuation in this college was to commit more firmly to their chosen career goals as they progress through their chosen major courses.

Two other factors affect the intent to persist among students that Persisted in college until graduation namely "Academic reputation" and "Financial Attitude". This finding suggests that pre-matriculation perceptions of teacher's quality and reputation increase the desire to continue in college. In addition, pre-matriculation expectations of higher tuition and other college related costs diminish the intent to continue among the Persist group. Although Cabrera et al.

(1993) did not find a significant path between financial attitude and intent to persist, our study concurs with recent research that demonstrates that high expectations of college costs diminish the pre-matriculation intent to persist in such college (Paulsen & St John, 2002).

The pre-matriculation intent to persist among Dropout students resembles closely the Cabrera et al. (1993) model of first-to-second year college persistence (see Table 5 and Figure 1). Pre-matriculation goal commitment increases the intent to persist in college. The second most important factor is pre-matriculation institutional commitment, which increases intent to persist. Pre-matriculation perceived academic reputation is the third most important factor and also increases the intent to persist. Finally, a favorable pre-matriculation attitude towards social integration increases intent to persist. Pre-matriculation financial attitude is not a significant factor in the intent to persist in college.

There are also major differences among the Persist and Dropout groups regarding goal and institutional commitment (see Table 5 and Figure2). Regarding goal commitment, pre-matriculation perceived academic reputation is the main determinant of goal commitment for both Persist and Dropout groups. In addition, in the Persist group pre-matriculation expectations of high tuition and other college related costs (financial attitudes) significantly reduce the goal commitment. In the Dropout group, goal commitment is independent from financial attitudes.

Regarding institutional commitment, academic reputation is the main determinant of institutional commitment in the Persist group. However, pre-matriculation attitude towards social integration is the main factor influencing institutional commitment in the Dropout group. It is evident from these findings that perceived high academic reputation increases goal and institutional commitment, while pre-matriculation favorable attitudes toward social integration only increase institutional commitment, which is most critical in the Dropout group.

CONCLUSION AND LIMITATIONS

This study demonstrates that there are significant differences in pre-matriculation attitudes towards college attrition among students that continue in college until graduation and students that eventually dropout. We establish this through our tests for indirect and causal relationships among such attitudes in both groups and discuss the differences. A limitation of this study is a sample of convenience given by the privilege access to a sectarian northeast private college. However, we mitigated the limitation by including in the study 95% of the freshman population of cohorts from 1995 to 1999. In addition, we calculated bootstrapping estimates to facilitate generalization to the population of this typical college.

Our work has provided tests of temporal ME/I, which is but one of the ways in which invariance mat be assessed. Though past research has noted differences between private and public, two-year versus four-year, and large versus small institutions of higher learning, little or no effort has been made to conduct tests on invariance along these dimensions. This area is ripe for research. Future research should provide tests of invariance across these different types of institutions so as to provide a more generalized understanding of the process of student attrition.

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