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GENERAL AND SPECIFIC GOAL ORIENTATIONS AS CORRELATES OF ADULT STUDENT DEGREE COMPLETION: LESSONS FROM THE COMMUNITY COLLEGE OF THE AIR FORCE*

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ABSTRACT

This research examined degree completion through the lens of Snyder's hope theory (Snyder, 2000) in an effort to expand the research on student retention from Tinto's sociological theory to a theory that focuses on the psychological orientations that might help explain student success. The study focused on a sample of 443 master sergeants enrolled in associate of applied science degrees offered by the Community College of the Air Force, a non-traditional, non-transfer, regionally accredited community college. The results of the logistic regression analysis revealed hope, as one component of overall goal orientation, to be a statistically significant predictor of degree attainment. Specific goal orientation, defined and measured as the strength of desire for earning this particular degree, was particularly important to degree completion for this sample.

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Few topics have received as much attention in higher education as has student retention. Because they enroll close to 50% of all beginning postsecondary education students (Cohen & Brawer, 2003), community colleges have a special interest in the student departure puzzle.

> Student retention is an important consideration in the life of community colleges today. Whoever references it—internal administrators, faculty, taxpayers, legislators, state policy makers, and so forth—student retention is significant for measuring institutional effectiveness in the prevailing environment of accountability and budgetary constraints. (Wild & Ebbers, 2002, p. 503)

Long known as the most responsive sector in higher education (Cohen & Brawer, 2003), community colleges are nonetheless plagued most severely by student retention issues (Cohen & Brawer, 2003; Nippert, 2001; Tinto, 1993). Braxton (2002) reminded his readers that "the national student departure from colleges and universities has remained constant at 45% for over one hundred years" (p. 1). This is verified by Adelman (2004), who reported that the baccalaureate degree completion rate for the three grade-cohorts studied longitudinally by the National Center for Education Statistics ranged from 45% to 49%. But for community colleges, these numbers are much worse. For those students who entered a community college upon graduation from high school in 1992, only 20% earned a certificate or associate's degree eight years later. The percentage of degree completion increased to 37% if bachelor's degree attainment was added (via transfer to another institution). So for all students who entered a community college upon graduation from high school in 1992, fewer than 38% earned a certificate, associate's degree, or bachelor's degree by the year 2000 (Adelman, 2004).

BACKGROUND

The Community College of the Air Force (CCAF) is a unique adult-education institution based on the community and technical college models. Founded in 1972, CCAF is a federally chartered community college. Accredited by the Southern Association of Colleges and Schools (SACS), the college offers the AAS degree in five broad areas: aircraft and missile maintenance; electronics and telecommunications; allied health; logistics and resources; and public and support services. CCAF degrees are directly related to specific Air Force career fields with the goal of providing professional development through an emphasis on management and leadership and on improving job performance through an emphasis on technical skills. The institution counts 375,000 registered students. These students are military members stationed throughout the world (almost exclusively active duty Air Force enlisted personnel).

The CCAF-AAS degree requires 64 credit hours taken in five areas:

1. technical education;
2. leadership, management, and military studies;
3. physical education;
4. general education; and
5. a program elective.

Students may satisfy the 24-hour technical education requirement through a combination of credits earned in Air Force technical training schools, CCAF-affiliated schools, and approved courses taken at civilian institutions. The six-hour leadership, management, and military studies component may be fulfilled through various professional military education opportunities offered throughout an airman's career or through civilian college credits. General education requirements (oral and written communication; mathematics; social science; and humanities) comprise 15 hours and may be earned at accredited civilian institutions and then accepted by CCAF as transfer credits to be applied toward the AAS degree. Students may also receive testing credit for courses that meet general education requirements. Students earn the physical education requirement (four semester credit hours) at the completion of basic training, and finally, the 15-hour program elective component may be fulfilled in a variety of ways: classes at civilian institutions or affiliated institutions; credit earned though professional military education or technical training; or through testing credit.

CCAF does not have a campus of its own; it has administrative offices at Maxwell Air Force Base, Montgomery, Alabama, but students attend no classes at a CCAF campus. Instead, they attend civilian institutions located in or near the communities where they are stationed for military duty, and all credits earned are then transferred to CCAF for credit. With only an administration building housed at Maxwell Air Force Base in Montgomery, and no campus of its own, CCAF remains one of the most innovative instructional ideas to come out of the community college movement. The 36-year-old model continues to serve the unique needs of the Air Force by producing technical experts and inculcating critical thinking skills at a time when such skills are needed more than ever.

Both CCAF (17% degree completion) and community colleges (approximately 20% degree completion) suffer from low degree completion. Moreover, as noted by the Community College Survey of Student Engagement (CCSSE, 2004, 2005), a large number of community college students attend part-time, work, and have other responsibilities while also commuting to school—characteristics similar to CCAF students. Whether attending under the auspices of CCAF or at other community colleges, two-year students have special needs that demand special attention.

RATIONALE AND THEORETICAL FRAMEWORK

Studies on student retention in higher education have relied almost exclusively on Tinto's (1993) paradigmatic theory of student departure for the past 30 years.

That Tinto's work is comprehensive, well-documented, and influential goes without saying. Nonetheless, the number of students who complete degrees has not increased significantly in the last 30 years (Adelman, 2004; Braxton, 2002; Nippert, 2001; Tinto, 1993). Two important factors in Tinto's theory are academic and social integration, factors that have led to and supported other empirical and theoretical research on student engagement in higher education (Kuh, Kinzie, Schuh, Whitt, & Associates, 2005; Seidman, 2005a). And this research has led to the study of and search for best practices in student engagement (see Kuh et al., 2005). Nonetheless, an extensive review by Braxton, Sullivan, and Johnson (1997) revealed mixed empirical support for the viability of Tinto's theory to explain college student departure, especially for two-year college students. Research by Braxton and Lee (2005), Braxton and Hirschy (2005), Hagedorn (2005), Halpin (1990), Mutter (1992), Nippert (2001), Pascarella and Chapman (1983), Pascarella, Duby, and Iverson (1983), and Voorhees (1987) all found mixed support for Tinto's person-environment fit model of student departure, most of which challenged the notion of social integration as a significant influence on two-year, commuter, non-traditional students' departure decisions. According to Cohen and Brawer (2003), "Tinto [himself] has asserted that any valid study of dropout must consider the intensity of the student's educational goal commitment . . . because it helps specify the psychological orientations the individual brings with him into the college setting" (p. 66).

Bean (1980, 1983) first addressed the aforementioned educational goal commitment in his research that emphasized *intent* as a significant variable of consideration in the student departure literature. He specified *intent* to be the immediate precursor to students' decisions to remain in school or dropout (Bean, 1983). In recent years, Bean (2005; Bean & Eaton, 2002) has turned his attention to the role of intent as it relates to the connection of beliefs, attitudes, and behavior in better understanding student departure. Codifying and articulating this interest resulted in Bean and Eaton's psychological theory of college student retention. The intent of their model was to explain *why* a student integrates or does not integrate socially and academically into a college environment by emphasizing psychological processes over sociological ones (Bean & Eaton, 2002).

The role of intentions in the retention phenomenon is important, but as Bean (2005) highlights, "By itself, intention is of little value in understanding the retention process. It is an *empty* variable because it does not help explain why students leave" (p. 219). To help make intent more meaningful for researchers, this study focused on the role of goal orientations as internal psychological processes that influence degree completion decisions. To accomplish this, Hope theory (Snyder, 1994, 1995, 2000, 2002, 2003; Snyder et al., 1991) was chosen as one potentially effective model to examine the psychological basis for degree completion.

Hope is a construct based on research about cognition, motivation, and goal commitment conducted by the late C. R. Snyder, the Wright Distinguished

Professor of Clinical Psychology at the University of Kansas. Snyder considers hope to be a two-dimensional cognitive skill set with motivation playing a secondary role. According to Snyder (2000), hope is a construct measuring one's willpower (motivation), or belief about ability to accomplish goals (what Snyder calls agency), and one's waypower (resourcefulness in producing plans to pursue goals), which Snyder calls pathways. Basically, hope theory is a sophisticated goal-setting theory with an explanation for why goal setting works or does not work. According to hope theory, individuals characterized as having high hope will set clearer goals and establish more specific plans for the accomplishment of their goals, whereas individuals characterized as having low hope will set more ambiguous and uncertain goals (or no goals at all) and will have unclear or unconvincing plans for their accomplishment (Snyder, 1994). High hope individuals are said to stay more focused on their goals, come up with evidence procedures to test their progress, and persist in the face of setbacks and difficulties (Snyder, 1994; Snyder et al., 2002).

Because fewer than 40% of community college students express as their goal the attainment of an associate's degree (Horn & Nevill, 2006), the authors theorized that two-year college students may very well have high hope but not the specific goal orientation to earn a particular two-year degree. In an attempt to capture this nuanced, complex nature of specific intent and general goal commitment, the authors combined a person's commitment to or desire for completing goals in general (hope) and a person's commitment to or desire for accomplishing a specific goat (intent) to represent a broader construct characterized as *goal orientation.*

PURPOSE AND RESEARCH QUESTIONS

Purpose

Although the sociological, person-environment fit theories of student departure, such as those of Astin (1993), Spady (1970, 1971), and Tinto (1993) have informed retention research for a number of years, other researchers (Bean & Eaton, 2002; Braxton, 2002) have begun offering theories that might help explain the psychological reasons people leave college. Although support for Tinto's (1993) theory exists, the theory has also received criticism and mixed results (Baird, 2002; Braxton et al., 1997; Seidman, 2005a). Instead of being seen as antagonistic, the theories that focus on the psychological influences on student departure should be seen as complementary to the sociological theories. "The point is not that we should abandon Tinto's conceptions but that we should use the theoretical debates in these analogous areas to sharpen and reconsider the meanings we attach to the conceptions and develop more appropriate solutions" (Baird, 2002, p. 75). Hope theory was chosen as an analogous theory for this reason.

Testing hope theory as part of an overall goal orientation construct that gives life to the empty variable of intent in the college student retention research was the foundation of this study. The major purpose was to add to the scholarly research on community colleges by considering a psychological theory, rather than Tinto's sociological, interactionalist theory, as a lens through which to view the student departure puzzle for non-traditional, commuter, adult students. This purpose included determining the effect of overall goal orientation and other selected variables on the odds of graduating with a two-year, CCAF degree.

Research Questions

This study attempted to answer the following questions:

1. Are the odds of completing a CCAF degree significantly related to overall goal orientation (level of hope plus specific desire for this particular goal)?
2. Are the odds of completing a CCAF degree related to any of the following?
   a. Gender;
   b. Race/Ethnicity;
   c. Aptitude (overall Armed Services Vocational Aptitude Battery test score—aptitude test given by Department of Defense);
   d. Deployment frequency (how often one has been overseas supporting the war on terror and military operations other than war);
   e. Shift worked (time of day when one works); and/or
   f. Perceived supervisor support.

METHOD

Logistic regression analysis was used to evaluate the data in this study. Logistic regression is considered a multivariate statistical technique recommended for studies investigating the relationship of multiple independent variables to a dichotomous dependent variable (Hosmer & Lemeshow, 2000; Menard, 1995; Tabachnick & Fidell, 2001; Walsh, 1987; Wright, 1995). Similar to ordinary least squares regression (OLS), logistic regression differs from OLS by using maximum likelihood instead of least squares to estimate the coefficients used in the regression equation. This is due to the binary nature of the dependent variable. Two of the critical assumptions of OLS regression are that the dependent variable be linear and normally distributed (Tabachnick & Fidell, 2001). By nature, a dichotomy violates these assumptions, and researchers have not found OLS to be robust against these violations (Austin, Yaffee, & Hinkle, 1992; DeMaris, 1992, 1995; Field, 2003; Glass & Hopkins, 1996; Grimm & Yarnold, 1995; Hosmer & Lemeshow, 2000; Menard, 1995). For dichotomous dependent variables, logistic regression is a widely supported statistical technique that has grown in popularity

during the past 20 years (Hosmer & Lemeshow, 2000; Tabachnick & Fidell, 2001). It is less restrictive in its assumptions than is discriminant analysis and is preferred to discriminant analysis when the outcome variable has just two groups (Glass & Hopkins, 1996).

Logistic regression is based on the natural logarithm of the odds of belonging to one group or the other. In the present study, the log odds were based on belonging to the degree completion or the non-degree completion group. The log odds of being a degree completer or a non-degree completer, for example, were regressed on the seven independent variables to determine which were significant. The log odds of being in one or the other category of the dependent variable can be transformed into a probability. That probability is then transformed into an odds ratio, which is an indication of how much the dependent variable changes given a one-unit increase in the independent variable (Field, 2003; George & Mallery, 2003). Due to criticisms surrounding the use of stepwise methods in regression analysis (Field, 2003; Menard, 1995; Newton & Rudestam, 1999), the forced entry method was used instead. The forced entry method is the default method of conducting logistical regression in which the researcher places all variables into the model at one time (Field, 2003). The forced entry method is the most appropriate method when testing a theory, the major purpose of this study (Field, 2003).

The broad construct of *goal orientation* was the major independent variable of interest, and it was defined and measured two ways. The first variable to comprise overall goal orientation was hope, operationally measured via Snyder's Dispositional Hope Scale, a psychometrically reliable and valid instrument (for validity and reliability of the scale, see Lopez, Ciarlelli, Coffman, Stone, & Wyatt, 2000; Snyder, 1995; Snyder et al., 1991, 2002). The second variable that defined overall goal orientation was desire for this specific goal of earning the degree. It was operationally defined via a question assessing desire for this goal based on an 8-point Likert scale. The other independent variables chosen for this study were: gender; race/ethnicity; deployment frequency; ASVAB test score; shift worked; and perceived supervisor support. The dependent variable was CCAF degree completion, measured as a dichotomy. All variables were selected based on their purported empirical or theoretical importance (Astin, 1993; Bean, 1983; CCSSE, 2004; Gall, Gall, & Borg, 2003; Halpin, 1990; Mutter, 1992; Nippert, 2001; Pascarella & Chapman, 1983; Pascarella, Duby, & Iverson, 1983; Pascarella & Terenzini, 2005; Voorhees, 1987). Financial aid was not included as an independent variable because all active duty airmen are eligible for 100% tuition assistance (with a $4,500 per annum and $250 per semester credit hour cap). Moreover, master sergeants earn about the same pay (with some variation based on years in service, special duty pay, or bonuses) and were, therefore, assumed to belong to the same social class. Socioeconomic status, then, was also not included as a variable. SPSS 11.0 was used for the data analysis.

Sample

The target population was active duty Air Force master sergeants ($N = 28,979$). The average age of this population was 39.7 years and the average length of time in service was 19.3 years. Eighty-nine percent of this population were men; 11% were female (Air Force Enlisted Demographics, 2004). Of this population, about 55% had earned their CCAF degrees (J. Larkins, personal communication, August 27, 2004). In 2004, 73% of master sergeants were white, 21% were Black or African American, 1% Asian, and 5% declined to respond. The American Indian/Alaskan native population was so small ($n = 55$) as to represent 0% of the population. The same applied to many of the racial combination mixes reported (Air Force Enlisted Demographics, 2004). Of Air Force master sergeants, 1,262, or 4%, declared themselves as Hispanic or Latino (Air Force Enlisted Demographics, 2004). The rank of master sergeant is the third highest enlisted rank (airman basic; airman; airman first class; senior airman; staff sergeant; technical sergeant; *master sergeant;* senior master sergeant; and chief master sergeant).

The choice to select master sergeants in the Air Force was based on the recommendations of Dr. Jim Larkins, Director of Institutional Effectiveness for CCAF (personal communication, August 27, 2004) and Kraska and Larkins (1999). Fifty-five percent of active duty Air Force master sergeants have a CCAF degree, master sergeants are assumed to be career airmen, and they have been on active duty longer (19.3 years) than the average time to degree for the CCAF degree (12.5 years). Finally, for master sergeants, earning the CCAF degree is an important consideration in their career progression. In short, a master sergeant should have earned a CCAF degree. This fact, combined with the opportunity for 100% tuition assistance to earn the degree, highlights the curiosity about a 45% non-completion rate for this population.

Procedure

Information about CCAF active duty master sergeants, both those who had completed degrees and those who had not, was obtained through electronic surveys administered with the help of the Air Force's Advanced Distributed Learning (AFIADL) survey tool and through the CCAF student records database. A list of the entire master sergeant population was obtained from a computer at CCAF Headquarters (located at Maxwell Air Force Base in Montgomery, Alabama) that is linked to the Air Force Personnel Center's database for all Air Force personnel. The resultant product was then entered into SPSS and a stratified random sample (stratified by degree completers versus non-degree completers) produced a total sample of 1,403 master sergeants. Right Now Web Metrics was the survey software used to send e-mails from the server at Maxwell Air Force Base in Montgomery, Alabama, to each of the 1,403 subjects via e-mail. The e-mails were typed into Notepad™, a Microsoft Office™ software program and then pasted into the survey workbench of Right Now Web. This particular survey

was created as a targeted survey, meaning the researcher would be able to track who responded and who did not. This was necessary because two variables, degree completion and ASVAB test scores, would be attained through the AFPC database instead of as self-report data. These data would then need to be matched to the respective subject. Once the participants completed the survey, the results were recorded real time in the Right Now Metrics survey workbench for immediate viewing. The results were then downloaded into SPSS and analyzed using logistic regression.

RESULTS

A total of 443 usable responses were received (for a response rate of 32%). The breakdown of respondents included 190 non-graduates (out of 753) and 253 graduates (out of 650), for response rates of 25% and 39%, respectively.

According to Porter and Whitcomb (2003), response rates under 50% are common in educational research studies that use surveys to collect data. Moreover, Andrews, Nonnecke, and Preece (2003) reported that response rates of 20% are common for electronic survey methodologies. Although high response rates are ideal, sample size, not response rates, is the important consideration when using logistic regression analysis. Because logistic regression uses maximum likelihood estimates to fit the model to the data, sample size is a particular issue of concern. Although disagreement exists about how large a sample should be, Austin et al. (1992) recommended 30 cases per independent variable. The final sample size (443) was large enough to accommodate seven independent variables ($30 \times 7 = 210$).

Assumptions

One of the aspects of logistic regression that makes it so appealing is that its assumptions are not restrictive (Hosmer & Lemeshow, 2000; Menard, 1995; Tabachnick & Fidell, 2001; Wright, 1995). It does not require that the predictor variables be normally distributed or that the error terms have equal variances, but the technique is not without assumptions. Unfortunately, no set standard for assumptions testing or reporting is followed in the research literature for articles that publish logistic regression. For example, in a review of six articles reporting logistic regression as a statistical technique, none were found to mention tests of assumptions (see Feldman, 1993; Kaufman, 1996; Martinez, Nielson, & Lee, 2003; Reise, 1999; St. John, Ho, Simmons, & Musoba, 2001; Xitao & Wang, 1999). And in three teaching articles on the subject of logistic regression (Davis & Offord, 1997; Peng & So, 2002; Walsh, 1987), the authors did not address testing for or reporting assumptions. Some authors do provide a more comprehensive treatment of assessment testing and reporting (Hosmer & Lemeshow, 2000; Menard, 1995; Wright, 1995), but Peng and So's comment sums up the

situation in these words: "Despite the popularity of logistic regression modeling and the ease with which researchers are able to apply this technique . . . confusion continues to exist over terms, concepts, modeling approaches, and interpretations" (p. 32). In fact, the only assumption other than having a dichotomous dependent variable that Peng, Lee, and Ingersoll (2002) mentioned in their article on using logistic regression is an assumption of binomial distribution, which they report can be assumed as long as the sample was obtained randomly. Moreover, there appears to be no research indicating how robust logistic regression is to violations of its assumptions.

Nonetheless, to add credibility and validity to the results in this study, six assumptions were tested to see if the data violated the assumptions. The assumptions tested were as follows: adequate sample size (discussed above), dichotomous outcome variable, cell counts, relevant predictor variables, excessive collinearity, and the presence of outliers.

For a logistic regression analysis to be reliable and valid, the dependent variable must be a dichotomy (Field, 2003; Hosmer & Lemeshow, 2000; Menard, 1995; Wright, 1995). For this study, the dependent variable was degree completion versus no degree completion, a commonly studied and naturally occurring dichotomy in education. This assumption was met.

The third assumption, cell counts, is simply the adequacy of expected cell frequencies for dichotomous variables and is related to the sample size assumption. Why is this important? According to DeMaris (1992), "Statistical inferences in logit modeling rests largely upon the asymptotic behavior of sample statistics" (p. 41). To clarify, note that an asymptote is characteristic of a binomial distribution. According to Menard (1995), "Zero cell count occurs when the dependent variable is invariant for one or more values of a categorical independent variable" (p. 68). Hosmer and Lemeshow (2000) report that special attention needs to be given to any contingency table that reveals zero cells: "Including such a variable in any logistic regression program causes undesirable numerical outcomes to occur" (p. 93). In order to test for the cell count assumption, a cross tabulation was conducted in SPSS. In order to meet this assumption, no cell could have a count less than five (DeMaris, 1992). The only variable that violated this assumption was gender. Consequently, a second cross-tabulation was conducted without gender as a variable, and no cell count violation was detected. Because of this, gender was removed from the model prior to the logistic regression analysis being conducted. Removing dichotomous independent variables that violate the cell count assumption is a strategy supported by Hosmer and Lemeshow (2000) and Tabachnick and Fidell (2001). Finally, see Hosmer and Lemeshow's comment above as to the importance of not including variables in a model if they produce zero cells in a cross tabulation analysis.

The fourth assumption, relevant independent variables, also assumes that no irrelevant independent variables are chosen for a logistic regression analysis. As Menard (1995) stated, this is extremely difficult to achieve with 100% accuracy,

so if the researcher has used a theoretical model to guide his or her selection of variables, this assumption can be assumed to have been met. Wright (1995) supports this position as well. Such a theoretical model was employed in this study.

The fifth assumption was absence of excessive collinearity. Collinearity is positive correlation between independent variables. As it is impossible for independent variables to be completely void of correlation (Menard, 1995), the concern is with excessive collinearity, or multicollinearity. Unfortunately, SPSS does not check for excessive collinearity as part of its logistic regression analysis, so Pearson *R* correlations were analyzed with the independent variables in this study to see which, if any, were excessively correlated. The threshold for too much correlation comes from Menard who reported that relationships of .80 or higher are cause for concern. No excessive collinearity among variables was discovered.

The final assumption tested for this study was the assumption of outliers that have standardized residuals that fall beyond –2 and +2. This is reported as part of the SPSS logistic regression diagnostics after a model has been specified. All but 5% of subjects should have scores that fall within –2 or +2. Only three subjects had standardized logistic regression residuals that fell outside the threshold for this assumption; consequently, the data met this assumption.

Descriptive Statistics

SPSS Graduate Pack 11.0 was used for all data analysis actions, including the production of descriptive statistics for the sample of 443 respondents. The frequency data for graduates and non-graduates and the three discrete independent variables are presented below (see Table 1).

As the reader can see from Table 1, the sample of 443 comprised 43% non-graduates (N = 190) and 57% graduates (N = 253). Males made up 89% of the sample (N = 395) and females, 11% (N = 48). This proportion was identical to the ratio of men and women in the active duty master sergeant population. Whites comprised 78% of the sample (N = 344) with non-whites equaling 22% (N = 99). On the degree completion survey, respondents had the choice of seven race/ethnicity categories. However, the only meaningful number of non-white respondents other than African Americans (N = 67) at 15% were Hispanics (N = 19) at 4%. Due to concerns about zero cells in logistic regression analysis and due to the low number of responses from other than Caucasians and African Americans, the race/ethnicity variable was collapsed into a dichotomy with white and non-white as the categories. Such an action is supported in the research literature (Field, 2003; Hosmer & Lemeshow, 2000; Menard, 1995; Tabachnick & Fidell, 2001). The same collapsing procedure was used for the variable *shift worked.* Originally, this was a discrete variable with three levels (days, mid-shift, night-shift) but was collapsed into a dichotomy to make the analysis easier to understand and to avoid possible cell count violations. The final numbers were

Table 1. Frequency Data for Discrete Variables

Variable	Category	Frequency (Grads)	Frequency (Non-grads)	Frequency (Total)	%
Gender	Male	225	170	395	89
	Female	28	20	48	11
	Total	253	190	443	100
Race/ethnicity	Non-white	52	47	99	22
	White	201	143	344	78
	Total	253	190	443	100
Shift worked	Shift worker	13	28	41	9
	Days	240	162	402	91
	Total	253	190	443	100
Total		253	190	443	100

day-shift workers with an $N = 402$ (91%) and shift-workers other than day-shift with an $N = 41$ (9%).

Fit of the Logistic Regression Model

Assessing the overall fit of the statistical model is the first step in evaluating a logistic regression analysis. One does this by first noting the initial log-likelihood statistic (referred to as -2LL). In SPSS, the log-likelihood is multiplied by -2, hence the reference to -2LL. According to Field (2003), "This multiplication is done because -2LL has an approximately chi-square distribution and so makes it possible to compare values against those we might expect to get by chance alone" (p. 178). What this statistic represents is similar to the sum of squared errors in linear regression. The -2LL statistic, "is the total amount of information that needs to be explained by the model" (Field, 2003, p. 194). If the -2LL decreases from block 0 (when only the constant is in the model) to block 1 (when specified variables have been added), then it can be determined that the variables added to the equation improved the predictability of the model. In the current example, the -2LL (variance that needs to be explained) started at 605.1 when only a constant was in the model, and it decreased to 525.8 after the addition of seven variables (see Table 2).

The seven variables added in the first block of the regression equation were deployment frequency, shift worked, perceived supervisor support, race/ethnicity, ASVAB score, and goal orientation (comprised of hope and specific goal commitment). Gender was not added to the model at all due to its violation of the cell

Table 2. Logistic Regression Model Summary at Block 1

Initial -2 Log Likelihood	Block 1 -2 Log Likelihood	Model Chi-square	*df*	Sig.
	Variables added: ASVAB, deployment frequency, shift worked, importance of degree, hope, perceived supervisor support, race/ethnicity	(difference between initial -2LL and block 1 -2LL)		
605.1	525.8	79.3	7	.01

counts assumption (discussed earlier in the section on assumptions). The -2LL is a chi-square distribution, and the resulting chi-square statistic, that which is left over after subtracting the block 1 -2LL from the block 0 -2LL, is the model chi-square. It indicates how much variance was explained in the model and if that variance was significant. Table 2 presents this data. From this table, it can be seen that the model chi-square was 79.3 (how much more variance was explained by the model with the selected variables in it), and that it was significant ($p \leq .05$), with $p = .01$. The model chi-square statistic can be thought of as similar to the *F*-test in linear regression (Field, 2003). The model predicted degree completion better with the seven variables in it than it did with only the constant in the model. To explain this more precisely, consider the following comment from Field:

> At this stage of the analysis, the value of -2 log-likelihood should be less than the value when only the constant was included in the model (because lower values of -2LL indicate that the model is predicting the outcome variable more accurately). . . . The question of how much better the model predicts the outcome variable can be assessed using the *model chi-square statistic,* which measures the difference between the model as it currently stands and the model when only the constant was included. (p. 178)

In the current example, the model chi-square was 79.3, indicating how much the -2LL decreased (improved) from the chance-only model to the model with the seven block 1 variables added.

Hosmer and Lemeshow Test

Another goodness-of-fit measure for the overall model is the Hosmer and Lemeshow Test (Hosmer & Lemeshow, 2000). This test indicates whether the data generated came from the model proposed by the researcher and whether the observed and predicted values were similar or different (Garson, 2005). It "divides

subjects into deciles based on predicted probabilities, then computes a chi-square from observed and expected frequencies" (Garson, 2005, p. 6). The test uses 8 degrees of freedom to produce a *p* value. If the Hosmer and Lemeshow test statistic is non-significant ($p > .05$), then the null hypothesis of no significant difference is accepted. This is the desired condition, which may seem counter-intuitive, but remember, the Hosmer and Lemeshow test indicates the congruency between observed and predicted values. This means that no significant difference is desirable. The researcher wants to find no significant difference in this case because it means that the observed and predicted values are similar, i.e., the model is a good fit with the data. The Hosmer and Lemeshow test for the block 1 model produced a chi-square of 7.7 with 8 degrees of freedom, which was non-significant at $p < .05$ for the model when the seven block 1 variables were added. This means that the model fit the data well.

Significance of Individual Predictor Variables

As Menard (1995) points out, "If the overall model works well, how important is each of the independent variables? Which variables are stronger or weaker, better or worse, predictors of the dependent variable" (p. 17)? To answer these questions, an examination of the coefficient estimates for the predictor variables was needed. Table 3 lists the statistics and coefficients produced by the logistic regression model, which allowed a determination to be made concerning how significant each variable was to the overall model, controlling for the other variables.

The first statistic, β, is the unstandardized logit coefficient. According to Field (2003), the value of β represents "the change in the logit of the outcome variable associated with a one-unit change in the predictor variable. The logit of the outcome is simply the natural logarithm of the odds of Y occurring" (p. 180). Because the logit coefficient is unstandardized and requires a transformation for its interpretation, the more useful Exp(β) is used in the interpretation of the logistic regression model (Field, 2003; Garson, 2005). In short, it indicates whether the predictor variables positively or negatively affect the outcome (dependent) variable.

Exp(β) in the last column of each table is the odds ratio. It explains the change in the odds of graduating with a CCAF degree given a one-unit increase in the predictor variable. The odds ratio is a value that represents the odds of the outcome occurring divided by the odds of the outcome not occurring. And the value of the odds comes from dividing the probability of the outcome occurring by the probability of the outcome not occurring (Field, 2003).

> We can interpret exp(β) in terms of the change in odds. If the value is greater than 1, then it indicates that as the predictor increases, the odds of the outcome occurring increase. Conversely, a value less than 1 indicates that as the predictor increases, the odds of the outcome occurring decrease. (p. 184)

Table 3. Variables in the Logistic Regression Model

Variables in the model	*B*	*S.E.*	Wald	*df*	Sig.	Exp(β)
Deployment frequency	.02	.01	1.80	1	.18	1.02
Shift worked	–1.23	.39	10.25	1	.00*	.30
Perceived supervisor support	–.04	.06	.44	1	.51	.96
Race/ethnicity	–.15	.27	.31	1	.59	.86
ASVAB score	.03	.01	17.46	1	.00*	1.03
Goal orientation						
Hope	.05	.02	7.60	1	.01*	1.05
Desire for this particular goal	.32	.06	33.05	1	.00*	1.40

In short, the odds ratio indicates how many more or less times likely the dependent variable will occur, given the presence of predictor variables. The S.E. column is simply the standard error, a measure of the "dispersion" of β (George & Mallery, 2003, p. 330).

The Wald statistic (fourth column) is a chi-square distribution that indicates whether or not β is significant. Higher values of the Wald mean that the β coefficients are significant (Field, 2003). It lets the researcher know if the value of the predictor variables are different from zero. Whether or not that difference is significant may be answered by the significance column (Sig.). The calculation of the significance in logistic regression is done at the $p \leq .05$ level, but the regression output reports the significance at the level it occurs in the Sig. column. The "*df* "column is simply the degrees of freedom used to calculate the significance of the Wald (significance is in the sixth column).

The significance level of the Wald statistic in this model indicated that four variables significantly predicted CCAF degree completion: shift worked; ASVAB score; and the two variables that comprised overall goal orientation. Specifically, the shift work variable's unstandardized logit coefficient indicated that moving from normal day hours (7:30 a.m.–4:30 p.m.) to any shift hours (4:30 p.m.–7:30 a.m.) had a negative effect on obtaining a CCAF degree ($\beta = -1.23$). The Wald of 10.25 indicated that the shift worked variable was largely different from zero and the significance ($p \leq .05$) indicated that the Wald was significant and that this variable, therefore, significantly predicted which master sergeants did not graduate with the CCAF degree. The .30 value for the Exp(β) column meant that as master sergeants moved from day to shift work, their odds of completing a CCAF degree decreased by a factor of .30. If Exp(β) was greater than 1, it indicated that the predictor variable had a positive impact on the outcome variable (i.e., as the predictor variable values increased, then the odds of the outcome variable occurring also increased). If Exp(β) was less than 1,

as it was for shift worked, then it meant that as the predictor variable increased (in this case from 0 to 1, or from day to shift work), then the odds of the outcome variable occurring decreased. How many more or less times the odds of the outcome variable were likely to happen can be explained by the .30.

Table 3 shows the significance of the other individual predictor variables as well. For the ASVAB test score variable, the reader can see that as the scores increased, the odds of obtaining the CCAF degree increased by 1.03 times. Moreover, the strength of the master sergeants' goal orientations, both general (as represented by hope) and specific (as represented by commitment to or desire for this particular goal of earning a CCAF degree) significantly correlated with degree completion. Because the β was positive, and because Exp(β) was larger than zero, the reader can know that the impact of the desire variable on the outcome variable was positive. The Wald statistic of 33 indicated that it was the variable with the largest value from zero, which was supported by the odds ratios of 1.4. Because this finding was significant ($p \leq .05$), the odds ratio (Exp(β)) meant that as the importance of the degree to each person increased, the odds of obtaining a degree increased by a factor of 1.4. The same can be said of hope; as a person's level of hope increased, the odds of obtaining a degree increased by 1.05.

DISCUSSION

Researchers have been studying retention with interest for more than three decades now (Adelman, 2004), yet the number of students who complete degrees has not increased significantly (Adelman, 2004; Braxton, 2002; Nippert, 2001; Tinto, 1993). With the increasing emphasis on and controversy surrounding student retention as a measure of institutional effectiveness, especially for community colleges, this research study attempted to make a positive contribution to this conversation by focusing on an overlooked dimension in the retention issue: individual, psychological influences on the decisions underlying degree completion. This study also sought to stimulate a new line of research by using Snyder's hope theory (2002) to study college student retention and by using an often-ignored population—military students. As Braxton and Hirschy (2005) point out, "A multitheoretical approach to reducing institutional rates of student persistence is needed because college student departure is best characterized as an ill-structured problem . . . [which defies] a single solution" (p. 61).

The first major finding related to the first research question concerning the role of goal orientation in predicting CCAF degree completion. Based on the odds ratios produced by the logistic regression equation, the odds of completing a CCAF degree were statistically and significantly related to goal orientation. Overall, goal orientation was the strongest predictor of degree attainment for this sample. From the results of the logistic regression analysis, hope had an odds ratio of 1.05, and this was significant at $p < .05$ ($p = .01$). As the odds ratio is an indication of how much more likely an outcome is to occur given a one-unit

increase in the predictor variable, this finding means that master sergeants with higher hope were more likely to complete a degree than are those with lower hope. Specifically, for every one unit increase in level of hope, a master sergeant's odds of completing a CCAF degree was multiplied by 1.05. In the logistic regression model, the desire variable's odds ratio of 1.4 meant that master sergeants for whom the degree was important were more likely to complete it than were those for whom the degree was not important. The data reveal that specific goal orientation was particularly important to degree completion for this sample. The results of this analysis with hope as a proxy for general goal commitment and desire as a proxy for specific goal commitment suggest that students may complete degrees at higher rates if they have a specific desire to earn a degree, if they have positive, goal-directed energy, and if they plan successful routes to their goals. One possible explanation for the reason hope did not have a stronger relationship to degree completion could be that some non-completers possessed high hope but not the desire for this particular goal of degree attainment. This issue of specific intent versus general goal-directed thought and energy needs to be studied further because it could help higher education leaders better understand and define what it means for a student to succeed in college.

The second major finding dealt with the variables other than goal orientation. Except for gender, all other variables listed in research question two were entered in the logistic regression model (remember, the effect of gender was not assessed because it violated the violation of cell counts, so it was removed from the equation prior to the logistic regression analyses as recommended by Hosmer & Lemeshow, 2000). These variables produced a model that predicted degree completion better than did chance. Of the variables entered in the logistic regression model other than goal orientation, only two were significant predictors of CCAF graduation status: ASVAB scores and shift worked. The strongest negative influence came from being a shift worker (odds ratio = .30). Shift workers were less likely to complete the degree than were regular hour workers. With only 41 respondents classified as shift workers, though, caution should be used in interpreting this finding.

LIMITATIONS AND FUTURE RESEARCH RECOMMENDATIONS

Several limitations and possible weaknesses should be identified in the current study. First, the direct relationships between hope and shift worked, hope and ASVAB score, and hope and specific goal commitment were not assessed. Further investigation needs to separate the individual effects of the different variables. Moreover, the nuanced relationship between general and specific goal orientation needs to be further investigated to help researchers and practitioners figure out how these two variables might elucidate the student departure decisions for two-year community and technical college students.

Second, the sample for this study was drawn from a single institution and, arguably, a very specialized one. It is quite possible that students who are military members have discipline levels, work ethics, and other factors that are different enough from other community college students so as to make comparisons between the two tenuous. Research on students who are considered non-traditional, adult, part-time, working, and commuter consistently points out that these students are fundamentally different from the traditional 18-24 college cohort who attend full-time (Cohen & Brawer, 2003; CCSSE, 2005; Hagedorn, 2006; Horn & Nevill, 2006). However, the work done by the Community College Survey of Student Engagement (CCSSE, 2004, 2005) illustrates that a growing number of community college students match several of the characteristics of the sample contained in this study: nontraditional, part-time, working, and commuter. There are obvious differences between a master sergeant pursuing a degree via CCAF and a civilian pursuing a degree from a local community college, but if an institution serves non-traditional students who work, attend school part-time, and commute, then the lessons learned from this study may, with caution, be applicable to that institution's students. As Bean (2005) points out, certain demographics may be correlated with higher or lower rates of attrition, but those demographics are not the cause for attrition. "The factors and processes that influence leaving are assumed to be the same for all students: a student who does not fit in or who does not get passing grades will likely leave college regardless of his or her demographic status" (p. 216). And as Hagedorn (2006) argues, "Dwelling on social situations or applying a deficit model may explain student 'non-success,' but does nothing to further our knowledge on directing students to their goals" (p. 5).

Trying to identify the aforementioned factors is an ongoing process for education researchers. This study attempted to further increase the circle of influence education research might have on student success by looking at a new population and a new theoretical framework. To this end, the research was exploratory and based on a single institution, one that may indeed be very specialized. The results of this research obviously need to be extended beyond the current sample to include more women and minorities as well as students from more heterogeneous social class stratifications.

Third, CCAF's lack of a physical campus initially appears to be a cause of concern in trying to draw comparisons and make inferences. Although CCAF does not have a self-contained physical campus, the students pursuing CCAF degrees complete their academic courses at other two-year colleges that have physical locations. For example, if someone were stationed at an Air Force base in West Texas, that individual would take most of his or her academic classes for the CCAF degree at a community college in West Texas, and would, therefore, resemble one of any number of other adult students at the campus. Still, the results of this study need to be examined further to include other non-military community colleges to see if those students fare the same, better, or worse than CCAF students.

IMPLICATIONS AND CONCLUSIONS

Although the specialized nature of the sample in this study warrants extreme caution in generalizing the findings, this research is not without lessons to community and technical college professionals who serve older, working, commuting students with complex lives, many of whom share the disciplined and focused attributes often associated with military students (Cohen & Brawer, 2003; CCSSE, 2005; Horn & Nevill, 2006). According to the Community College Survey of Student Engagement (CCSSE, 2005), 60% of community college students enroll part-time, 57% work more than 20 hours per week, 21% commute 6-20 hours per week, and 93% spend at least one hour per week commuting to and from class. This research, while limited in several areas, nevertheless contributes to the scholarship on college student success and student degree completion for the much maligned, disenfranchised, and little understood population of non-traditional community college students. Braxton and Lee (2005) note the lack of empirical and theoretical knowledge about student departure and degree completion at two-year and commuter institutions, strongly urging student departure researchers to continue diversifying the images of what retention looks like at various institutions and for various populations.

What makes the information in this study actionable? First, this study highlighted the possibility that both general and specific goal orientations are correlates of degree completion and that further study with other community college samples is warranted. Exploring cognitive and psychological influences on student persistence and degree completion does not mean researchers should ignore or exclude important environmental and sociological variables; instead, a focus on hope theory and other psychological theories may help researchers explore the individual motivational implications of intellectual and social engagement: Why, exactly, does engagement matter, if it does, or why does it not matter, if it does not, for some samples or populations in some contexts? In short, what are the underlying internal processes that students use that ultimately manifest into adaptive or maladaptive behaviors?

Second, although aptitude (ASVAB scores) and a measure of outside influence (shift worked) were related to degree completion or non-completion, so were measures of psychological orientation: namely, hope and the specific internal desire to earn a particular degree. Specifically, even under the most austere conditions (military deployment, a non-significant variable), specific goal commitment and being able to initiate and sustain action toward the paths chosen for goal attainment were associated with higher degree completion. What implications for policy and practice does the aforementioned hold?

It should be obvious that hopeful thinking may be present in someone who does not desire a two-year degree even though he or she is attending a two-year college (note the difference between overall hope and desire under the goal orientation variable in Table 3). A student may possess goal-directed energy and

may be able to mentally plan successful routes to his or her goals without having degree attainment as a specific desire or goal. This is supported by the most recent data on community college students and their degree aspirations which indicates that the majority of students at two-year schools are not there for the specific goal of degree completion (Hagedorn, 2005; Horn & Nevill, 2006). If community college leaders use this information appropriately, it could help shape the policy conversations and define the reality surrounding degree completion as a proxy for success at community and technical colleges. Armed with what students want to accomplish and how the school is helping students achieve those goals, institutional leaders can position themselves for arguments to taxpayers, legislators, state policy makers, or anyone else interested in the accountability of higher education institutions. Students may very well be achieving their goals at community colleges without completing degrees, but unless that information is known, and unless community college professionals themselves begin defining the retention environment for their campuses, this will continue to be an intractable problem. Hagedorn (2005) and Seidman (2005b) argue that retention formulas and performance indices for students at two-year colleges should include student intention, goals, and aspirations. In short, what does success look like for this student at this institution? And has the student achieved this measure of success?

From a practitioner's perspective, consider that Snyder's research has shown hope to be malleable, meaning it can be taught. This places classroom teachers, especially, in a unique position to help improve student goal setting, planning, and persistence. Within all retention theories is the common link of student perception of events. Steele's (1999) work with stereotype vulnerability, the overwhelming psychological research on locus of control, hope, self-expectancy, optimism, and a host of other internal psychological processes—and the practical experience of those who have worked with students in a classroom—point to a widely known but often overlooked truth of human behavior: What people think about and focus on becomes their reality. Hope theory speaks to this truth. Snyder has found overwhelming evidence of hope's strength in explaining success and failure in a number of clinical and academic settings. The current research added two-year students to the growing list of people for whom hope might provide a successful strategy. How?

Recall that hope may be defined as "the perceived capacity to:

1. develop workable goals;
2. find routes to those goals (pathways thinking); and
3. become motivated to use those pathways (agency thinking)" (Snyder, 2005, p. 73).

One way to help students, then, is to strengthen their goal-oriented thinking using a three-pronged strategy of goal-setting, strategy, and motivation.

The first practice implication includes helping students generate specific, measurable, and challenging goals but also realistic goals. As part of the goal-setting process, students need to generate reasons why they wish to pursue the goals they have generated because purpose can be a stronger motivator than object. Part of the goal setting intervention is also teaching students self-regulated and meta-cognitive strategies so that they internalize the importance of and know how to think about learning strategies that will take them closer to the goals they have set.

The second practice implications is to improve the mental routes generated to achieve goal attainment, what Snyder (2002) referred to as pathways thinking. Students should be taught how to break long-term, long-range goals into shorter goals, to generate possible setbacks that might occur, to plan for alternate routes when setbacks do occur, to use mental rehearsal techniques, to ask for help when it's needed, and to learn other specific skills that will help students move closer to achievement of their goal pursuits.

The final specific strategy includes improving students' agentic thinking (their motivation and belief about ability to accomplish their goals). With this strategy, students need to learn how to frame negative experiences appropriately, to change the internal, self-deprecating conversations they have with themselves when they experience a setback, to change external conversations they have with others, and to be mindful of lifestyle choices that have deleterious effects on successful goal pursuits.

In short, implementing the soft and hard skills of success into the college curriculum could represent the best of academic, intellectual integration by having faculty members—and others—spend time with students teaching them about more than just subject matter discipline. Ability and outside environmental influences certainly shape student behaviors as they relate to successful strategies in college. This highlights the need for sociological perspectives on development and retention, but many community college students, especially adult students, need help with the basic cognitive and psychological skills to be successful as college students. Theories emphasizing the internal, psychological processes affecting goal orientation, such as hope theory, should be considered as possible tools to help build these skills by giving students both motivation and strategy to bend their reality around otherwise limiting factors.

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