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Community College Student Motivation and Persistence to Goals

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COMMUNITY COLLEGE STUDENT MOTIVATION
AND PERSISTENCE TO GOALS

A Dissertation
Presented to
the Faculty of the Morgridge College of Education
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In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by
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ABSTRACT

Community colleges in the United States serve a vital educational role in job training, preparation for transfer to a four-year institution, granting academic degrees and certificates as well as offering opportunities for personal growth and development. Persistence has traditionally been measured by degree completion or by transfer rates. However, students who enter community college with other goals may successfully meet their goal while not reaching traditional persistence milestones. To date, much of the research on persistence has either focused on traditional students at four-year institutions, or on demographic risk factors among community college students. Little has been done to evaluate the interrelationships between behavioral variables thought to influence community college student persistence.

The purpose of this study was to use a national longitudinal dataset to evaluate a structural model integrating of the effects of behavioral variables associated with student motivation along with mediating factors that influenced community college students as they persisted toward their individual goals. The initial goal was to establish a measurement model for the specified latent variables. The second step involved an analysis of a structural model to establish relationships among the latent variables and endogenous variables. The model was found to describe the community college student population of the BPS: 04/06 survey very well.
Students’ combined cognitive ability, self-efficacy, and self-regulatory capacities do allow them to overcome external pull factors that have traditionally been shown to impede student persistence. Students who have higher levels of cognitive abilities, self-efficacy, and self-regulation persist even though they may not feel integrated into the institution academically as indicated by faculty contact. If a student is faced with the pull of outside employment and/or inadequate financial aid, is their capacity for self-regulation and their feelings of self-efficacy appear to enable the student to persist toward their goals. The results of this study have shown that more than any other factor, motivation may indeed be the key to community college student persistence. The results of this study serve to provide an alternative lens through which to view community college student persistence. This viewpoint has not been extensively considered in the extant research literature up to this point. The model presented in this study breaks from most traditional persistence models with the inclusion of psychosocial variables, and was found to be useful in identifying factors not commonly thought to be involved in student persistence.

This study adds to the limited body of knowledge and addresses the gap in literature regarding differences in factors relating to persistence of community college students. The findings should have important implications for research and instruction within the community college environment. Such data could serve to reduce community college student attrition by: (1) aiding in the development of educational programs, (2) helping to develop institutional and public policy to sustain effective student support initiatives, and (3) target students, for whom specific policies should be developed to
encourage persistence. By considering how community college students’ needs and goals interact, federal, state, and college-level policy-makers might better consider how scarce resources may best be used to foster student success and persistence among the nation’s fastest growing college sector.
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CHAPTER ONE

Introduction

Much research has been done on why people choose goals, how goals affect action, and the influence of internal motivation and behavior on goal attainment. Community college students enter an institution with a specific goal or set of goals, and those goals directly impact the student’s motivation. Academic achievement goals provide insight into students’ short and long-term intentions and play a role in the student’s persistence towards completion. Academic goals such as grades, social esteem, or post-graduation employment opportunities can vary extensively in nature and in time of attainment (Zimmerman, 1989).

Today, more than 1,100 community colleges serve more than 10 million students across the United States. The broad range of programs in comprehensive community colleges makes it difficult to identify a single mission for these institutions, but generally, community college students continue to obtain certificates, diplomas, and degrees in credit and noncredit areas, including college transfer programs, terminal and transfer technical programs, vocational training, workforce development programs and with industry, workforce development programs with displaced workers, basic skills and remedial programs, adult basic education and General Educational Development (GED), seniors programs and vocational noncredit programs. In addition, community colleges
are often the primary educational source to prepare learners for external certification programs, for example, information technology, allied health, financial services, and hazardous materials certification. Most importantly, community colleges do all these things as integral community partners, tying their programming to local community needs (Milliron & de los Santos, 2005).

With a 2009 American Graduation Initiative proposal, the nation’s community college system is expected to substantially expand its capacity. This proposal was followed with a federal Fiscal Year 2011 budget proposal released February 1, 2010 which included some key program increases for community colleges and their students (AACC, 2010). Included in these increases are changes to the Pell Grant program, funding for Supplemental Educational Opportunity Grants, and Federal Work Study. Additionally, a restatement and refinement of the American Graduation Initiative includes $10.6 billion projected for community colleges over ten years, with the goal of graduating five million more students by 2020. Clearly, with these proposed programs the world’s eye will be focused more clearly than ever on the ability of America’s community colleges to attract and retain their students.

One of the most valuable aspects of community colleges is attraction of at-risk students to higher education. According to Cohen and Brawer (1996) and Wild and Ebbers (2002) ease of access, low tuition, and an open-door policy have contributed to the increased number of minority and first generation students in community colleges. Many community colleges find large minority populations enrolled in their programs although the graduation rates may be uneven or the transfer rates lower than the entrance numbers (Lovell, 2007). Additionally, community colleges tend to enroll more
underprepared students than four-year institutions. Because of the open-door policies, underprepared students are encouraged to enroll in a community college, where they can take advantage of developmental education, or remedial courses (Fike & Fike, 2008).

It is clear that students attending two-year colleges, are more diverse, have different needs, different goals, and many more risk-factors. The student characteristics of community colleges have an effect on retention/attrition. Since the characteristics are much different than four-year students, traditional models developed using four-year college students may not be as useful when investigating community college students. Therefore, student retention for community college students should be investigated via different lenses than that of four-year institutions.

Success for community college students may also be defined as successful achievement of specific job–related skills, which may be acquired with only a handful of courses. In such a case, the act of non-persistence reflects positive achievement, though from a traditional expectation of college behavior it implies failure (to continue) (Bers & Smith, 1991). Students may enroll with intent to learn a specific skill, to gain promotion at their current job, or for personal enrichment (Bailey, Alfonso, Calcagno, Jenkins, Kienzl, & Leinbach, 2004).

On the other hand, students may also enroll to test the postsecondary milieu in an inexpensive environment (Wild & Ebbers, 2002), or may have a clear goal to finish lower level educational requirements and transfer to a four-year institution (Hoachlander, Sikora, & Horn, 2003). It is important to examine the factors that influence the persistence of community college students in order to develop a more complete understanding of this diverse population.
Using data from the Student Right-to-Know Act and Beginning Postsecondary Students (BPS) Data, Baily, Jenkins, and Leinbach (2005) found that students entered community colleges with both short-term goals and long-term goals. Of that cohort of students 57% of the students who enrolled in community college did so for the purpose of earning a degree or certificate or to transfer to a baccalaureate institution, while 40% wanted job skills or personal enrichment. Six years later, 40% of those whose goal was to transfer had completed an associate’s degree and half of those had transferred and earned a bachelor’s degree, while 22% with transfer goals were still in school. It is clear that community college students enroll with a variety of goals, sometimes multiple goals. A growing question in community college research revolves around measuring student attainment, yet how is student attainment best measured when not all students enroll with the specific goal of achieving a degree? Another question may address how are students persisting toward their individual goals as they move through the community college system?

In order to create policies that support student success, it is important to understand the issues that both foster and impede student persistence, and to understand whether or not students are persisting to their goals. Work ranging from the development and testing of conceptual models to the examination of independent personal and institutional characteristics has shown the explanations for differences in persistence to be many and varied. The majority of persistence research to date has focused on traditionally-aged students attending four-year institutions (Cofer & Summer, 2000; Ethington, 2000; Hippensteel, St. John, & Starkey, 1996). Although researchers and policy-makers attempt to generalize these results to include all college students, this
practice has led to an incomplete understanding of persistence at two-year colleges and created a considerable gap in the relevant research literature to date.

In their study of community college students, Hyers and Zimmerman (2002) found that students who were most likely to graduate based upon their high academic ability and low demographic risk factors, did not necessarily persist in their college education. They had lower than expected graduation rates, indicating that factors other than academic ability and demographic variables influenced retention. The researchers suggested the importance of personal motivation and goals as alternative variables. A cursory review of the research literature indicates that research on the relationship between specific motivation variables and student retention in community colleges is sparse, several authors have acknowledged the importance of motivation in student persistence, but did not specify what motivational variables were essential (Solis, 1995; Voorhees, 1987). Despite the relative dearth of large scale studies focusing on community college student persistence, two factors have been identified that influence persistence among community college students: goal setting and self-efficacy (Bers & Smith, 1991; Fralick, 1993; Garardi, 1996; Hagedorn, Maxwell, & Hampton, 2002; Mohammadi, 1994; Perin, 2006; Silver, Smith, & Greene 2004).

One of the most important predictors of student persistence for community college students is having a clear goal for the future. As mentioned earlier, community college students enroll in school for various reasons, and the more concrete the reasons are, the more likely they will endeavor to achieve them. Researchers have indicated that one of the strongest predictors of either academic achievement or failure is the aspiration for success, thus having achievement goals (Kao & Tienda, 1995; Wentzel, 1991).
students develop these achievement goals, the goals act as cognitive representations for what the students are striving for (Pintrich & Schunk, 2002). Studies on goal theory state that having a goal will increase motivation (Bandura, 1997). Students who have goals are more likely to experience a sense of self-efficacy when attaining those goals, and are more likely to engage in activities that will help them attain those goals (Pintrich & Schunk, 2002).

In a 1975 literature review, Cope and Hannah concluded that personal commitment to educational goals is the single most important determinant of persistence in college. Evidence from later studies (Allen, & Nora, 1995; Axelson & Torres, 1995; Bers & Smith, 1991; Munro, 1981; Napoli & Wortman, 1998; Pascarella & Chapman, 1983; Terenzini, Lorang, & Pascarella, 1981) confirmed that goal commitment does have an important influence on persistence. For community college students, researchers have demonstrated that educational objectives/intents were the most powerful discriminating factor between persisters and non-persisters (Bers & Smith, 1991) and students who lacked academic and career goals were more likely to drop out of community college (Fralick, 1993).

Goals increase people’s cognitive and affective reactions to performance outcomes because goals specify the requirements for personal success (Zimmerman, Bandura, & Martinez-Pons, 1992). Research suggests that the motivational formulation developed in achievement situations can illuminate behavior in social relationships and academic settings. Current research is aimed at fleshing out and testing the larger model of social motivation in which implicit theories predict social goals, and social goals provide the framework for social behavior (Dweck & Leggett, 1988). Much along the
same lines, persistence theories predict influences on academic outcomes and provide the framework for academic behavior.

Traditional student persistence studies have been based on longitudinal research grounded in theories about student persistence and attrition at four-year institutions. Very much like persistence theories, social cognitive career theory (Lent, Brown, Sheu, Schmidt, Brenner, Gloster, Wilkins, Schmidt, Lyons, & Treistman, 2005) is concerned with the interplay between personal, environmental, and behavioral variables that are assumed to give rise to people’s academic and career-related interests, choices, and performance outcomes. Central to these investigations have been the concepts of academic and social integration which suggest that students’ decisions to stay or leave are influenced by the level of connection they have developed with the institution. However, there appears to be a gap in the research on the interactions of student goal seeking behavior, self-efficacy, and academic integration in the persistence of community college students toward their goals.

As community college students initiate and proceed through their educational experience, they process and reevaluate their goals until they either persist to their goal or attrit. The process of persistence is impacted by such internal or sociocognitive variables as students’ beliefs in their self-efficacy, their self-regulatory abilities, and their capacity for self-motivation. Additionally, external variables such as academic and social integration, faculty feedback and accessibility, and pull from family and work are strong influences on community college student persistence.

Unlike four-year institutions where student peer groups often tend toward homogeneity of goals (e.g., bachelor’s degree) within the context of single
institutions, two-year colleges often serve diverse student bodies that have differing needs, experiences, and expectations. Therefore, it is imperative that research models and methodology carefully consider the impact of unique characteristics. Research on persistence among community college students has focused on demographic risk factors, such as age, ethnicity, past academic performance, financial status, and registration behaviors.

However, recent developments show that environmental factors such as faculty-student interaction and student services are also associated with student persistence. Furthermore, although the number of studies that investigated psychosocial variables is scarce, the importance of those factors should not be overlooked. Research has been limited in providing adequate information of the interrelationships between the diverse variables shown to influence student persistence. Much of the research has focused on a part of the problem by examining a few variables at a time so the overall picture of student retention at the community college level has not been clear.

**Statement of the Problem**

A recent report offers predictions for fiscal year 2009-2010 from a survey of the National Council of State Directors of Community Colleges by the Educational Policy Center at the University of Alabama. Community college leaders expect to see declines in state operating budget support ranging from 1% up to 11% in the five-year period 2006-2011 (Palmer, 2011), which is larger than any other postsecondary sector. In other reports addressing state specific issues, as of March 2010, California is faced with a $1.5 billion reduction in K-12 and community college funding for 2010-11, Minnesota’s
governor is reducing funding for higher education institutions to 2006 levels, and Rhode Island’s governor has proposed cutting higher education funding by nearly 6%.

All-in-all, at least 39 states have cut assistance to public colleges and universities resulting in reductions in faculty and staff in addition to tuition increases (Johnson, Oliff, & Williams, 2010). This decline is in spite of record community college enrollments. Tuition is expected to rise at more than double the rate of inflation in an effort to offset budget shortfalls. Although raising Pell Grant distributions is expected to significantly help low income students access community colleges, doubts as to whether the Pell increase will be large enough to cover projected decreases in funding of state student aid programs (Katsinas & Tollefson, 2010).

A recent report by the Pew Research Center indicated that the share of 18- to 24-year-olds attending college in the United States hit an all-time high, driven by a surge in enrollments at community colleges (Fry, 2009). Recently, more and more colleges have decided to limit growth in an effort to limit costs, and spurning the bigger-is-better paradigm. While selective, well-known, and well-endowed colleges have long resisted growth. However more modest institutions are moving into holding patterns (Carlson, 2011). Limiting enrollment is not an option for community colleges. However students are increasingly finding course availability inadequate. Colleges simply do not have the funds to hire faculty for all of the courses students require. Some students are finding they must wait a semester or more before they may enroll in a required course. Waiting is not always an option, in some cases students choose not to persist because courses may not always be available.
Community colleges are faced with a broad mission, and a broad and diverse student base. An expected increase of older returning adults and fast growing Latino populations are causing concern among college leaders who predict their state’s community colleges do not have sufficient capacity to serve current and projected numbers of students (Katsinas & Tollefson, 2010). While not directly limiting access, community colleges are more frequently capping program access. Students who chose to enroll in specific programs are finding space constraints interfering with their goals. This substantial increase in community college enrollment has found many community colleges busting at the seams, with limited space, faculty and funds to meet students’ needs.

For many students, community colleges are the only feasible entry point to higher education. Low cost, and open admissions allow many students who would not otherwise consider higher education an option to enter college. However, elevated dropout rates observed at community colleges suggest that many students are not succeeding at this entry point to higher education (Marti, 2007). Barriers to student success may range from a lack of institutional access or support, limited funding and scholarship opportunities, family and job constraints, or a lack of will or motivation. But, are all students who are not meeting traditional persistence indicators truly not succeeding? Are students enrolling with goals that are not measured by traditional persistence indicators?

Emerging research suggests substantial variation in community college students’ postsecondary pathways, some of which ultimately represent academic success, but would be difficult to classify as success in terms of conventional accountability measures
Research focuses on program effectiveness at community colleges are frequently based on studies of four-year colleges. New high school graduates who may be financially challenged or academically underprepared, or older students returning to higher education as a step toward career change face different issues and have different goals than students at traditional four-year institutions. Measures of persistence and completion present unique challenges to community colleges that enroll large numbers of non-traditional students that are not necessarily seeking degrees (Marti, 2007).

According to Bailey and Alfonso (2005) the dominant theoretical perspective on retention and completion is based on the student integration or engagement model, which was developed based primarily on four-year college models with emphasis on full-time, traditional-aged, residential students. Empirical tests of these models have not yielded strong support for their application to community colleges. Bailey and Alfonso go on to suggest that because insufficient national data exist on institutional practices, most program effectiveness research is based on samples from single institutions. While these can be useful, their conclusions are difficult to generalize because effects may be based on particular features of the college being studied. They assert that as much as possible, national-level databases should be used to allow research to produce results that would be significantly more generalizable to community colleges nationwide.

The problem this research project will address is to shine a light on the issue of student persistence from the perspective of goal attainment. Community colleges are being faced with large funding cuts and students faced with tuition increases, traditional measures of effectiveness may not be sufficient. Traditional persistence and completion
measures may not address all of the goals of community college students. Combining these incomplete persistence measures with student persistence models developed for traditional college students leaves a large group of postsecondary students out of the research literature. This research project will look at the factors that influence the persistence of community college students as they progress toward their goals rather than traditional performance indicators such as graduation, certificate completion, or transfer to four-year schools. Additionally, this project addresses factors that may play a stronger role in community college student persistence, rather than those factors included in traditional student persistence models. Finally, this research project considers community college students from a nationwide perspective, rather than the local, regional or institutional views typically taken in community college research.

**Purpose of the Study**

More than four decades of research on student retention have produced an extensive body of literature. The result is an ever more sophisticated understanding of the complex web of events that shape student leaving and persistence. But for all that, substantial gains in student retention have been hard to come by (Tinto, 2007). Many students arrive at community colleges intending to complete a degree. However others may enroll because it is close to home and affordable. The goals of some students may be met by taking a small number of courses. Community college advocates have these students in mind when they say that failure to complete a degree does not necessarily mean failure to achieve an educational goal (Bailey, Jenkins, & Leinbach, 2005).

Traditional performance indicators alone, such as graduation, certificate completion, or transfer to four-year schools, may not accurately reflect the success of
community college students. Performance indicators for community colleges should be student driven; that is, success should be measured in terms of goal achievement (Polinsky, 2003). Research has shown that both situational variables and dispositional variables play important roles in producing behavior. It is important to determine why some students persist in their academic endeavors while others drop-out even when demographic, academic, and financial variables are matched. Factors that have been associated with persistence in community college settings include environmental variables (e.g., faculty-student interaction and student services) and psychosocial variables (e.g., goals and self-efficacy).

Studies of traditional students show that increasing selectivity for students increases student retention and graduation rates at four-year institutions (ACT, 2004). However, because of their open-door policy, community colleges cannot select the “most likely to finish” students merely to raise their retention rates. Community colleges cannot control the working hours of students or their family responsibilities. Many of the variables researched in the past do not contribute to any interventions strategies to increase student retention. If that is the case, what variables should community colleges target in order to solve the problem of low retention rates among their students?

Different students with similar demographic backgrounds (i.e., low SES, minority, and low parent educational attainment) and the same responsibilities (i.e., work, family, and finance) may differ in their outcomes of college education. Some may decide to stay in college, while the others may decide not to.

A key factor in advancing understanding of student persistence is the use of a conceptual model. As problems become more complex, the utility of the conceptual
model increases. According to Bean (1990) strong conceptual models can provide a simplified, yet comprehensive explanation of the problem being studied by allowing researchers to focus on variables with large impact while ignoring those without significant statistical influence.

The purpose of this study is to determine how behavioral characteristics associated with motivation influence the persistence of community college students toward their goals. To address this objective, the proposed study will test a model of community college student persistence based on national data collected from a community college population. This study will examine the structural relationships among three constructs: (1) behavioral variables associated with student motivation, (2) intervening variables, (3) persistence toward goals. Student behavioral characteristics will be examined to determine their direct and indirect effects on community college students’ persistence toward goals and the direct and indirect effects of intervening variables on persistence to goals. Such data could serve to reduce community college student attrition by: (1) aiding in the development of educational programs, (2) institutional and public policy to sustain effective student support initiatives, and (3) target students, for whom specific policies should be developed to encourage persistence.

The study detailed here is intended to offer a new contribution to the research literature on community college students, student persistence, and program effectiveness that has not yet been found in the literature to date. This paper offers research focusing on the goals of community college students, and whether they are truly meeting their goals, or being lost in the shuffle. It also offers research addressing the factors that influence community college students as they persist toward their goals, and integrates...
widely accepted college student persistence models with psychosocial and behavioral models as they apply to community college students to offer better insights into what motivates community college students in the United States today.

Research Objectives

In general, explanations regarding the source of motivation can be categorized as either extrinsic or intrinsic. Extrinsic sources include family and/or employment commitments and financial factors. Intrinsic sources and corresponding theories can be subcategorized to include cognitive, affective, and conative behaviors. In an educational setting, these behaviors describe academic attainment, self-efficacy, and self-regulatory characteristics. Recent research linking intrinsic behaviors to academic attainment has shown significant effects (Brown, Tramayne, Hoxa, Telander, Fan, & Lent, 2008; Polinsky, 2000, Robbins, Lauver, Le, Davis, Langley, Carlstrom, 2004).

The emphasis on incorporating student goals reflects the diversity of goals among students at 2-year institutions and the concomitant fact that a variety of educational pathways can be taken to achieve these goals. Data from the Beginning Postsecondary Students’ Survey show that among students beginning their postsecondary education in the public 2-year sector, 16% indicated that personal enrichment was their primary reason for enrolling, 22% indicated that obtaining job skills was their primary reason for enrolling, and 38% indicated that transferring to a 4-year institution was their primary reason for enrolling (Bradburn 2003).

By addressing similarities within the persistence, goal setting, and intrinsic behavior theories, this researcher proposed a model linking these theories as they relate to
community college student persistence. The research questions explored in this study are as follows:

1. Do the measured indicators adequately represent the latent constructs?
2. Does the proposed model fit the observed data?
3. In the proposed model, do student behavioral characteristics such as self-efficacy, self-regulation, and cognitive ability directly and/or indirectly affect student persistence?
4. In the proposed model, does the availability of financial aid mediate students’ behavior as they persist toward their goals?
5. In the proposed model, does faculty contact mediate students’ behavior as they persist toward their goals?
6. In the proposed model, does outside employment mediate students’ behavior as they persist toward their goals?

**Significance of the Study**

More than four decades of research on student retention have produced an extensive body of literature. The result is an ever more sophisticated understanding of the complex web of events that shape student leaving and persistence. But for all that, substantial gains in student retention have been hard to come by (Tinto, 2007). Many students arrive at community colleges intending to complete a degree. However others may enroll because it is close to home and affordable. The goals of some students may be met by taking a small number of courses. Community college advocates have these students in mind when they say that failure to complete a degree does not necessarily mean failure to achieve an educational goal (Bailey, Jenkins, & Leinbach, 2005).
It is important to determine why some students persist in their academic endeavors while others drop-out even when demographic, academic, and financial variables are matched. Factors that have been associated with persistence in community college settings include environmental variables (i.e., faculty-student interaction and student services) and psychosocial variables (i.e., goals and self-efficacy).

The majority of persistence research in community college settings has used single variables in their studies. However, multivariable studies are more useful in the practical setting since in reality, numerous variables interact with one another to create an overall effect, each with direct and indirect effects on student persistence. For example, when Halpin (1990) investigated Tinto’s model among community college students, he found that demographic background variable sets accounted for 24 percent of the variance between persisters and nonpersisters, with environmental variable sets accounting for an additional 27.9 percent. Integration variable sets contributed another 30 percent to the explanation of variance.

Napoli and Wortman (1998) developed a model based on Tinto’s (1993) model, but included additional psychosocial measures of conscientiousness, agreeableness, psychological well-being, self-esteem, social support, student satisfaction ratings, negative life events, and negative school events. Results showed educational goals were associated with socioeconomic status and self-esteem. Both social support and academic integration were significantly influenced by a variety of background and psychosocial factors, social integration was associated with social support, and persistence was influenced by many factors as well. When all of these factors were combined, 89 percent of the persistence/withdrawal outcomes were identified.
Thus, the results of this study imply the complexity of variables that intertwine to influence the ultimate persistence behavior of students. When multiple variables are investigated simultaneously, it allows the researcher to examine the interrelationships between the variables which exist in real life. Do students’ combined cognitive ability, self-efficacy, and self-regulatory capacities allow them to overcome external pull factors that have been shown to impede student persistence? Do students who have higher levels of cognitive abilities, self-efficacy, and self-regulation persist even though they may not feel integrated into the institution academically? If a student is faced with the pull of outside employment and/or inadequate financial aid, is their capacity for self-regulation and their feelings of self-efficacy enough to enable the student to persist toward their goals?

The use of student retention as a performance indicator is becoming increasingly common (Burke & Servan, 1998; Burke, 2000; Ewell, 1998). Many states attempt to create indicators that are applicable to all institutional types. Several researchers (Burke, 2000; Ewell, 1998) have called for separate indicators at two-year and four-year institutions. Traditional performance indicators may not accurately reflect the success of community college students. Performance indicators for community colleges should be student driven; that is, success should be measured in terms of goal achievement (Polinsky, 2003). Research has shown that both situational variables and dispositional variables play important roles in producing behavior. Person-situation interactions are best understood in probabilistic terms, with the situation potentially altering the probability that a predisposing tendency will prevail (Dweck & Leggett, 1988).
Studies of traditional students show that increasing selectivity for students increases student retention and graduation rates at four-year institutions (ACT, 2004). However, because of their open-door policy, community colleges cannot select the “most likely to finish” students merely to raise their retention rates. Community colleges cannot control the working hours of students or their family responsibilities. Many of the variables researched in the past do not contribute to any interventions strategies to increase student retention. If that is the case, what variables should community colleges target in order to solve the problem of low retention rates among their students?

Different students with similar demographic backgrounds (e.g., low socioeconomic status, minority, and low parent educational attainment) and the same responsibilities (e.g., work, family, and finance) may differ in their outcomes of college education. Some may decide to stay in college, while the others may decide not to.

Where persistence eventually pays off, as in virtually all innovative endeavors, early quitting is the losing option. However, the costs of giving up too early receive little attention because unrealized futures are neither observable nor easily visualized. The history of innovation vividly documents that premature abandonment of beneficial ventures would have deprived societies of the major advances that they enjoy in virtually every aspect of life (Bandura, 1997). In community college settings, the premature abandonment of goals results in the student’s attrition, and may be documented.

**Operational Definitions**

**Endogenous Variable**

**Persistence to goals.** Community colleges successfully serve many individuals’ educational and career goals. For many students attending community colleges the
subbaccalaureate credential is the primary educational objective. Many students attend community colleges to enhance their work skills and opportunities (Laanan, 2000). In a national survey of over 100,000 students at 245 community colleges in 41 states, Phillippe and Valiga (2000) reported that more than half of the community college students surveyed were first-generation students, and 60% of credit students responded that a major reason for taking classes at the community college was to meet the requirements for their chosen occupation.

Clearly, students enroll in community colleges for many reasons above and beyond the attainment of a certificate or degree. The question to be addressed in this study, involved the role of behavioral factors that contributed to community college student’s persistence toward their goals. In this case, persistence to goals was defined as: Continued enrollment or having met self-defined goals as described throughout longitudinal study process. For the purposes of this study, student goals were merged into three categories: A) Associate’s degree or certificate (at the time of enrollment, the student declared that their goal was to complete a degree or certificate), B) Professional development (at the time of enrollment, the student declared that their goal was to complete one or more courses to meet the requirements for their chosen profession), and C) Personal development (at the time of enrollment, the student declared that their reason for enrolling was to take one or more courses for personal reasons, not associated with employment).

**Exogenous Variables**

**Conative capacity (self-regulation).** Zimmerman (1989) described self-regulated students as being metacognitively, motivationally, and behaviorally active in
their own learning processes, and in achieving their own goals. As such, students’ perceptions of themselves as learners and their use of various processes to regulate their learning were thought to be critical factors in an analysis of academic achievement.

For the purpose of this study, self-regulation was operationally defined as self-generated thoughts, feelings, and actions for attaining academic goals (Zimmerman, 1998). In this study, students were viewed as self-regulators: as agents whose academic success depended on what they build. From this perspective, self-regulators were able to activate, change, and maintain learning strategies in diverse settings. They treated learning as an activity that they developed proactively, involving motivational, behavioral, and meta-cognitive processes of self initiative, rather than mere reactive processes stimulated by their reaction to teaching. One characteristic of self-regulated learners considered in this study was their capacity to manage their own motivational and cognitive resources with the intention of learning successfully. This view implied that true learning – even considering that it is produced in a certain setting – was a personal experience that required students’ engagement and active participation (Pintrich, 2004; Valle, Cabanach, Rodriguez, Nunez, Gonzalez-Pienda, Solano & Rosario, 2007).

Research on academic self-regulation grew out of efforts to explain proactive efforts of students to learn on their own – their personal initiative, resourcefulness, persistence, and sense of responsibility (Zimmerman, 1998). One method of measuring self-regulation in an academic setting is the Metacognitive Questionnaire (MQ), validated by Rose and Winne (1993), which uses self-reported scores for using social resources and tactical planning. Self-regulated learners would be more inclined to use active learning strategies (e.g., more highly conative). As self-regulated learners are more academic and
socially integrated, the frequency of academic and social interaction served as a measure of the latent conative variable. Self–regulation in this study was measured by student’s self-reported frequency of meeting with academic advisors, attending fine-arts activities, participating in school clubs, participating in school sports, attending study groups, and performing community service. Students who were more highly self-regulated, scored higher in these measures as they exhibited higher levels of initiative, resourcefulness and responsibility.

**Affective capacity (self-efficacy).** Bandura (1997) defined self-efficacy as an individual’s confidence in their ability to organize and execute a given course of action to solve a problem or accomplish a task. Self-efficacy beliefs have been shown to be related to academic performance and persistence. In a meta-analysis of the relations of self-efficacy beliefs to academic performance and persistence Multon, Brown and Lent (1991) found effect size estimates in their meta-analysis of .38 for academic performance and .34 for persistence. These results suggest that, across various types of student samples, designs and criterion measures of the studies involved, self-efficacy beliefs account for roughly 14% of the variance in students’ academic performance, and about 12% of the variance in their academic persistence.

A number of researchers studying academic self-efficacy have developed instruments that measure individuals’ confidence in their ability to perform tasks. These measures range from very general in nature to more specific levels of measurement which may tie academic self-efficacy to specific courses or course content. As this study evaluated community college student’s general sense of self-efficacy, the measures were designed to address a student’s more general, broad sense of efficacy. Two incremental
validity studies performed by Gore (2006) in an effort to determine the extent to which academic self-efficacy accounts for variance in college outcomes suggested that efficacy beliefs may be used to predict college outcomes.

For the purposes of this study, self-efficacy was operationally defined as: self-evaluation of one’s ability and/or chances for success in the academic environment. Students with higher self-efficacy would be more inclined to set personal goals and engage in civic participation. Specifically, general self-efficacy was measured with self-reported questions addressing the student’s feeling of the importance of being a community leader, being financially well-off, influencing political structure, having steady work, and the highest degree the student expected to attain. The reasoning behind these general measures was to evaluate the students’ overall sense of self-efficacy in their ability to reach their future goals. Students who were more confident in their abilities would be more likely to set higher goals, and engage in civic involvement. As self-efficacy was intended to be reflective of affective behavior, this measure served to evaluate the affective variable.

**Cognitive ability (academic attainment).** Standardized cognitive ability tests (such as SAT/ACT) are typically the standard by which cognitive ability is measured. However, many community college students may not take these standardized tests. Grade Point Average (GPA) has been accepted in the literature as an alternative indicator of cognitive ability (Cabrera, Castaneda, Nora, & Hengstler, 1992). Research has consistently found high criterion-related validities (approximately $r=.45$) with cumulative GPA and cognitive ability (Schmitt, Keeney, Oswald, Pleskac, Billington, Sinha & Zorzie, 2009). In a prediction of persistence using precollege and first-semester
measures, Kahn and Nauta (2001) found that the strongest predictor of student persistence at a four-year university was first-semester GPA, followed by high school rank and academic self-efficacy. In their study, high school rank, ACT scores, and first-semester GPA were moderately intercorrelated, with correlations of 0.41, 0.28, and 0.14 respectively at p < .001 (Kahn & Nauta, 2001). For the purpose of this study, cognition was represented by academic achievement, and measured by looking at grades as a representative of academic performance. Specifically, cognitive ability was measured by GPA as reported by students and institutional records.

**Mediating Variables**

**Faculty contact (academic integration).** A number of research studies found faculty-student interaction to be an important factor in student development and achievement. Such interactions have been shown to influence degree aspirations, self-efficacy and esteem, academic success, satisfaction, goal development, and adjustment to college (Astin, 1993; Chang, 2005; Lamport, 1993).

Tinto’s (1993) persistence model emphasized the importance of interaction between the student and the college in order for integration to occur, which would in-turn influence persistence. Although Tinto suggested that both academic and social integration are essential for student retention, at the community college level academic integration has been shown to have a stronger impact (Pascarella & Chapman, 1983; Voorhees, 1987).

In this study, faculty contact was measured by the frequency of academic student-faculty contact. Self-report measures of informal meeting or talking with faculty outside
of class (never, sometimes or often). Students who reported more frequent meeting or talking with faculty ranked higher on the faculty contact variable.

**Financial aid.** Financial variables associated with student persistence include both employment status and the effect of tuition and financial aid. A number of studies have acknowledged the influence of financial aid and student persistence (Cofer & Somers, 2000; Hippensteel, St. John, & Starkey, 1996). Financial aid broadly encompasses a number of means of support, including grants, scholarships, tuition waivers, and loans. This variable was considered by NCES to be a measure of unmet financial need. This study specifically looked at Pell grant funds available to the student, and was broken down into categories of no funds received, some funds received ($1 - $2999), and maximum funds received ($3000 - $4050).

**Outside employment.** Student employment while enrolled has been thought to be negatively associated with persistence as it would interfere with available study time. Outside employment may also prevent students from attending school full-time, or even attending classes for which they are registered. A number of studies have associated employment status with student persistence (Bers & Smith, 1991; Cofer & Somers, 2001; Feldman, 1993; St. John, 1990). As a measure of employment status, students reported not working a job at all, working part time (1-39 hours per week), or working full-time (40 hours or more per week).

**Assumptions and Limitations**

This study was limited in several ways. First, the use of secondary data meant that the research was limited by the questions asked in the initial survey. Every attempt was made to include latent variables that were adequately addressed by the survey
questions. A confirmatory factor analysis was performed to evaluate the degree to which
the latent variables were represented by the factors. The study was designed such that if
a confirmatory factor analysis did not indicate adequate representation of the variables,
the structural model would still be evaluated to determine the interrelationships among
the constructs.

A second limitation involved the dataset being used. The dataset was from the
Beginning Postsecondary Students Survey (BPS: 04/06). This survey was designed to
follow the paths of first-time beginners (FTBs) for a number of years as they navigated
the system of postsecondary education, and captured transfer patterns, co-enrollment, and
periods of nonenrollment (stopouts) (Cominole, Wheeless, Dudley, Franklin, Wine, &
Hunt-White, 2007). As not all community college students were FTBs, the data captured
a limited subset of the population of community college students.

The BPS survey, like most NCES surveys, is a complex survey which employed
multistage cluster sampling design. In order to ensure more accurate population
estimates, typically underrepresented population groups were oversampled. Additionally,
because this was a national survey, it required multistage cluster sampling. Rather than
choosing a simple random sample of college students in the United States, NCES
sampled institutions first then students within that institution which resulted in a
clustering of students within institutions. This sampling process is known to result in
homogeneities within samples. However, oversampling and multistage cluster sampling
may be compensated for by the use of sampling weights which were provided by NCES,
and used in all phases of this analysis.
A third limitation involved the time period encompassed by the BPS: 04/06 survey. The first survey of students occurred in 2004 for students enrolled in 2003, it was comprised of students who were beginning postsecondary education in the 2003-2004 academic year. The first follow-up to that survey occurred in 2006 during the 2005-2006 academic year. The third follow-up occurred in September 2009 for the 2009-2010 academic year. The purpose of the follow-ups was to monitor the academic progress of students during the period following their initial entry into postsecondary education.

As the data for the 2009 collection was not yet available, this study used data from the 2004 and 2006 data collection periods. The expected completion time for an Associate’s degree is typically two years. With a 150% buffer extending that two year period to three years, students may have just been completing their degrees by the first follow-up. Although this was most likely not enough time for all of the degree seeking students to have meet their goals, it did fall within the commonly accepted 150% completion time period.

Summary

The community college is playing an ever increasing role in the delivery of higher education to a diverse array of students. However, a review of the literature quickly makes it apparent that persistence at the two-year college has not been studied extensively. A number of models and a variety of variables have been advanced to explain student persistence. It is clear from the literature that these models have given insight to researchers and policy-makers into student behavior. In addition, most of the variables have been shown to be related to student persistence, either directly or indirectly through mediating variables.
Chapter 1 provided an introduction of the variables, conceptual model, and the rationale for the study presented in this paper. A statement of the problem, purpose of the study, and significance of the study were also outlined followed by conceptual and operational definitions of the study variables. Research hypotheses and questions were also included along with the rationale upon which those hypotheses were based. Chapter 2 will review the literature and research related to persistence, self-regulation, the importance of goal-setting and intention in persistence, self-efficacy, and mediating variables that impact persistence such as financial aid, faculty contact, and employment.
CHAPTER TWO

Review of Selected Literature

Introduction

The study of student persistence has spanned decades, and involves a complex web of ideas and theories. This literature review begins by looking at community college students, and addressing the question “who are community colleges students, what do they do, and why?” This section addresses the goals of community college students and factors that differentiate them from students at traditional four-year institutions. This is followed by the introduction of a theoretical framework examining motivational and behavioral factors that are thought to influence student persistence. Following that is an introduction of primary student persistence/retention models. A discussion of research follows, as it pertains to student attainment, goals, and motivational influences, with a focus on the retention of community college students in particular. Finally, the last portion of this literature review concludes with the implications for a theoretically based community college student retention model based on behavior and persistence theories as they apply to community college students.

Who are Community College Students? What do they do? Why?

The population of community college students is diverse. A recent publication by the National Center for Education Statistics reports that they are 60 percent white, 15 percent black and 14 percent Hispanic. Forty-one percent are males. Community college
students are more likely to be older, and only 31 percent of them are enrolled full-time. Forty-one percent of community college students work full-time (Horn, Nevill & Griffith, 2006).

Critics of community colleges point out that a significant proportion of students complete relatively few college credits. One study calculated that the majority of community college students complete one year or less and 35 percent complete one semester or less. The same study also showed that less than one-half of community college students complete any degrees at all (Kane & Rouse, 1999). However, such data does not take into consideration the reasons community college students enroll in the first place. Perhaps the students are not intending to complete a degree when they enroll. Perhaps their goal upon enrollment is only to complete one or two classes, and they are leaving after they complete that goal.

In a descriptive summary of the 1995-1996 Beginning Postsecondary Students’ Survey, Berkner, Horn, Clune and Carroll (2000) described academic goals of students who began at less-than-four-year institutions (community colleges or career and vocational colleges). Of the roughly three million students who first enrolled in postsecondary education in 1995–96, about 40 percent began in four-year institutions (usually in bachelor’s degree programs), but the majority began at less-than-four-year institutions, including one-half at two-year institutions and about 10 percent at less-than-two-year institutions. Less-than-two-year institutions offer only vocational certificate programs that can be completed anywhere from a few months to just under two years. Two-year institutions, or community colleges, offer both certificates and associate’s degrees that require two to three years of full-time enrollment. The students who started
at these less-than-four-year institutions in 1995–96 could have completed a certificate or associate’s degree program by 1998, while those in four-year bachelor’s degree programs would normally just be completing their junior year of college.

A major difference between certificate and associate’s degree programs is the time it takes to complete them. A vocational certificate program is often completed in about one year, while associate’s degrees take at least two years to complete. Students beginning at less-than-two-year institutions were relatively easy to classify. Since these institutions offer only vocational certificates, students can only be enrolled in certificate programs, and the highest degree they can earn there (their first degree goal) is a certificate (81 percent indicated this as their degree goal). About 19 percent indicated that they did not expect to earn any degree at that institution. When asked the purpose for enrolling, the majority (73 percent) indicated that their primary reason for enrolling at a less-than-two-year institution was to learn job skills.

At two-year institutions, the options are more varied. Depending on how the questions were interpreted, and the students’ convictions (or indecision) at the time, Berkner, Horn, Clune and Carroll (2000) found that the responses varied in consistency. Moreover, the possible responses to these questions were not mutually exclusive. Students enrolled in an associate’s degree program who intended to transfer to a four-year college could have responded appropriately in a number of ways. They could have reported being in an associate’s degree program, a bachelor’s degree transfer program, or no degree program (just accumulating transfer course credits). In addition, they could have responded with almost any of the options about their primary purpose (Berkner, Horn, Clune & Carroll, 2000).
The attainment rates after three years were higher for those beginning in the certificate programs (46 percent) than for those in associate’s degree programs (29 percent). There are several reasons for the higher attainment rates of those in certificate programs. Certificate programs are relatively short in duration. The full-time students who completed certificates did so in an average of 15 months. Moreover, the majority (55 percent) of the students in certificate programs were always enrolled full time. Additionally, most (82 percent) of the students in certificate programs expected to earn a certificate at the institution where they started. Associate’s degree programs take longer to complete than certificates, and just one third (36 percent) of the students in associate’s degree programs attended full time during their entire enrollment. In addition, those in associate’s programs were less likely to expect to earn a degree at their 2-year institution. Among liberal arts/undeclared majors, about one-half planned to earn a degree (22 percent before transferring and 25 percent with no transfer plans). After three years, just nine percent had actually earned a degree, and most of these students (seven percent) were still enrolled and continuing their education. Among those in applied associate’s degree programs, about three-fourths (74 percent) expected to complete a degree at the institution, and 20 percent did so within three years (Berkner, Horn, Clune & Carroll, 2000).

An understanding of student goals or intentions and the ways students move through community college is important before one can begin to address retention or student persistence. In 1994, the American Association of Community Colleges (AACC) published a recommended framework for establishing indicators for measuring student intention as a foundation for determining eventual outcomes. In a community college
setting, goal attainment cannot be understood independently from student intent. In developing the indicator system, AACC recognized that not all community college students planned to graduate with an associate’s degree and transfer to a four-year institution. Similarly, not all graduates of career and technical programs intend to enter the workforce directly, they may opt to pursue a bachelor’s degree.

Voorhees and Zhou (2000) conducted a data analysis on perceptions of goal attainment and reported intention shifts among community college students. Using a survey questionnaire developed to evaluate perceptions of goal attainment, initial intentions, and intentions at the time of the survey, Voorhees and Zhou sampled 3,219 students in the Colorado statewide community college system. They found that 69.9 percent of student surveyed would not meet their goal in the term they were surveyed. Of this group, 63.2 percent indicated they would continue at their current college. In evaluating associations among persistence intentions and perceptions of goal attainment, they found a significant relationship which was interpreted to suggest that goal shifting in and of itself is not a negative factor in persistence decisions. Additionally, the data indicated that 79.2 percent of students had not changed their intentions since they entered college. Among those who had changed their intentions, 73.6 percent reported just one change. The most common change being a shift from career intentions to academic goals.

Although this study was severely limited in that it did not survey students who had already left college, it did provide insight into student goals and how those intentions may change over time. The results of this study indicated that although most community college indicator systems presume students who enter community college intend to earn a
degree or transfer, very few students enter college with those intentions (Voorhees & Zhou, 2000). As such, traditional persistence measures may not be effective at evaluating the efficacy of community colleges for meeting student needs.

Voorhees (1987) initially proposed a model in which the factors related to persistence were gender, purpose for enrolling, and intent to return. Following-up in 1997, Voorhees proposed a causal model to explain the learning and cognitive outcomes of community college students. More than previous models, the Voorhees model emphasized the competing demands of family, work, and community on community college student outcomes.

**Theoretical Framework**

It has been suggested that theoretical frameworks are important for simplifying a complex problem, thus allowing statistical analysis to have greater utility (Bean, 1990). Student persistence research has historically been rooted in developmental, psychological, organizational, and sociological theory. This research has addressed both internal and external sources of influence in student’s decisions to persist in an educational setting, as well as the behaviors and choices that allow them to do so. Sources of influence on student behaviors have been shown to range from motivational factors, goal setting capacity, self-efficacy, cognitive capacity to family influence, and financial factors.

Given that behavior is a product of both self-generated and external sources of influence (Bandura, 1986), neither intention nor desire alone have much effect if people lack the capability to exercise influence over their own motivation and behavior (Bandura, 1991). As students enter college, they do so with a set of thoughts, ideas, and goals which influence their motivation and the decisions they make as they move through
college. Ultimately these motivational factors will influence the student’s decision to continue in college or to drop-out.

Modern theories of motivation focus on the relationship of beliefs, values, and goals with action (Eccles & Wigfield, 2002). In an educational setting, this action is reflected in students’ motivation toward learning and the ability of students to regulate their behavior to achieve their learning goals. Conversely, goal orientation may also show a role in motivation. Bandura (1997) and Schunk (1990) have shown that specific, proximal, and somewhat challenging goals promote both self-efficacy and improved performance.

In looking at the self-generated sources of influence on student behavior and motivation, it makes sense to turn to the field of psychology. Although psychological theories abound as to the sources of influence in individual behavior, a concept referred to as the trilogy of mind has been widely accepted for decades and provides a clear launching point for the following discussion. The trilogy of mind refers to a division of mind that defines three areas: conation, affect, and cognition. The trilogy of mind has evolved conceptually over the course of the years, with distinctions among the areas becoming better described (Hilgard, 1980; Mayer, 2003). In psychological and behavioral research, the trilogy of mind concept has exerted a strong influence on the organization of personality traits. As such it provides a rationale for the separate analysis of conative, affective, and cognitive traits (Mayer, 2003).

To clarify the research, and to better link the psychological framework to extant research on college students, conative and affective traits may also be described as self-regulation and self-efficacy. Embedded within conative behavioral characteristics, self-
regulation addresses individual differences in motivation and volition. The conative construct is implicated whenever students select from alternative courses of action and maintain effort and persistence until their goals are achieved or abandoned for new goals.

Self-regulated learning strategies are actions and processes directed at acquiring information or skill that involve agency, purpose, and instrumentality perceptions by learners. They include such methods as organizing and transforming information, self-consequating, seeking information and rehearsing or using memory aids (Zimmerman, 1989). Academic self-regulation is concerned with the degree to which students are metacognitively, motivationally, and behaviorally regulate proactively their own learning process.

Self-regulated learners are not only distinguished by their proactive orientation and performance but also by their self-motivative capabilities (Zimmerman et al., 1992). According to Zimmerman (2000), self-regulated learners have three important characteristics: They use a variety of self-regulated strategies (active learning processes that involve agency and purpose); they believe they can perform efficaciously; and they set numerous and varied goals for themselves. Furthermore, self-regulated learners engage in three important processes: self-observation (monitoring of one’s activities); self-judgment (evaluation of how well one’s own performance compares to a standard or to the performance of others); and self-reactions (reactions to performance outcomes). It would follow that self-regulated learners direct their learning processes and attainments by setting challenging goals for themselves (Bandura, 1991) and applying appropriate strategies to achieve their goals (Zimmerman, 1989).
Self-regulated learning is influenced by self-motivation and a students’ sense of self-efficacy. Self-motivation occurs when students attend closely to their performances. They are inclined to set goals for themselves of progressive improvement, even though they have not been encouraged to do so. Goal setting enlists evaluative self-reactions that mobilize efforts toward goal attainment. The directive and motivational effects of self-monitoring have been found to be quite variable. It sometimes increases the behavior being observed, sometimes reduces it, and may have no effect. One can bring some order to this variability by considering the intervening mechanism of self-directedness. Knowledge of how one is doing alters one’s subsequent behavior to the extent that it activates self-reactive influences in the form of personal goal setting and self-evaluative reactions (Bandura, 1991).

While students are internally regulating their behavior, they are also acting on self-regulatory influences. In their action, self-efficacy, or affect refers to perceptions about one’s capabilities to organize and implement actions necessary to attain designated performance of skill for specific tasks (Zimmerman, 1989). Self-efficacy beliefs partly determine how the various subfunctions of a self-regulatory system operate. Such beliefs affect the self-monitoring and cognitive processing of different aspects of one’s performances and the outcomes that flow from them. They influence the perceived causes of successes and failures. Thus, people who regard themselves as highly efficacious tend to ascribe their failures to insufficient effort, whereas those who regard themselves as inefficacious view the cause of their failures as stemming from low ability. The effects of causal attributions on motivation and performance attainments are mediated almost entirely through changes in self-efficacy beliefs (Bandura, 1991).
Self-efficacy perceptions are thought to help determine one’s choice of activities and environments, as well as one’s effort, expenditure, persistence, thought patterns, and emotional reactions when confronted by obstacles. Self-efficacy has been found to be predictive of academic and career-related choice and performance indices (Lent, Brown, & Hackett, 1994). Theory suggests that “people act on their judgments of what they can do as well as on their beliefs about the likely effects of various actions” (Bandura, 1986, p. 231). Although affirming the dual role of self-efficacy and outcome expectations, Bandura (1986) has argued that these two forms of belief are often differentially potent, with self-efficacy serving as a more influential determinant of behavior. For example, there are instances in which people may anticipate valued outcomes accruing from a given course of action, but avoid such action if they doubt their capabilities. A strong sense of efficacy, however may sustain efforts even where outcome attainment is uncertain (Lent et al., 1994).

Self-efficacy has also been proposed to be related to and predictive of achievement (Bandura, 1997). It refers to the belief about one’s ability to be able to organize thoughts, feelings, and actions in order to gain a desired outcome (Bandura, 1986). Researchers have demonstrated that self-efficacy is significantly related to academic performance and persistence outcomes (Multon, Brown, & Lent, 1991).

In an academic setting, academic ability and past performance influence a student’s confidence in his or her academic ability (e.g., self-efficacy), the anticipated consequences of persisting and/or graduating (e.g., outcome expectations), and the determination to persist and graduate (e.g., performance goals) (Kahn & Nauta, 2001). Whereas self-efficacy beliefs are concerned with one’s response capabilities, outcome
expectations involve the imagined consequences of performing particular behaviors. Bandura (1986) distinguished between several classes of outcome expectations, such as the anticipation of physical, social, and self-evaluative outcomes that may affect behavior.

Clearly, self-generated behaviors, as organized by the trilogy of mind influence the performance of students in an academic setting. It would stand to follow that these behavioral influences factor into student’s persistence decisions. The following discussion introduces persistence theories as they have progressed through the decades and how these theories relate to conative, affective, and cognitive behaviors.

**Persistence Theories**

The major theoretical models of student persistence have been developed by several researchers to identify and analyze the numerous variables that impact a student’s decision to remain in college or drop-out (Bean & Metzner, 1985; Spady, 1970, 1971; Tinto, 1975). These three models are typically used as a framework in studies of traditional university students, and have been adapted in studies of community college students.

William Spady (1970) developed a descriptive theory of student persistence and attrition. Spady based his theory on Emile Durkheim’s (1951) theory of suicide (Summers, 2003). According to Durkheim, the tendency of an individual to commit suicide increases as their values become more incongruent with those of society or they feel they lack support from society. Spady adapted this theory and considered student attrition as analogous to committing suicide – in that in each case a person withdraws from a social system (Cabrera, et. al., 1992).
Spady’s model was based on five variables, four of which (grade performance, intellectual development, normative congruence, and friendship support) actually influence the fifth variable (social integration) (Spady, 1970). Spady then indirectly linked the five independent variables to the dependent variable (dropout decision) through two intervening variables (satisfaction and institutional commitment) to describe why students choose to persist or drop-out (Summers, 2003). Spady (1971) then applied his proposed model in a longitudinal study of 683 first-year undergraduates at the University of Chicago in 1965. Upon completion of that study, Spady revised his model by adding a separate component comprised of structural relations and friendship support. Spady (1971) also revised the relationships among the variables to more accurately describe the interactions he found in his study.

Vincent Tinto (1975) used Spady’s theory to develop what he described as a predictive theory of student attrition. His goal was to address the multiple characteristics involved in student’s decisions to persist or attrit. Tinto’s (1975) model was based on the theory that student persistence can be viewed as a longitudinal process of interactions between the student and the academic and social systems of the college. Tinto measured these interactions as the student’s social and academic integration with the institution. As students experience an institution, they modify their goals and commitments to the institution. According to Tinto (1975), students enter college with a variety of attributes, experiences and backgrounds, each of which impacts a student’s performance in college.

Using his predictive theory of attrition, Tinto (1975) suggested that given a students individual characteristics, prior experiences, and commitments that the individual’s integration into the academic and social systems of the college most directly
predict the likelihood of a student continuing at that college. However, Tinto also considered external influences in a student’s decision to continue at a college. Tinto (1975) asserted that external influences are viewed through the student’s lenses of commitment and integration, and that students are continually evaluating their commitment to an institution in relation to these external influences and performing a cost-benefit analysis to determine whether their investment of time, energies and resources are better served by staying in college.

Tinto (1975) developed his model because he sought to identify the various elements involved in the attrition process. Previous studies on persistence did not allow the determination of the effects of independent variables on student’s decisions to persist or attrit. Essentially, using his model, Tinto was able to predict that students who attend private, higher-quality, four-year institutions are more likely to persist than students who attend public, two-year, or lower-quality institutions. But his model is unable to predict individual persistence or attrition based on the input of individual characteristics.

Despite its impact, Tinto (1987, 1993) and others (Bean, 1990; Ethington, 2000; Pascarella, & Terenzini, 1998; Tierney, 1992) have suggested that Tinto’s (1975) model does not equally explain persistence among different populations, particularly nontraditional students. In addition, Bean and Metzner (1985) suggest that the model is less relevant where social interactions with peers and faculty are limited to time in class, a situation in which many community college students find themselves.

Bean and Metzner’s (1985) student attrition model associated student behaviors with the decision to persist. They identified behaviors as actions shaped by students’ attitudes and beliefs that result not only from the experience within the institution but
from external factors as well, such as the student’s financial situation or family support. The behaviors are based upon the perception of institutional quality as well as students’ perception of their own fit with the institutions.

According to Bean and Metzner’s (1985) model, persistence is directly influenced by student background characteristics, environmental pull characteristics, academic performance and student satisfaction. Persistence is also believed to be indirectly affected by student experiences acting through both academic performance and student satisfaction. In addition to direct effects, student background characteristics are believed to indirectly affect student persistence through academic performance and the construct environmental pull.

Psychological theories have also emerged that have focused on theories of motivation (Pajares, 2002). This is understandable since persistence/retention and attrition are all actions people make (behavior), and behavior is psychologically motivated. Bean and Eaton (2000) advanced Bean and Metzner’s (1985) attrition model and offered an integrated model that focused on both Tinto’s integration and psychological theories, specifically, self-efficacy, attributions, and coping styles.

According to Bean and Eaton (2000), the individual and his or her set of perceived strengths and experiences from the past interact with the environmental variables of the present. For example, students perform self-assessments regarding their efficacy toward writing a paper and their experience with the faculty on campus from which the student just received feedback. Then, they will connect that particular experience to how they generally feel about the institution. In addition, since individuals from different cultures and different genders perceive the world differently, the
interactions of psychological and environmental variables are different from person to person.

Bean and Eaton (2002) developed a model of student attrition using approach/avoidance theory. They based their model on psychological theories in an effort to enhance understanding of the retention process. The four theories they used as the basis for their model were: attitude-behavior theory, coping-behavioral theory, self-efficacy theory, and attribution theory. Attitude-behavior theory, described in 1979 by Fishbein and Azjen assumes that behavior is caused by intentions, which are caused by attitudes, which in-turn reflect beliefs about the consequences of behavior weighted by the evaluation of the consequences (Liska, 1984).

Using the attitude-behavior theory, Bean and Eaton (2002) base their theory on the fact that an individual enters an institution with psychological attributes which have been shaped by experiences, abilities, and self assessments. Key to these psychological attributes is the individual’s perception of their own self-efficacy. Based on self-efficacy theory, the individual makes decisions based on their perceived ability to act in a certain way to assure certain outcomes (Bean & Eaton, 2002). In other words, when an individual enters an institution they do so with the thought that they have confidence and can perform well. In addition, the individual enters the institution with normative beliefs based on their past experiences, these beliefs cause them to ask; “Do the important people in my life think attending this college is a good idea?” and “Have my academic and social experiences prepared me to succeed in college?” Bean and Eaton (2002) suggest that as academic and social self-efficacy increase, academic and social integration also increase.
In addition, Bean and Eaton (2002) also considered coping behavior and attribution, or locus of control in their model. Based on the assumption that coping behaviors allow a student to adapt at school, student’s academic and social integration can be partially attributed to adaptation. Also, locus of control indicates the extent to which a student attributes their past successes or failures to external or internal forces. This model suggests that students who have an internal locus of control are more likely to achieve success because they link studying and attending classes with academic achievement.

Most college student persistence models address traditional-age students. Donaldson and Graham (1999) proposed the Model of College Outcomes for Adults in an effort to integrate literature and research on adults’ experience in higher education. The model proposed a framework to examine and assess the key elements affecting learning of undergraduate nontraditional students. This model sought to explain the nature of the undergraduate experience for adults by taking into consideration the complex nature of the lives of the older student.

The model examined the relationships among six major elements related to undergraduate collegiate experiences: (1) prior experience, (2) psychosocial and value orientations, (3) adult cognition, (4) the classroom as the central avenue for social engagement on campus, (5) life-world environment, and (6) college outcomes. According to Donaldson and Graham (1999), while social involvements heavily influence the learning outcomes of traditional students, the college classroom is the primary influence for adult students. The college classroom mediates the psychosocial and value orientations, the life-world environment, adult cognition, and the college
outcomes. It serves to connect adult students with faculty as well as their peers, thereby enabling adult students to socially construct their interpretation of what being a college student entails. Adult cognition focuses on the learning processes that adult students bring with them to college as well as those that they develop while enrolled in college. Adult students make connections between the processes and world around them, and for them, the context of knowledge is important. The environment includes the adult’s environment outside of the college and encompasses their family, their job, and their communities, providing an alternative to the traditional campus involvement. This component also emphasizes supportive or reinforcement agents which include family, coworkers, supervisors, and community members. Thus, while the Model of College Outcomes views more conventional measures of outcomes as important, the model stresses that additional outcomes are important to adult students and identified the need to consider the dynamics of psychosocial interactions.

Although this model has never been statistically evaluated, Donaldson and Graham assert that in comparison to traditional-aged students, a greater number of variables would have a significant influence on persistence for the adult students. Perhaps the most worthy conclusion that can be drawn from this model is that the predictors of institutional persistence were significantly altered upon independent examinations of persistence among the two age groups (Donaldson & Graham, 1999).

**Research and Integration of Persistence Theories**

While the persistence models share similarities, they do have distinct differences. Some researchers have attempted to bridge the differences among models through integration of the models. Following is a review of the literature where researchers have
conducted studies using one or more than one model to explore student persistence.
Clearly, persistence has been studied at length. The result has been the development of
primary models, which researchers have tested at length. Yet, critics are quick to point
out their limitations (e.g., four-year focus, lens of retention, lack of geographic focus,
etc.). The following discussion of persistence research is based on these models, and
identifies ways in which researchers have attempted to integrate these models, as well as
a discussion about persistence through different lenses and for different populations of
students.

Tinto’s model is based on concepts of social and academic integration. His theory
asserts that students’ background characteristics and goal commitments influence not
only how a student will perform in college, but also how he or she will interact with, and
subsequently become integrated into an institution’s social and academic systems.
“Given individual characteristics, prior experiences, and commitments….it is the
individual’s integration into the social and academic systems of the college that most
directly relates to his continuance in that college” (Tinto, 1975, p. 96).

Pascarella and Terenzini (1980) sought to construct a measure specifically
designed to assess social and academic integration and to examine the predicative validity
of such a measure. Using a longitudinal design conducted at Syracuse University in New
A follow-up survey conducted during spring semester, yielded 773 usable responses. The
researchers used multivariate analysis of covariance to determine if the institutional
integration scales significantly differentiated between freshman year persisters and
voluntary dropouts. A finding of significant covariance justified proceeding with a discriminate analysis in an effort to determine the predictive utility of the scales.

Pascarella and Terenzini (1980) found that a discriminant analysis based on fourteen pre-college characteristics, freshman-year academic performance, and extracurricular involvement, the institutional integration scales they developed increased correct identification of persisters and dropouts from 58.2 percent to 81.4 percent and from 34.5 percent to 75.8 percent, respectively. Using the five scales alone, they were able to correctly identify 78.9 -percent of persisters and 75.8 percent of the students who later dropped-out. These results generally supported the predictive validity of the major dimensions of Tinto’s (1975) model. Of notable interest, however, Pascarella and Terenzini found particularly strong contributions of student-faculty relationships. Persisters’ average scores on faculty-interaction scales were approximately one standard deviation higher than those students who dropped-out voluntarily at the end of their freshman year.

Pascarella and Chapman (1983) compared withdrawal from three types of institutions – four-year residential, four-year commuter, and two-year commuter institutions. Using Spady (1970) and Tinto’s (1975) models as a basis to guide their study, they used path analysis to test the Tinto model at the three different types of institutions. Using longitudinal data collected during the 1978-1979 and 1979-1980 academic years the researchers gathered data from 2,326 full-time freshmen from 11 two-year and four-year institutions. Data were gathered via the Student Involvement Questionnaire (SIQ), which collected data on student involvement and a variety of
activities that Spady (1970) and Tinto (1975) suggested as dimensions of social and academic integration.

The authors noted that the 2,326 students responding to the SIQ represented an overall response rate of 35 percent. Chi-square goodness-of-fit tests indicated that the overall sample was representative of the population from which it was drawn with respect to sex, but it was underrepresented by older freshmen (21 years and older) at five institutions. The authors did not have access to information on other sample demographic variables to evaluate adequacy of representation.

Although the study was limited by the response rate and the overall representativeness of the sample, particularly the ability of the data to be considered a representative national sample, the authors continued with their analysis. Because of the differences in institutional size, and response rate, Pascarella and Chapman acknowledged the possibility that larger institutions might dominate, and chose to weight each case in a particular institution inversely to the representation of that institution within the subgroupings of institutions. This weighting served to equate the contribution of each institution within a particular category.

Discriminant analysis was used to determine the efficiency of the variables in correctly classifying persisters and withdrawals. Path analysis was used in which only significant beta weights, or standardized path coefficients, were retained, which resulted in reduced path models for each validation. The reduced model explained 12 percent of the variance in persistence. Pascarella and Chapman (1983) equated institutional commitment to social integration, and a combination of institutional and goal commitment to academic integration. The concept of social integration was
operationalized by an eight-item scale which included friends and dates on campus, participation in extracurricular activities, weekends spent on campus, peer conversations, and informal contact with faculty. Academic integration was operationalized by a nine-item scale which included grade-point average, hours spent studying, books read and cultural events attended, conversations with faculty and peers about academic topics, and participation in honors programs or career development programs.

The direct effects of institutional commitment and goal commitment were approximately equal. Social and academic integration did not directly influence persistence, but did have an indirect effect through their influence on institutional commitment and goal commitment. The commitment variables had the strongest direct effects on persistence. Other than that, only two other variables had significant direct effects: living on campus (positive), and attending a 2-year institution (negative). Based upon their results, Pascarella and Chapman (1983) asserted that the Tinto model had predictive validity for all types of institutions, but that at commuter institutions academic integration had the strongest influence whereas at residential colleges social integration had a stronger effect.

A 1990 study by Halpin, applied the Tinto model to the analysis of student persistence at a community college. The study was undertaken with a cohort of 381 first-time, full-time freshmen from a rural New York state community college. It was later determined that out of this cohort, 75.8 percent persisted to the second semester, 14.7 percent were academically dismissed, and 9.4 percent withdrew voluntarily. Modeling a questionnaire after Pascarella and Terenzini (1980), Halpin collected 291 usable
questionnaires, this represented 76 percent of the total population, however, females were over-represented in the sample so a weighting was utilized in the data analysis.

Halpin performed a discriminant analysis which indicated that his set of background variables (sex, parent’s educational background, and highest degree expected) accounted for 24 percent of the variance in persisters, versus withdrawers and dismissals. Addition of the academic integration, social integration, institutional commitment, and goal commitment variables contributed another 30 percent of explained variance in group membership. Halpin affirmed that these results indicated that the integration variables significantly discriminated among the three groups (persisters, withdrawers, and dismissals), even after the effects of the background and environmental variables are held constant. Halpin (1990) confirmed Pascarella and Chapman’s (1983) results that Tinto’s model is indeed applicable to community college students, also confirming the concept that academic integration has a stronger effect than social integration in such a setting.

Building upon Pascarella and Terenzini (1980) and Halpin’s (1990) work on the predictive validity of academic and social integration, Strauss and Volkwein (2004) sought to examine the predictors of institutional commitment of first year students at both two-year and four-year institutions. Institutional commitment had previously been considered analogous to social and academic integration. Building upon Tinto’s model and subsequent research which emphasized the importance of institutional commitment in student persistence decisions, Strauss and Volkwein used Hierarchical Linear Modeling in a multivariate analysis of students at both institution types.

The study used data from a multi-campus database aggregated from 23 four-year and 28 two-year institutions. Using Hierarchical Linear Modeling, the researchers
examined 8,217 responses from first-year students. The data were collected by a consortium of the State University of New York System and participating institutions. Institutional level data were supplemented by data from the Integrated Postsecondary Data System (IPEDS). Student-level data were collected from an outcomes survey administered directly to the students. Institutional commitment was identified as the dependent variable and measured by four items that addressed the student’s overall impression of, sense of belonging to, satisfaction with, and choice to attend the institution again. Strauss and Volkwein grouped the data into institutional commitment, organizational characteristics, pre-college characteristics, encouragement from others, financial aid, social integration, academic integration, and grade-point average. Performing an ordinary least squares regression, having institutional commitment as the dependent variable, the researchers reduced the variables to the selected model based on the above variables.

Strauss and Volkwein (2004) found that although first-year students at two-year institutions have higher institutional commitment scores than those at four-year institutions, however those students also tended to leave college without a degree more frequently than students at four-year institutions. The researchers suggested this paradox may be influenced by the fact that students at two-year institutions may not intend to complete a degree, and instead may be completing a few courses for professional development or remediation. As such, they may be more highly committed to the institution, but they are leaving as they meet their goals, rather than attending until they attain a degree.
Cabrera, Nora, and Castaneda (1993) combined Tinto’s student departure model and Bean’s student attrition model in an attempt to further explain students’ persistence/withdrawal behaviors. They identified a baseline model that incorporated both Tinto and Bean’s theoretical frameworks. A longitudinal research design with a student population drawn from the fall 1988 entering freshman class at a large southern urban institution was employed. To maintain consistency with previous tests of the individual models, the student population was limited to first-time freshman who were United States citizens or permanent residents, under twenty-four years of age, and not married. This sample population was comprised of 2,459 students. Students were surveyed twice (spring, 1989, fall 1989) with a questionnaire designed by Cabrera, Nora, and Castaneda (1993) to measure the variables identified in the integrated model. The initial survey and follow-up yielded 466 useable surveys. Using a two-step structural equation modeling strategy, they found that the effects of environmental factors outside of the institutions, such as financial issues and family support, are more complex and have increased impact on student’s departure decisions. Thus, they concluded that the retention model needs to consider the relationship between the individual, institution, and environmental variables to fully understand student’s decision making processes. Results indicated that when two theories were merged into one integrated model, a more comprehensive understanding of the interplay among individual, environmental, and institutional factors was achieved. However, the authors acknowledged that the generalizability of the findings to other institutions should be approached cautiously. They acknowledged that the patterns underlying the college persistence process may vary
by type of institution, the setting, and the composition of the student enrollment (Cabrera, Nora & Castaneda, 1993).

In an effort to address the ever increasing diversity in higher education, Cabrera, Nora and Castaneda’s integrated model (1993) was further advanced by Sandler (2000) with the addition of three variables; career decision-making self-efficacy, perceived stress, and financial difficulty. Sandler sought to examine the relationship between adult learners and academic institutions. As adult students draw relationships between their academic experience and other life roles that adult students encounter, these variables may impact the persistence of non-traditional students. With the addition of career decision-making self-efficacy Sandler sought to identify the degree of confidence students express about their competency or ability (self-efficacy) to embark on informational, educational, and occupational goal planning activities.

Sandler (2000) suggested that the complexity of adult student persistence may require a complete paradigm shift beyond Tinto, Bean and the synthesis of Cabrera et al. (1993). This observation was put forth largely because Sandler’s model drew elements from social cognitive theory, self-efficacy, and the theory of planned behavior. In this way, Sandler’s model explored the idea of interaction among person, environment, and behavior that moves beyond the person-environment fit models put forth by Tinto, Bean, and Cabrera. This model reflects an exchange among students, the environment and institution as adult students incorporate career goals, and career decision-making self efficacy into persistence decisions.

The study group for Sandler’s (2000) study was composed of students 24 years of age or older studying in a two-year and four-year degree bearing program for adult
students at a private urban research university in the Northeast United States. A survey questionnaire was designed based on Cabrera, Nora and Castanada’s (1993) Student Experiences Survey with the addition of the three additional constructs: career decision-making self-efficacy, perceived stress, and financial difficulty adapted from the Career Decision-Making Self-Efficacy Short Form instrument. The final sample included 469 adult students. Over 95 percent of the students were commuters.

Preparing for data analysis, Sandler found moderate levels of kurtosis and skewness indicating non-normality of the data. A weighted least squares method, which allows for non-normality, was used as an adjustment for the multivariate non-normal conditions. Sandler (2000) employed a two-step structural equation modeling procedure which included measurement and structural stages. The measurement stage was comprised of a principal components procedure followed by computation of factor scores for each respondent. Using these factor scores, the author performed structural equation modeling on the path model.

Sandler’s resultant path model proved to be very complex. Using a standardized total effect size criterion of .10, which indicated that a unit change in the total effect of a given variable is associated with at least a 10 percent change on a dependent outcome, Sandler found a total of 42 endogenous path relationships greater than the effect size criterion of 0.10. As a structural model, Sandler’s model had a “close to perfect” fit with a chi square of 136.719 with 173 df; p = .981.

The squared multiple correlation ($R^2$) explaining the variance in persistence was moderate at 43 percent. The seven strongest total effects on persistence included: intent to persist (total effect = 0.66, p. < .001), institutional commitment (total effect = 0.20, p
<.001), academic integration (total effect = -0.17, p < .001), social integration (total effect = 0.15, p < .001), family encouragement (total effect = 0.12, p < .01), and career decision making self-efficacy (total effect = 0.11, p < .001). These results indicated that the intent to persist had a strong total effect on persistence, and it was entirely a direct effect. Institutional commitment had a negative effect on persistence, and was entirely an indirect effect. Academic integration and encouragement have negative, although low level, total effects on persistence. Social integration had a low positive total effect on persistence. It was largely a direct effect.

The results indicated that the intent to persist for nontraditional learners has a strong total effect on persistence. The total effects of intent to persist included the effects of career decision-making self-efficacy, financial attitudes/difficulty, academic integration, and institutional commitment. As it was, Sandler’s model effectively bridged traditional persistence research with behavioral components to explain adult student persistence. Sandler’s (2000) model introduced variables not previously included in adult student persistence research, the results proved to be very complex, with some (e.g., social integration showing a positive effect on persistence for adult learners) results running counter to those found in previous research.

Sandler asserted that his model served to more comprehensively explain adult student persistence decisions through the inclusion of career decision making self-efficacy. However, the results are somewhat counterintuitive in that they indicated that the career decision-making self-efficacy of adult students negatively influenced the feelings they expressed being a part of the academic life and social life of the institution, and positively influenced their interest and attitudes in persisting to the following year at
the institution. Previous research had shown that feeling a part of the academic and social life of the institution (academic and social integration) positively influenced persistence decisions (Bers & Smith, 1991; Pascarella & Terenzini, 1980; Tinto, 1987).

A recent study of 320 students at a community college in the south-central area of the United States by Crisp (2010) evaluated the influence of mentoring experiences on student persistence decisions. Using structural equation modeling, Crisp composed latent constructs representing mentoring, social integration, academic integration, institutional commitment, and goal commitment. Results of this study indicated that gender-based differences in the reported college experiences of male and female students were present. Women perceived significantly more psychological, degree, academic, and role model support. However, Crisp reported a lack of relevance for community college students as they reported factors found only in traditional persistence models. Not all aspects of student persistence models were found to explain the nature of student persistence among community college students as described by Tinto (1993) and Pascarella & Terenzini (1980). Inclusion of those traditional constructs associated with student persistence resulted in non-significance until they were dropped from the model.

A more specific follow-up study by Karp, Hughes, and O’Gara (2011) focused on Tinto’s integration framework as it applied to community college students. Using in-depth interviews with students at two urban community colleges in the Northeast, the researchers examined the ways that first-year community college students engaged with their institutions. They found that students did indeed develop a sense of integration and attachment to their institutions, and that this integration was both academic and social. However, their results contradicted Tinto’s model in that both academic and social
integration developed in concert for community college students and that the same activities lead to both academic and social relatedness.

The above literature provides a solid research foundation for established persistence models and the interactions between the student and the academic and social systems of the college. However, the variances in the influence of academic and social integration for students at two-year and four-year colleges could lead one to question other differences in influence for students at different institutional types. Most specifically, Crisp (2010) was unable to directly associate traditional persistence constructs with community college students’ persistence decisions. What other influences may play a role in student persistence at two-year institutions?

Tinto originally asserted that a longitudinal process played a role in student persistence decisions. He suggested that as students experienced an institution, they modified their goals and commitments to the institution. As such, a student’s goals and commitments to the institution would appear to influence persistence decisions. The following literature appraises the importance of goals in student persistence decisions.

**The role of goals in persistence**

A thorough understanding of the role of student goals and intentions, and the ways in which students move through community college is important to attain before one can begin to address persistence. In 1994, the American Association of Community Colleges (AACC) published a recommended framework for establishing indicators for measuring student intention as a foundation for determining eventual outcomes. In a community college setting, goal attainment cannot be understood independently from student intent. In developing the indicator system, AACC recognized that not all
community college students plan to graduate with an associate’s degree and/or transfer to a four-year institution. Similarly, not all graduates of career and technical programs intend to enter the workforce directly. They may opt to continue on to pursue a bachelor’s degree.

Social cognitive theory holds that goals play an important role in the self-regulation of behavior. While environmental events and personal history shape their behavior, people are seen as more than just mechanical responders to deterministic forces; by setting goals, people help to organize and guide their behavior, to sustain it over long periods of time even in the absence of external reinforcement, and to increase the likelihood that desired outcomes will be attained (Lent, 1994).

Social Cognitive Career Theory (SCCT) is concerned with students’ beliefs about performing a behavior, such as persisting in college. It was based on the general Social cognitive theory and was extended and adapted to add relevancy to basic career development processes (Lent et al., 1994). Lent and his colleagues utilized a framework that emphasized three social cognitive mechanisms that they viewed as particularly relevant to career development: (a) self-efficacy beliefs, (b) outcome expectations, and (c) goal representations.

SCCT is relevant to academic development as it dovetails, developmentally, with career development. Interests and skills developed during the school years ideally become translated into career selections – although social and economic factors frequently intervene to affect the level and content of choices pursued (Lent et al., 1994). It was these intervening factors that were proposed to affect a student’s persistence
towards goal completion. Career theory in concert with goal theory may play an important role for the community college student.

Voorhees (1987) initially proposed a model in which the primary factors related to persistence were gender, purpose for enrolling, and intent to return. Following-up in 1997, Voorhees proposed a causal model to explain the learning and cognitive outcomes of community college students. More than previous models, the Voorhees model emphasized the competing demands of family, work, and community on community college student outcomes.

Voorhees and Zhou (2000) conducted a study on perceptions of goal attainment and reported intention shifts among community college students. Using a survey questionnaire developed to evaluate perceptions of goal attainment, initial intentions, and intentions at the time of the survey, Voorhees and Zhou sampled 3,219 students in the Colorado statewide community college system. They found that 69.9 percent of student surveyed would not meet their goal in the term they were surveyed. Of this group, 63.2 percent indicated they would continue at their current college. In evaluating associations among persistence intentions and perceptions of goal attainment, they found a significant relationship which was interpreted to suggest that goal shifting in and of itself is not a negative factor in persistence decisions. Additionally, the data indicated that 79.2 percent of students had not changed their intentions since they entered college. Among those who had changed their intentions, 73.6 percent reported just one change. The most common change being a shift from career intentions to academic goals. Although this study was severely limited in that it did not survey students who had already left college, it did provide insight into student goals and how those intentions may change over time.
The results of this study indicated that although most community college indicator systems presume students who enter community college intend to earn a degree or transfer, very few students do enter college with those intentions (Voorhees & Zhou, 2000). As such, traditional persistence measures may not be effective at evaluating the efficacy of community colleges for meeting student needs.

Similarly, in a 1991 study, Bers and Smith argued that an alternative approach to studying persistence is one that focuses on students’ educational objectives rather than their experiences while at the institution. Bers and Smith (1991) applied Pascarella and Terenzini’s (1980) Social and Academic Integration Scales (which were based on Tinto’s social and academic integration model) to community college students. Bers and Smith surveyed a randomly selected sample of students enrolled on the tenth day of the fall 1988 term at a midsize suburban community college in the Midwest. This survey technique did not identify first-time, full-time freshman who would most closely resemble previous persistence studies at four-year institutions. Rather, this study examined a sample of the entire college population. Students completed a survey which contained items about student’s objectives, future educational plans, future enrollment plans, and a variety of demographic items. Pascarella and Terenzini’s (1980) social and academic integration scale was embedded in the questionnaire.

A principal components factors analysis was performed using the 30 items pertaining to student’s academic and social integration to determine whether or not the same factors found by Pascarella and Terenzini (1980) would also emerge with a two-year student population. The factors found were similar to prior findings and required a small amount of modification. The researchers reported that they were “certainly within
the spirit of the original intent of measuring academic and social integration” (Bers & Smith, 1991, p. 548).

Bers and Smith (1991) also found from the discriminant analysis that among the covariates, employment status contributed most to the discriminant function; persisters and nonpersisters were significantly different with respect to their outside employment. The more hours community college students were employed, the less likely they were to persist, although students not employed at all were less likely to persist than those employed part-time. Among the integration scales, institutional commitment and goal commitment significantly differed among persisters and nonpersisters.

Although Bers and Smith (1991) found statistically significant differences in student characteristics, objectives, and their subjective experiences which would indicate that all may be important factors affecting persistence, the total $R^2$ was modest and indicated that there are other factors not captured in their model that have a powerful effect on student behavior.

A 1998 study by Napoli and Wortman sought to build upon Bers and Smith’s 1991 work and examine the validity of Tinto’s model (1975, 1987, 1993) within a community college population and to refine the model by examining the mediational influences of psychosocial measures. In addition to Tinto’s variables, Napoli and Wortman (1998) added conscientiousness, agreeableness, well-being, self-esteem, social support, student satisfaction ratings, negative life events, and negative school events. The sample group for the study consisted of 1,011 first-time freshmen students enrolled in freshman seminar classes at a three-campus community college system in New York. For the purposes of the study, the authors defined a retained student as one who
reenrolled in classes by the eighth week of the subsequent Spring semester. Of the 1,011 students in the study, 72.4 percent reenrolled in the Spring semester. Previous academic/performance data were collected from student data files, and self-report measures were obtained from a questionnaire administered once in the Fall of 1994 and again in the Spring of 1995. Using structural equation modeling and discriminant function analysis, Napoli and Wortman (1998) evaluated their expanded version of Tinto’s model.

Napoli and Wortman tested the structural model separately from the measurement models. The chi-square value for the model was not significant ($\chi^2 = 193.5$, $p > .10$) and the Comparative Fit Index was high (CFI = 0.99). These results indicate an excellent fit between the data and the hypothesized causal model of persistence behavior. All standardized path coefficients for the model were significant at the $p < .05$ level. Additionally, the model accounted for 57% of the variance in student persistence behavior.

Results showed that educational goals were associated with socioeconomic status ($\gamma = 0.11$), and the psychosocial variable, self-esteem ($\gamma = 0.07$). Academic integration was influenced by a variety of background and psychosocial factors that accounted for 59% of its variance. Of the cognitive and psychosocial factors, goal commitment ($\beta = 0.11$), grade-point average ($\beta = 0.20$), and conscientiousness ($\gamma = 0.08$) had a direct, positive, and significant impact on academic integration. Additionally, academic integration exerted the strongest influence on goal commitment ($\beta = 0.51$).

Thus, Napoli and Wortman (1998) suggested a student’s interaction with his or her classmates and instructors involving academic issues serves an important function in
promoting and reinforcing one’s commitment to earning a college degree. This study provided further detail into the factors contributing to community college student persistence. The addition of the psychosocial measures including self-esteem, and social support accounted for a large part of the variance in persistence behavior ($R^2 = 0.21$).

Rather than focusing on traditional persistence models, Ethington (1990) chose to evaluate a model which integrated achievement behaviors with behaviors thought to be associated with persistence: choice and performance. This model provided a framework that specified causal relationships among aptitude, socialization, attitudinal factors, and affective factors. The model was comprised of two components: a psychological component in which relationships were specified between various student cognitive factors and a socialization component which included factors associated with the beliefs and attitudes of students’ parents and teachers.

Using data drawn from the Cooperative Institutional Research Project sponsored by the American Council of Education and the University of California, Ethington randomly selected a small subset of 500 students from the dataset of 8,790 respondents. A path analysis of the model indicated four statistically significant indirect effects. Of those, self-concept served a dual role by indirectly influencing persistence and as the dominant mediator for the indirect influence of prior achievement. Of the total effects, prior achievement had the greatest total influence of any variable. This research served to reinforce the importance of the value placed on college attendance and goal orientations were reinforced. As such, it was suggested that in order to enhance the likelihood of students persisting in college, intervention should be directed at helping students formulate and articulate their goals (Ethington, 1990).
In an effort to understand community college student retention by evaluating student goals, intentions and behavior, Polinsky (2003) surveyed 915 students at a community college in suburban Pittsburgh, PA. Using an instrument created specifically to evaluate factors found most often in the research to be associated with retention, called the Student Intention Survey. Polinsky found that 52 percent of students leaving the institution left short of accomplishing their goals. In this study, negative attrition was found to be associated with working many hours per week, work demands, family problems, financial problems, and personal problems. Of the students who achieved their goals, 36.4 percent were attending primarily to learn about a subject, while 28.6 percent of those intending to acquire certain skills did so before leaving. Overall, 47.7 percent of those who left the college indicated that they had completed their goals before leaving. Thus, the college’s positive attrition rate was 47.7 percent, while its negative attrition rate was 52.3 percent.

Of the students who successfully met their goals in Polinsky’s (2003) study, 94.7 percent of students indicated self-determination/motivation was a factor in their success. Other reasons for success included encouragement/support from friends and family (39.5%), encouragement/support from faculty (26.3%) and encouragement/support from support staff (15.8%). Although the researchers found that personal factors emerged as the leading cause of attrition among all students, those who left short of their goals left primarily due to employment and finance reasons.

Both Tinto’s (1975) model and Bean and Metzner’s (1985) model include education goals as a background characteristic, however, the treatment of the variable is fundamentally different. Tinto (1975) posits that the student’s original educational goals
interact with the college structure through student experiences, which ultimately change and shape the student’s educational goals. Bean and Metzner (1985) also believe that a student’s educational goals interact with the environment shaping both the academic and social experiences of the student. However, they do not believe that failing to persist should be viewed as a reevaluation of the original student goals, particularly among nontraditional students who have significant outside influences. Pascarella and Chapman (1983) found student educational goals to be an important predictor of persistence across all institution types.


Goal-setting theory is not limited to, but focuses primarily, on motivation. Social-cognitive theory research is primarily focused on self-efficacy, its measurement, its causes, and its consequences at the individual, group, and societal levels in numerous domains of functioning. Goal-setting theory is consistent with social cognitive theory in that both acknowledge the importance of conscious goals and self-efficacy. Despite their differences, the two theories agree about what is considered important in performance motivation. The two theories differ in emphasis and scope. The focus of goal-setting theory is on the core properties of an effective goal: specificity and difficulty level; goal
effects at the individual, group, and organization levels; the proper use of learning versus performance goals; mediators of goal effects; the moderators of goal effects; the role of goals as mediators of other incentives; and the effect of goal source (assigned vs. self-set vs. participatively set) (Locke, & Latham, 2002). Although goal-setting theory is not the primary objective of this review, the link to motivation may serve to illuminate other factors involved in community college student persistence.

**The role of motivational factors in persistence.**

Recent reviews of the motivational literature (Covington, 2000; Dweck, 1999; Eccles & Wigfield, 2002) have highlighted the theories of self-regulation and expectancy values and the need to integrate motivational and cognitive models. As Covington pointed out, “the quality of student learning as well as the will to continue learning depends closely on an interaction between the kinds of social and academic goals students bring to the classroom, the motivating properties of these goals, and prevailing reward structures” (Covington, 2000, p. 171).

In addition to social and academic integration and goals, persistence is influenced by a student’s confidence in his or her academic ability (e.g., self-efficacy), the anticipated consequences of persisting and graduating and the determination to persist and graduate (Kahn & Nauta, 2001). The construct of self-efficacy – an individual’s perceived capability in performing necessary tasks to achieve goals – is relevant to postsecondary academic success as it is thought to influence the amount of effort put into performance of a task, perseverance on the task, and ultimately, the level of one’s achievement (Bandura, 1997).
Self-efficacy has been found to play a mediating role that can act beyond past experience to shape new behaviors and outcomes. Several studies have demonstrated that self-efficacy influences performance in academic domains, including college student academic achievement (Pajares, 1996; Pajares & Miller, 1994; Spitzer, 2000; Wood & Locke, 1987). Self-efficacy has been found to be positively related to college adjustment (Chemers, Hu & Garcia, 2001) college student academic achievement (Pajares, 1996; Zimmerman, 2000), and student persistence (Robbins, Lauver, Le, Davis, Langley & Carlstrom, 2004). Although important theoretical distinctions regarding self-efficacy exist, such as the extent to which self-efficacy judgments are more task- or situation-specific, by and large, most research supports the relationship between self-efficacy and academic performance (Bandura, 2001).

Basing research on Bandura’s social cognitive theory, which suggests that self-efficacy strongly influences the choices people make, the effort they expend, and how long they persevere in the face of challenge, Pajares (1996) and Pajares and Miller (1994) evaluated the role of self-efficacy on academic achievement. In a study of 350 undergraduates from a large public university in the South, Pajares and Miller (1994) evaluated the impact of mathematics self-efficacy, mathematics self-concept, high-school and college math experience on performance in mathematics. Pajares and Miller hypothesized that self-efficacy would have stronger direct effects on performance than other variables in their study. Of all path coefficients from the independent variables to performance, only those from math self-efficacy ($\beta = 0.55, t = 10.87, p > .0001$), math self-concept ($\beta = 0.16, t = 3.07, p < .005$) and high school math level attained ($\beta = 0.09, t = 1.11, p < .05$) were significant. However, the magnitude of the self-efficacy to
performance path coefficient was significantly stronger than any other path. Both the
direct and total effects for self-efficacy were significantly stronger than those of the other
variables at predicting performance in mathematics.

Basing an investigation on Tinto’s (1987) model, Peterson (1993) sought to
explore the relationship between career decision-making self-efficacy and student
integration. Peterson acknowledged the widely accepted link between academic and
social integration and persistence and attrition; however, she also noted a relationship
between self-efficacy and persistence. Survey responses were obtained from 418
students at a nondegree-granting unit of a large Midwestern University. The mission of
the college was to prepare academically underprepared students for transfer to degree-
granting units within the university or to transfer to another university. Like community
college students, students in this unit were at risk for attrition for academic reasons and
for economic reasons.

Simple product-moment correlation was used to evaluate the relationship between
students’ perceived career decision-making self-efficacy and their integration with the
educational institution and (b) their initial goals and commitments. Career decision-
making self-efficacy was moderately correlated (0.35) with goals and commitments and
moderately correlated (0.42) with overall integration. However, career decision-making
self-efficacy had a stronger relationship with academic integration than with social
integration (0.34). As such, career decision-making self-efficacy explained about 12
percent of the variance in social integration and about 18 percent of the variance in
overall integration and academic integration.
Additionally, Peterson (1993) found moderate correlation between goals and commitments and overall integration (0.41), with social integration correlation coefficient of 0.35 and an academic integration coefficient of 0.38. An evaluation of intercorrelation between career decision-making self-efficacy and integration proved to be significant for both genders. Students who were not employed perceived a significant (p ≤ .01) and strong relationship between career decision-making self-efficacy and integration. Peterson asserts that there is sufficient evidence to warrant inclusion of the variable, career decision-making self-efficacy as an individual characteristic in further studies of integration. A logical next step would be to include self-efficacy as a variable in persistence studies as well.

A 2000 study by Spitzer evaluated predictors of college success in terms of impact on GPA for traditional and nontraditional age college students. Spitzer performed a multiple regression analysis of 267 traditional age and 88 nontraditional age students at a private liberal arts college. In a model that included academic self-efficacy, self-worth, social acceptance, social support, motivation and self-regulation as predictors of GPA the model had a significant $R^2$. The $\beta$ weights indicated that academic self-efficacy was the strongest positive predictor of GPA, while self-regulation and social support also made positive contributions to GPA.

A longitudinal study of first-year college student adjustment examined the effects of academic self-efficacy on students’ academic performance (Chemers, Hu, & Garcia, 2001). Predictor variables (high school GPA, academic self-efficacy and optimism) and moderator variables (academic expectations and self-perceived coping ability) were measured at the end of the students’ first academic quarter and then related to classroom
performance, personal adjustment, stress, and health as measured at the end of the school year.

Using structural equation modeling, Chermers, Hu and Garcia (2001) tested the fit of data acquired from first year students at a large Western residential university. The initial questionnaire elicited a 23% response rate (373 students) and the second questionnaire returned a 69% response rate (256 students). The authors found significant and substantial direct effects of self-efficacy on academic performance (standardized coefficient = 0.34, p < .001). There were also significant mediated effects of self-efficacy on academic performance (standardized coefficient = 0.08, p < .01). Chemers, Hu and Garcia asserted that there was compelling support for the role of self-efficacy and optimism in first-year college students’ success and adjustment. Self-efficacy directly and indirectly showed strong relationships to academic performance and personal adjustment of the first-year students studied.

A study of first-time, full-time freshman at a public, four-year institution in the Southwest, Allen (1999) sought to examine the structural relationships among motivational factors, student background factors, academic performance, and persistence. Of the 1,000 freshmen who met the criteria, 581 completed Allen’s motivation assessment instrument. The motivation construct was evaluated using an inventory designed to assess desire to finish college, institutional impression, and family emotional support.

Allen used a two-step structural equation modeling procedure. The first step involved an exploratory factor analysis to guide the selection of items and development of scales. The three factors listed above as components of the motivational construct
were described by 19 items. Reliabilities for these factors were desire to finish college (0.76), institutional impression (0.85), and family emotional support (0.81). Stage two involved evaluation of the proposed structural model using weighted least squares (WLS) estimation procedures. The chi-square of the model was $\chi^2 = 2.371$ (df = 1; p = 0.12). Goodness-of-fit indices lent support for the model.

Of the variables thought to impact persistence, direct effects were observed for desire ($\gamma = 0.32$) and GPA ($\beta = .752$). The largest total effect on persistence was exerted by GPA (total effect = 0.75), with the second largest total effect coming from a tie between desire and high school rank (total effect = 0.34). Phi coefficients were examined to identify statistically significant hypothesized noncausal relationships among background variables. It was hypothesized that motivation would be related to parents’ education, family emotional support, and gender. The structural model revealed that higher levels of family emotional support were associated with higher levels of desire to finish college. The structural correlation between family emotional support and desire was 0.39. Although pre-college factors were expected to influence persistence, and did so in this model, motivational factors showed an influence on persistence decisions as well.

A 2001 study by Torres and Solberg tested a path model of Latino college student outcomes. The model integrated self-efficacy, stress, family support, and social integration into an evaluation of persistence intentions and health. They hypothesized that college self-efficacy was associated directly with stronger persistence intentions and associated indirectly with better health. Torres and Solberg surveyed a total of 189 students over a 2-year period. Students were recruited from a two-year technical college,
and a four-year university. They were given a College Experience Survey which included a 20-item College Self-Efficacy Inventory designed to measure level of confidence in performing various academic tasks associated with college success, a 21-item instrument called the College Stress Inventory, 25 items developed by Pascarella and Terenzini (1980) to evaluate social integration and persistence intentions, 10-items from a Social Provisions Scale to assess family support, and finally a modified version of a College Distress Inventory designed to address mental health issues associated with college student populations. Using path analysis, results supported a number of significant and meaningful paths. Self-efficacy directly predicted social integration, persistence intentions, and stress. Overall, the results indicated that self-efficacy served as an important determinant in educational outcomes (Torres & Solberg, 2001).

A 2005 research study by Zajacova, Lynch and Espenshade investigated the combined effects of academic self-efficacy and stress on academic performance. Using a survey instrument created by the authors, Zajacova et al. used structural equation models to assess the importance of stress and self-efficacy in predicting three academic performance outcomes first-year college GPA, the number of accumulated credits, and retention after the first year.

The study participants included 107 first-semester freshmen at a large 4-year institution in the Northeast. The survey participation rate for entering spring semester students was 93.3%. Using both exploratory and confirmatory factor analysis to determine whether the stress and self-efficacy items in the instrument could be reduced to a smaller subset of indexes and whether stress and self-efficacy could be considered distinct constructs. The authors then used structural equation modeling to examine the
effect of stress and self-efficacy as latent constructs on the previously described outcome variables. The authors noted a strong limitation in their study as the applicability of structural equation modeling with such a small sample size. Although structural equation modeling is appropriate for evaluating latent constructs, caution must be taken when evaluating small sample sizes.

In their first structural model Zajacova et al. (2005) estimated the effect of only stress and the background variables on the outcome variables, in the second model they estimated the effect of self-efficacy only, and finally they combined stress and self-efficacy. All three models fit the data well based on measures of model fit. In the first model the error correlations between each pair of outcome measures were moderately significant and positive, ranging from 0.30 for the residual correlation between enrollment and GPA to 0.51 for the correlation between credits and GPA. In the second model self-efficacy had a significant and positive effect on credits and GPA but no effect on persistence. In the third model, combining stress and self-efficacy, stress had a slightly significant and positive effect on persistence, while self-efficacy had none. The error correlation between stress and self-efficacy was found to be moderate, at -0.41, which was consistent with the author’s assertion that the two are related, but distinct, constructs. However, self-efficacy had a significant and positive effect on both credits accumulated and GPA while stress had none.

The internal reliability of stress and self-efficacy scales was high. Academic self-efficacy and stress were found to be negatively correlated, with the correlations between the two ranging from -0.27 to -0.71. The results suggested that academic self-efficacy is a more robust and consistent predictor than stress of academic success.
In an effort to examine the role that academic self-efficacy beliefs play in predicting college success, Gore (2006) performed two incremental validity studies to determine the extent to which academic self-efficacy beliefs could account for variance in college outcomes beyond that accounted for by standardized test scores. Gore based his definition of academic self-efficacy on Schunk (1990, 1994), which described it as an individual’s confidence in their ability to successfully perform academic tasks at a designated level.

For the first validity study, participants were 629 first-year college students enrolled in a large, public Midwestern university. Using hierarchical linear regression to evaluate the degree to which ACT scores and perceived self-efficacy could predict college GPA, Allen found that students’ self-reported self-efficacy scores collected at the beginning of college failed to account for variance in GPA. However, scores collected at the end of the first semester proved to be a significant predictor of GPA, with an additional 10% of variance accounted for. An additional 4% of the variance in third semester GPA was also accounted for by self-efficacy. Overall, Gore found self-efficacy to be the most consistent predictor of college GPA. Combining academic self-confidence measures with college self-efficacy measures accounted for between 2% and 3% of the variance in GPA at the beginning of college. In contrasts, end-of-semester self-efficacy and academic self-confidence measures accounted for between 7% and 9% of the variance in GPA. Regression coefficients confirmed that course-related college self-efficacy beliefs were the strongest predictors of college GPA.

In the second validity study, Gore (2006) used a stratified sample of four-year institutions who agreed to a longitudinal two-year commitment to determine the
relationship between academic self-confidence and college outcomes. Using hierarchical linear and logistic regression, Gore found that a model containing academic self-confidence scores was superior to a model utilizing ACT standardized test scores alone to describe first- to second-semester retention.

Taken in concert, both studies provide evidence that self-efficacy may be an important factor in determining influences on student persistence decisions. The longitudinal patterns noted in the study confirmed Bandura’s (1986) theory that self-efficacy beliefs of experienced college students are more strongly related to performance and persistence than the self-efficacy beliefs of new students. As self-efficacy beliefs develop as a result of personal performance accomplishment, vicarious learning, persuasion and self-interpretation, Gore suggested that students’ academic self-efficacy beliefs are more likely to be accurate as students gain academic experience. Further research should be undertaken to evaluate the effects of academic self-efficacy in community college settings.

Sorey and Duggan (2008) examined predictors of institutional persistence between adult and traditional aged degree-seeking students enrolled at a two-year community college in Virginia. They based their research on Donaldson and Graham’s (1999) Model of College Outcomes for Adults. Collecting data at two time intervals in the 2005-2006 academic year, Sorey and Duggan surveyed students utilizing measures developed by Metzner and Bean (1987), Cabrera, Nora, and Castaneda (1993), and Pascarella and Terenzini (1980) to evaluate intent to leave, institutional commitment, goal commitment, academic integration and social integration. The authors used a
discriminant analysis to identify the strongest predictors of persistence before beginning an independent examination of the adult students and traditional aged students.

Although hindered by a low response rate, the authors reported confirmation of several findings previously noted in the literature. Degree type did significantly predict institutional persistence for the traditional-aged students and the adult students when aggregated as one population. Using two-way contingency table analyses to evaluate the significance of the relationships between the outcome of persistence or withdrawal and the variables of gender, race, degree type, and enrollment status the authors found a Pearson $X^2$ of 4.76, $p = .029$, as the only significant relationship between degree type and persistence.

Sorrey and Duggan also performed a descriptive discriminant analysis on 12 of the variables (encouragement, academic and social integration, degree utility, institutional commitment, intent to leave, GPA, finances, goal commitment, number of dependents, employment, and high school performance) in order to identify the variables with the most influence on student persistence. No significant differences were found within the covariance matrices among the persisters and withdrawers ($p$ value $f = 0.67$ for the Box’s $M$ test). However, eight of the pooled within-group correlations between the discriminating variables and the canonical discriminant function were greater than or equal to the author’s predetermined significance level of 0.30. These variables included encouragement (0.54), social integration (0.51), degree utility (0.51), academic integration (0.45), institutional commitment (0.41), intent to leave (0.39), GPA (0.35), and finances (0.32).
These results indicate that the discriminant function for encouragement was consistent with the structure coefficient, with encouragement contributing the most to the discriminant function and also having the greatest independent contribution. Students who perceived higher levels of encouragement and support from significant others were more likely to persist than students who perceived lower levels of encouragement. It may be argued that encouragement and support from significant others would positively influence a students’ perceived self-efficacy. This finding supports earlier findings by Naretto (1995), Napoli and Wortman (1998), and Nora (2001), who found this variable to have a significant influence on persistence through direct or indirect means.

In a 2008 meta-analytic path analysis of Social Cognitive Career Theory’s (SCCT) academic performance model and academic persistence models, Brown and his colleagues evaluated data from a sample of full-time college students who were enrolled in four year institutions. They found that goals related significantly to retention in an academic persistence model. Additionally, the researchers found that self-efficacy beliefs derived from the cognitive variables high school GPA and ACT/SAT scores were predictive of academic persistence. Their research supported the theory that self-efficacy beliefs are substantially related to academic goals. However, they did not find that goals contributed to grade-point averages that students attained in college. Rather, the effect of self-efficacy on academic performance appeared to be more direct than being mediated by goal mechanisms. Although this study effectively described the role of cognitive variables, self-efficacy and goals on student persistence, the meta-analytic path analytic technique using data that perhaps did not describe the variables well hindered its predictive capabilities.
Research has shown that a students’ perceived efficacy to achieve motivates academic attainment both directly and indirectly by influencing personal goal setting. Self-efficacy and goals together contribute to academic attainment (Zimmerman et al., 1992). In order for students’ strategic actions to be described as self-regulated, one must know their academic goals and perceptions of efficacy (Zimmerman, 1989). In studies of college students pursuing engineering and science majors, self-efficacy and certain other social cognitive variables have been found to be good predictors of students’ interests, goals, persistence and performance (Hackett, Betz, Casas, & Rocha-Singh, 1992; Lent, Brown, & Larkin, 1986; Lent, Brown, Schmidt, Brenner, Lyons, & Treistman, 2003; Lent, Larkin, & Brown, 1989; Nauta, Epperson, & Kahn, 1998).

A number of significant studies have related self-efficacy to and implied that it is predictive of achievement. Other studies have significantly related self-efficacy to academic performance and persistence outcomes. Relationship between self-efficacy and student outcomes has been salient in the community college setting as well. Grimes and David (1999) investigated underprepared community college students and concluded that motivational factors (e.g., self-efficacy) influence student success and persistence. Similarly, Silver, Smith, and Greene (2004) in their study found that self-efficacy was associated with improved academic achievement and Hagedorn and her colleagues (2000) associated academic self-confidence with higher rates of retention. Clearly, self-efficacy is related to students’ persistence behaviors in community college settings.

Student self-efficacy beliefs develop as a result of personal performance accomplishment, vicarious learning, persuasion and self-interpretation Gore (2006). Factors such as personal goals addressing community involvement, financial well-being,
personal influence, and ability to work productively contribute to these beliefs. As such, evaluating personal importance is a method of determining self-efficacy levels in a student population.

In addition to self-efficacy, self-regulation has been shown in a number of studies to be an influence in performance outcomes of college students. As goal attainment is a performance outcome, the inclusion of academic self-regulation as a factor in community college student persistence would be reasonable. Academic self-regulation is concerned with the degree to which students metacognitively, motivationally, and behaviorally proactivate their own learning process. Self-regulated learners are not only distinguished by their proactive orientation and performance but also by their self-motive capabilities (Zimmerman et al., 1992). According to Zimmerman (2000), self-regulated learners have three important characteristics: they use a variety of self-regulated strategies (active learning processes that involve agency and purpose); they believe they can perform efficaciously; and they set numerous and varied goals for themselves.

Furthermore, self-regulated learners engage in three important processes: self-observation (monitoring of one’s activities); self-judgment (evaluation of how well one’s own performance compares to a standard or to the performance of others); and self-reactions (reactions to performance outcomes). From a social-cognitive perspective self-regulated learners direct their learning processes and attainments by setting challenging goals for themselves (Bandura, 1991) and applying appropriate strategies to achieve their goals (Zimmerman, 1989).

A number of research studies have demonstrated the significance of self-regulation in academic contexts (Pintrich & DeGroot, 1990; Schunk, 1989; Tabachnick,
Miller & Relyea, 2008; Zimmerman, 2000). The research relating self-regulation to college student persistence is severely limited. McCaig’s (1990) study was one of the first to address self-regulatory learning processes with high-risk student achievement. Given that theory widely recognizes the self-regulated learner as someone who can assess the requirements of the learning task at hand, and one who can identify and deploy appropriate learning strategies, it would stand to reason that self-regulation would play a role in persistence.

In a study focusing on task instrumentality and goals in a college student population, Tabachnick, Miller and Relyea (2008) found that consistent with social-cognitive theory, future goals had significant direct and indirect relationships to the goal of college graduation, perceived task instrumentality and self-regulation strategies. In the study, involving a path analysis, self-regulation strategies were directly predicted by task instrumentality and both directly and indirectly by future goals. Although the study population was second-year students at a large Southern university, one may postulate as to the relationships between self-regulation strategies and goals of community college students.

Another recent study by Kitsantas, Winsler, and Huie (2008) evaluated the predictive validity of student prior academic ability self-regulatory processes, and motivational beliefs over freshmen and sophomore years of college. Basing their study on the theory that academic self-regulation involves students who are independent, self-initiated learners with the ability to use a variety of learning strategies to accomplish specific learning goals (Kitsantas, 2002; Zimmerman, 2008).
Kitsantas, Winsler and Huie (2008) surveyed 198 students at a large, public mid-Atlantic university using the Motivated Strategies for Learning Questionnaire (MSLQ) to assess students’ motivational beliefs (task value, self-efficacy, and test anxiety) and self-regulation. Correlations were used to examine the relationships among the college GPA, prior ability (via SAT scores), self-regulation, and motivation variables. The strongest correlation with self-regulation variables was directly with time and study environment, and indirectly with later GPA, task-value and self-efficacy. In a regression analysis of self-regulation strategies and motivation variables, the data revealed that when predicting second-semester academic performance, time management and self-efficacy each contributed significantly to the model.

In an apparent contradiction to previous research, the authors reported that metacognitive self-regulation did not play a significant role in predicting achievement during freshmen or sophomore years. The authors suggested that this contradiction may perhaps be explained by the way metacognitive self-regulation was measured in their study. However, the use of the widely accepted MSLQ as a measure does not explain this apparent inconsistency. Although this study was limited in its construction, perhaps it was most severely limited by the homogeneity of the participants, its premise is sound, and further study into the predictive validity of self-regulation in academic performance is called for.

A small study by Cox and Ebbers in 2010 focused on the educational experiences and the factors contributing to the decision to persist for adult, female, part-time students at a community college in the Midwest. Interviewing five adult females enrolled at a community college, the researchers found positive support systems and campus
experiences were identified as important factors in the participants’ decisions to persist. However, more importantly researchers asserted that the importance of each woman’s inner drive and desire to persist despite obstacles played a key role in persistence decisions. This inner drive and desire to persist describe the students’ motivational capacities.

Studies have been based on the theory that students who display higher levels of academic self-regulation are independent, self-initiated learners with the ability to use a variety of learning strategies to accomplish specific learning goals (Kitsantas, 2002; Zimmerman, 2008). As such, students who are more highly self-regulated would be more likely to be motivationally and behaviorally proactive regulators and may be distinguished by their self-motive capabilities. Highly self-regulated students would be more likely to meet with academic advisors, participate in clubs or out of class activities, and include themselves in sporting or arts-related activities. Another indicator of self-regulation would be participation in study groups or community service work.

The role of faculty interactions in persistence.

Student-faculty interaction and student involvement with college services may be considered the major components of academic integration proposed by Tinto (1993) in his model. He emphasized the importance of interaction between the student and the college in order for integration to occur, which will influence persistence. Although Tinto suggested that both academic and social integration is essential for student retention, in general, academic integration has a stronger impact on student retention at the community college level (Pascarella & Chapman, 1983; Voorhees, 1987). This conclusion can also be drawn from a meta-analysis conducted by Napoli and Wortman
(1996). In their meta-analysis, they selected research using keywords such as persistence, academic integration, and community colleges. They concluded from the six studies they found that academic integration has a large and positive impact on student persistence among community college students compared to social integration. In addition, the interaction is what Astin (1999) called “student-faculty involvement” which is an important factor for student retention. Thus, although community college retention studies have not been based upon any specific theoretical models, some of the variables fit the conceptual models used in four-year institutions.

Tinto (1975) stated that a student’s level of academic integration was definable “in terms of both his/her grade performance and intellectual development in college” (p. 104). Terenzini and Pascarella (1977) were the first to test and validate this construct as a predictor of student persistence in their survey of 500 freshman students at Syracuse University. They found stayers reported significantly more informal contacts with faculty members. In their follow-up study, Pascarella and Terenzini (1980) sought to assess the major dimensions of Tinto’s (1975) model. They found particularly strong contributions of student-faculty relationships. Their research emphasized importance of faculty in both their formal teaching and informal non-teaching roles, as an influence on freshman students’ decisions to persist or withdraw. Though their earlier work found academic integration to be nearly equal to social integration in the prediction of student persistence, their 1980 study found strong contributions of student-faculty relationships, as measured by interactions with faculty and the faculty concern for student development and teaching scales.
A 2011 study by Cejda and Hoover found student-faculty engagement to be the best predictor of Latino student persistence. Interviews of students and faculty members at a rural community college, a suburban community college, and an urban community college focused on motivational maintenance, task engagement, and cognitive strategies utilized by the faculty members. Using the case-study format, Cejda and Hoover found faculty members participating in formal and informal groups, striving to understand the cultures of underrepresented populations on their respective campuses, and working to improve their instruction to create environments to facilitate student success. In this case, the study focused on Latino community college students, and for these students the researchers suggested that culture matters. The greater the amount of time and effort faculty dedicated to learning and appreciating Latino culture, the better able they were to help Latino students adapt and progress through the academic rigors of their campus. An important factor to note in this study was that two of the three institutions had made obvious institutional commitments toward the goal of creating an inclusive campus environment.

For community college students, faculty-related experiences seem to have a major influence on student retention. Satisfaction with faculty interaction (Heverly, 1999), having faculty with same ethnicity (Opp, 2002), and regular faculty-student contact (Schmid & Abell, 2003) all were positive influences on student persistence. Okun, Benin, and Brandt-Williams (1996) concluded that instead of fixed variables such as gender, age, ethnicity, and work hours, institutional commitment and encouragement from faculty were the significant predictor variables of a student’s decision to stay in college. Furthermore, positive classroom experiences (Grosset, 1991) and participation in study
groups (Schmid & Abell, 2003; Tinto, 1997) also influence student’s persistence. Given that increased student-faculty contact, participation in study groups, and satisfaction with faculty contribute to increased student involvement in the academic institution, it can be assumed that student involvement is an important aspect of the student retention process.

Instead of viewing academic performance as measured by college grade-point average, as an indicator of student integration, Bean (1980) believed it to be merely an outcome variable resulting from a student’s academic experiences (Cabrera, Nora, & Castaneda, 1993). For Bean, academic integration was better captured through the perceived quality of advising, the study skills and habits exhibited by the student, the student’s certainty about a particular major, and student patterns of absenteeism. In later work, Bean and Metzner (1985) even examined the perceived quality of student-faculty relationships as an additional measure of academic integration. In the two decades that have followed, the construct of academic integration has been validated many times, both at the four-year (Bean, 1983; Berger & Milem, 1999; Braxton & Brier, 1989; Donavan, 1984; Eaton & Bean, 1995; Munro, 1981; Sandler, 2000; Stoecker, Pascarella, & Wolfe, 1988; Titus, 2004) and the two-year level (Goel, 2002; Halpin, 1990; Napoli, & Wortman, 1998; Williamson & Creamer, 1988).

**The role of finances and employment in persistence.**

In a study of 581 first-time, full-time freshman students at a four-year institution in the Southwest, Allen (1999) sought to examine the structural relationships among motivational factors, student background factors, academic performance, and persistence. Through a two-step structural equation modeling procedure motivation and background factors were examined to determine their direct and indirect effects on academic
performance and persistence for minority and non-minority students. The assertions that background variables and desire to finish college played key roles in the persistence process were supported. Additionally, financial aid was the third variable to impact GPA or persistence. Results indicated that it had no significant direct effect on persistence. This is consistent with Cabrera, Nora, and Casteneda’s (1992) examination of the role of finances on the college persistence of 466 students. They found no direct effects of financial aid on persistence, but they found that it had a significant total effect. They suggested that the indirect nature of finances might affect the student’s academic integration, social processes, and resolve to persist in college. In Allen’s 1999 study, financial aid did, however, have a significant direct impact on GPA for non-minorities only.

Bean and Metzner (1985) suggested that the student’s ability to pay for college could directly impact student persistence. However in testing the model, they (Metzner & Bean, 1987) were unable to demonstrate significance of any of the proposed environmental pull variables on student persistence, including the student’s ability to pay for college. St. John (1990), using data from the NCES High School and Beyond 1980 longitudinal study, found that student persistence was significantly related to both loan and grant dollars received. Nora, Cabrera, Hagedorn and Pascarella (1996) examined data from 3900 students from 29 different two-year and four-year institutions. This study found that unmet financial need negatively impacted persistence for females and nonminority students. Using data from NPSAS: 87, St. John, Paulsen and Starkey (1996) found that a variety of financial measures had substantial direct influence on student persistence, and Hippensteel, St. John and Starkey (1996) found that among students at
two-year colleges, increasing tuition charges were negatively associated with year-to-year persistence.

Those researchers most concerned with examining the role of finances on student persistence, also often considered the impact of student employment. Nora, Cabrera, Hagedorn and Pascarella (1996) and St. John, Paulsen and Starkey (1996) found hours worked to be significantly related to student persistence. Cofer and Somers (2000, 2001) and Hippensteel, St. John, and Starkey (1996) both compared working full-time with those students not reporting full-time work and found no significant impact among two-year college students. In contrast, Titus (2004) used BPS: 96/98 data from more than 5,000 students attending four-year institutions across the US, and found that both work-study and working off campus had a net positive effect on student persistence.

Bean and Metzner (1985) suggested that student persistence is directly and negatively affected by hours worked. In addition, age becomes a mitigating factor; with advancing age, students may realize greater financial responsibilities and a greater likelihood of full-time employment while enrolled, thus persistence may be influenced. Metzner and Bean (1987) tested their model using stepwise regression. Their findings suggested that the number of hours worked was positively associated with stress and absenteeism and negatively associated with fulltime enrollment. Horn’s (1996) analysis was structured in such a way that all variables were dichotomous (students either worked more than 35 hours per week or less). She found that of students who reported working full-time, that 55.9% persisted compared to 69.2% for those not working full-time. However, after considering the covariance among other variables this factor failed to maintain significance.
Cofer and Somers (2000, 2001) found similar results to Horn’s. Looking at employment as a dichotomous variable (whether students worked or not, rather than amount of time spent working), they found a negative relationship between working full-time and student persistence, but it was not significant. Hippensteel, St. John and Starkey (1996) also used a dichotomous variable and found that work did not impact persistence. However their analysis did not set a threshold level for working hours, but instead compared students who reported working at all with students who did not report working. Bean and Metzner (1985) suggest that working on campus, particularly in the form of work-study, should be differentiated from work off-campus necessary to meet financial obligations. It is quite possible that this single classification of working versus nonworking did not allow for complete analysis of the effect. Brooks-Leonard (1991) studying 796 students at a single institution found employment status to be both directly and indirectly related to student persistence. Sandler (2000) found that the total effect of financial aid positively influences adult students’ attitudes about persistence, thereby increasing their available resources for participation and inclusion regarding the attainment of an undergraduate education. Other research on two-year persistence (Napoli and Wortman, 1998; Williamson and Creamer, 1988) often failed to consider the impact of employment on student persistence.

In a large study of 9,200 students enrolled in community colleges over a four-year period, Fike and Fike (2008) evaluated predictors of first-time-in-college student retention at a community college in West Texas. Using chi-square analysis and multivariate analysis the researchers found the strongest predictor of retention to be passing developmental reading, writing, and mathematics courses. Consistent with prior
research, Fike and Fike found receiving financial aid to be a predictor of student retention. This confirmed research by Wessel, Bell, McPherson, Costello, and Jones (2006) which indicated that students with greater financial need persist to graduation at lower rates. Additionally, Zhai and Monzon (2001) found that community college students indicate that financial difficulties are a key reason for their failure to persist.

**Summary**

Research literature addressing community college student persistence, has consistently reported several independent variables as displaying a more consistent pattern of relations with student retention. Factors found to be positively correlated with retention included high school grades (Feldman, 1993; Fischbach, 1990), number of course credits earned (Grimes, 1997; Webb, 1989), academic self-confidence (Webb, 1989), certainty of major (Webb, 1989), high educational goals (Feldman, 1993; Pascarella & Chapman, 1983; Voorhees, 1987; Webb, 1989), and positive feelings about student-faculty contact (Napoli & Wortman, 1998; Pascarella & Terenzini, 1980). Factors found to be negatively correlated with retention included employment (Bers & Smith, 1991; Cabrera, Nora & Castanada, 1993; Polinsky, 2003; Sandler, 2000), perceived stress (Sandler, 2000) availability of financial aid to meet needs (Polinsky, 2003). Research has suggested that the synergistic relationship of self-efficacy, motivation, self-regulation, and academic performance influence student persistence. While each variable alone has been shown to predict academic performance, it is suggested that they may be most effective in combination (Bandura, 1997; Pintrich, 1995; Schunk, 1994; Spitzer, 2000; Zimmerman, 1994).
A 1991 review of the literature by Pascarella and Terenzini concluded that community college students are less likely to persist than four-year college students. This relationship occurred even after holding constant a variety of personal, aspirational, academic, socio-economic status, and family background characteristics. They suggested that it was likely that the greater departure rates among community college students are related to problems associated with meeting demands from multiple communities. Community college students are not only faced with problems of college demands, but also the demands of external communities (e.g., family, friends, financial concerns, and employment). In attempting to cope with these added demands, community college students may be more likely to experience greater stress, which could lead to a reduced ability to participate and persist in college. Sandler’s (2000) study recognized that community college students are frequently adult students who are faced with bridging their educational experience with other key life roles.

The person-situation interactions that are influenced by personality attributes motivate students to enter a situation or institution with specific goals and to persist toward those goals. Bandura and Locke (2003) suggest that multivariate investigations have shown that perceived self-efficacy is a significant contributor to subsequent performance over and above the influence of other factors, including past performance. In a structural analysis, the relation of past performance to subsequent performance is heavily, if not fully mediated through efficacy beliefs, goals and aspirations, outcome expectations, and other sociocognitive determinants (Bandura, 1997).

As previously discussed, Sorey and Duggan’s (2008) analysis indicated a significant contribution to the decision to persist by encouragement and support from
significant others. The way in which students approach and deal with college and environmental pull factors is directly regulated by students’ motivation as indicated by their perceived self-efficacy, their ability to self-regulate, and their cognitive abilities. Based upon the influences found to be important in previous research literature, and research focusing on psychosocial variables addressing student motivation, this researcher is proposing a model in which community college students’ persistence toward their goals is directly and indirectly influenced by their perceived self-efficacy, self-regulatory skills, and their cognitive abilities. As students persist toward their goals, these motivational influences are mediated by external or environmental variables such as contact with faculty, outside employment, and the availability or lack of financial aid.

Throughout the academic process students reflect and react to intervening variables as they are guided by self-motivation. Metacognitive processing may influence the ability of students to seek tutoring, advising, or assistance from faculty as they proceed through their education. As Bandura (1991) suggested, knowledge of how one is doing alters one’s subsequent behavior to the extent that it activates self-reactive influences in the form of personal goal setting and self-evaluative reactions. Do students recognize when they need help, and do they know where to seek it out? Does the level of integration of the faculty and the student him/herself impact this metacognitive evaluation? There are many questions that remain to be answered with respect to these and other factors in the persistence of community college students.

Faculty interaction has been shown to play a role in student persistence. Community college instructors need to understand that college student motivation and performance is influenced by multiple factors including personal and contextual factors.
While instructors may have little influence over the personal factors, they certainly have influence over contextual factors (Lyke & Kelaher Young, 2006). In a 2004 study of engineering students at a four-year institution Bjorklund, Parente, and Sathianathan found that faculty interacting with and providing constructive feedback to students was significantly and positively related to student gains in several engineering design and professional skills.

Much of the earlier research on retention has been assessed through the lens of traditional students. Due to earlier research concentrating primarily on retention at four-year colleges and research institutions, a clear gap in research is apparent: few studies examined persistence issues on community college campuses. Studies that do address community college persistence often do so through a lens devised for four-year college students; fewer still addressed motivational or behavioral variables, although the available research does allow for inferences to be made. Establishing linkages between the environment, goals, and student motivational outcomes has been very important; determining how to create these goals in an academic setting is a next step (Ames, 1992).

Although community college students are classified in a number of ways (e.g., non-traditional students, adult students, first-time freshman) they represent a diverse population with a wide range of background characteristics and powerful influences outside of academic life. Community college students are more likely to work (either part-time or full-time), rely on financial aid, and experience the pull of family more strongly than traditional students. The model shown in Figure 2.1 describes an overall picture of the variables involved in community college student persistence to goal attainment. Bean and Metzner’s earlier (1985) student attrition model recognized that
student behaviors are shaped by student’s attitudes and beliefs that result from the experience within the institution and external factors such as the student’s financial situation or family support as well. If we consider these influences in concert with the psychosocial variables described in Social Cognitive Career Theory, and the self-efficacy variable described by Bean and Eaton (2002) as the exogenous variables, and the endogenous variable of persistence to goals, we can describe the model shown in Figure 2.2. The methodology used in formulating the model underlying this study relies heavily on sound conceptual models grounded in previous research.

*Figure 2.1. Goal Format of Community College Student Persistence.*
The primary purpose of this study is to bring together variables known to influence student persistence to increase the understanding of the relative efficacy of psychosocial constructs on community college success. Prominent in the research literature, self-efficacy, self-regulation, and cognitive ability have been shown to influence student persistence. As self-efficacy has been associated with personal goals in the literature, goals involving financial well-being, personal influence, leadership skills, and confidence in future employment serve as measures of the efficacious construct. Similarly, self-regulated learners have been shown to be independent, self-initiated learners with the ability to use a variety of strategies to accomplish their goals. Students who are more highly self-regulated would be more likely to be proactive in behavior. Highly self-regulated students would be more likely to meet with academic advisors, participate in clubs or out of class activities, including sporting or arts-related activities, as well as participate in study groups, or community service work. Additionally, this

<table>
<thead>
<tr>
<th>Exogenous Variables</th>
<th>Mediating Variables</th>
<th>Endogenous Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. <strong>Conative</strong> (self-regulation)</td>
<td>Financial Aid</td>
<td><strong>Persistence to goals:</strong></td>
</tr>
<tr>
<td>B. <strong>Affective</strong> (self-efficacy)</td>
<td>Faculty Contact</td>
<td>A. Academic degree/certificate/transfer to another college</td>
</tr>
<tr>
<td>C. <strong>Cognitive</strong> (academic achievement)</td>
<td>Employment</td>
<td>B. Professional development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C. Personal development</td>
</tr>
</tbody>
</table>
study will look at persistence to goals, rather than limiting persistence to degree attainment or transfer status.

Conclusion

This chapter began with review of persistence, with an eye toward community college persistence. It also focused on conative, affective, and cognitive behaviors exhibited by students as they persist toward their goals. A major difference in community college environments as opposed to four-year institutions is the impact of faculty on student behavior. In community college settings, the faculty is the primary point of academic contact for the student. As such, research has shown that academic integration as it relates to faculty contact is addressed as a potential variable. Additionally, research has indicated an effect on persistence by financial aid and outside employment. These environmental variables as they pertain to persistence are also addressed in this review.

Many institutions’ primary strategy for reducing attrition is the early identification of students likely to drop out and the development and implementation of intervention services for those students. Despite these efforts to reduce attrition, however, it largely remains an unsolved problem for community colleges. A more in-depth understanding of the process and those participating in it is necessary to develop initiatives that can further reduce student attrition (Summers, 2003).

Surprisingly, there is little integration or research synthesis of the educational and psychological literatures when looking at college outcomes. This lack of integration limits a full understanding of the relative predictive validity across academic performance, psychosocial behavior, and mediating variables highlighted in educational
persistence and motivational models focusing on community college students.

Persistence research seems to have balked at investigating behavioral variables in community college student persistence. Community colleges are open access, available to all and as such are unable to select students who are most likely to succeed. Student behavior is typically outside the reach of student orientation, advising and retention programs. It is not an easy policy question to address. Identifying the influence of behavioral variables that affect persistence may put community college personnel in the difficult position of recognizing students who may not be motivated enough to complete a degree or self-efficacious enough to successfully attend to their coursework. However, for policy decisions to be made, all factors that affect persistence must be addressed, and although it is not an easy question for policy-makers to address, the simple fact that a variable exerts an important influence on persistence should make its study valid.
CHAPTER THREE

Methodology

The following chapter provides a description of the methodology that was used in this study. Included in this chapter is a description the U.S. Department of Education’s National Center for Education Statistics (NCES) sampling design. It describes the study measures, data collection and processing, and data analysis procedures. This study explored relationships among student characteristics and individual rates of persistence of first-time undergraduate students enrolled at U.S. community colleges three years after their initial enrollment in postsecondary education. The survey targeted individuals who first began postsecondary education in the 2003–04 academic year, regardless of when they completed high school. Data were drawn from the 2004 Beginning Postsecondary Students Longitudinal Study (BPS: 04/06) and its subsequent 2005-06 follow-up sponsored by NCES. This study used a statistical technique known as structural equation modeling (SEM). The technique was chosen because it allows for: 1) simultaneous estimation of the measurement and structural models, 2) examination of the direct, indirect, and total effects among the constructs, 3) assessment of the “goodness of fit” of the conceptual model, and 4) reporting of the total variance explained by the model.

This chapter begins by introducing the conceptual model upon which the study was based, along with an explanation of the exogenous and endogenous variables. This
is followed by an explanation of the data collection procedures used by NCES to create the BPS data set including a discussion of the complex sample design, the use of weighting, and questionnaire design, validity, and reliability. The chapter concludes with a description of structural equation modeling, and the steps used by the author to facilitate analysis of the data and report the results.

**Conceptual Model**

The NCES Beginning Postsecondary Students Longitudinal Study (BPS: 04/06) from NCES was utilized to build a comprehensive statistical model to clarify the relationship between student behavior and persistence toward goals. Student-level variables obtained from the BPS dataset were used to perform a SEM analysis to confirm or deny relationships between the conative (self-regulatory), affective (self-efficacy), and cognitive (academic attainment) behaviors reported by community college students nationwide as they persisted toward their educational goals. Additionally, the mediating effects of intervening variables such as financial aid, faculty contact, and employment were evaluated to determine the direct effects and indirect effects of these mediators on persistence.

According to the conceptual model presented in this study, persistence to goals was thought to be directly influenced by student conative, affective, and cognitive behaviors as described in the literature. In addition to direct effects, psychosocial behaviors were believed to indirectly affect student persistence when mediated by financial aid, employment, and faculty contact variables. The BPS: 04/06 was a longitudinal study. As such, the same students were sampled twice in their educational
experience. This longitudinal format provided the opportunity to evaluate the stability of the psychosocial constructs over time.

As diagrammed in Figure 3.1, the first exogenous variable, conation, was a latent construct that was determined by looking at self-regulators as agents of their own academic successes. This construct was based on the idea that students who demonstrate more highly conative behaviors are more likely to identify, activate, change, and maintain learning strategies in diverse settings. They would treat learning as an activity to be developed proactively, a process involving motivational, behavioral, and meta-cognitive processes of self initiative. Less self-regulated students would merely engage in reactive processes stimulated by teaching. One characteristic of more highly self-regulated learners involves their capacity to manage their own motivational and cognitive resources with the intention of learning successfully. This would imply that true learning is a personal experience requiring students’ engagement and active participation. Self-regulated learners would be more inclined to use active learning strategies (e.g., more highly conative). Highly self-regulated students would be more likely to meet with academic advisors, participate in clubs or out of class activities, including sporting or arts-related activities, as well as participate in study groups or community service work as a supplement to their education. As self-regulated learners are thought to be more academic and socially integrated, frequency of academic and social interaction would serve as a measure of the latent conative construct.
The second exogenous variable, cognition was represented by academic achievement, and measured by looking at grades as an indicator of academic performance. The third exogenous variable, affect, was examined by evaluating students’ levels of self-efficacy. Based on the principle that students with higher self-efficacy would be more inclined to set personal goals involving financial well being, personal influence, leadership skills, they would be more confidence of future employment opportunities and more likely to engage in civic participation. As self-efficacy is thought to be reflective of affective behavior, these indicators would serve as indicators of the affective construct.

The first and most logical step in an analysis of latent constructs comprised of observed indicators would be to verify that the indicators do indeed represent the latent constructs. In structural equation modeling, this first step is known as confirmatory
factor analysis (CFA). CFA involves evaluation of these indicators in the form of measurement models. The measurement model evaluates how well the constructs are represented by their indicator variables. In this study, there are three latent constructs proposed in the conceptual model. The Conative, Affective, and Persistence constructs. The Conative construct was measured using six indicators which combine motivational, behavioral, and metacognitive processes of self-initiative behavior. The Affective construct was proposed with six indicators linking personal goals and civic participation. The Persistence construct was comprised of nine indicators. These included the reasons for enrolling, persistence, and attainment as measured in 2006, and if the student left, the reason for leaving being completion of desired classes. These three constructs are diagrammed in their measurement model for in Figure 3.2. The following table, Table 3.1 provides a code index for the measurement model, and summarizes the observed indicators for each latent construct.

*Figure 3.2. Measurement Model of Direct and Indirect Effects of Behavioral Variables on Community College Student Persistence.*

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Table 3.1

Code Index for Measurement Model

<table>
<thead>
<tr>
<th>BPS Number</th>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQ04C/06C</td>
<td>Conative</td>
<td>The student met with advisor concerning academic plans during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>FREQ04D/06D</td>
<td>Conative</td>
<td>The student attended music, choir, drama or other fine arts activities during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>FREQ04E/06E</td>
<td>Conative</td>
<td>The student participated in school clubs during the 2003-04/05-06 academic year.</td>
</tr>
<tr>
<td>FREQ04F/06F</td>
<td>Conative</td>
<td>The student participated in varsity, intramural, or club sports during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>FREQ04G/06G</td>
<td>Conative</td>
<td>The student attended study groups outside of the classroom during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>COMSERV/06</td>
<td>Conative</td>
<td>Student performed community service or volunteer work during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>IMPT04B/06B</td>
<td>Affective</td>
<td>Personal goals that are very important to the student in 2004/2006: Being a leader in the community.</td>
</tr>
<tr>
<td>IMPT04C/06C</td>
<td>Affective</td>
<td>Personal goals that are very important to the student in 2004/2006: being very well-off financially.</td>
</tr>
<tr>
<td>IMPT04E/06E</td>
<td>Affective</td>
<td>Personal goals that are very important to the student in 2004/2006: influencing the political structure.</td>
</tr>
<tr>
<td>IMPT04F/06F</td>
<td>Affective</td>
<td>Personal goals that are very important to the student in 2004/2006: availability of leisure time.</td>
</tr>
<tr>
<td>IMPT04I/06I</td>
<td>Affective</td>
<td>Personal goals that are very important to the student in 2004/2006: being able to find steady work.</td>
</tr>
<tr>
<td>HIGHLVE/ DGEVR06</td>
<td>Affective</td>
<td>Highest level of education that the student ever expects to complete.</td>
</tr>
<tr>
<td>ATTENDA</td>
<td>Outcome Goal</td>
<td>The reason enrolled is to complete an associate’s degree.</td>
</tr>
<tr>
<td>ATTENDB</td>
<td>Outcome Goal</td>
<td>The reason enrolled is to complete a certificate.</td>
</tr>
<tr>
<td>ATTENDC</td>
<td>Outcome Goal</td>
<td>The reason enrolled is to learn job skills/prepare for a job.</td>
</tr>
<tr>
<td>ATTENDD</td>
<td>Outcome Goal</td>
<td>The reason enrolled is for personal interest or enrichment.</td>
</tr>
<tr>
<td>ATTENDE</td>
<td>Outcome Goal</td>
<td>Transfer to a 2-year college.</td>
</tr>
<tr>
<td>ATTENDF</td>
<td>Outcome Goal</td>
<td>Transfer to a 4-year college.</td>
</tr>
<tr>
<td>ATTENDG</td>
<td>Outcome Goal</td>
<td>Transfer to another college.</td>
</tr>
<tr>
<td>PROUT3</td>
<td>Outcome Goal</td>
<td>Persistence and attainment at end of academic year 2005-2006.</td>
</tr>
<tr>
<td>RLV06G</td>
<td>Outcome Goal</td>
<td>Reason why student decided to leave school: finished taking desired classes.</td>
</tr>
</tbody>
</table>

Procedures

NCES Databases

All of the observed indicators of the latent constructs and observed variables used in this study were obtained from the Beginning Postsecondary Students (BPS: 04/06) Longitudinal Study of 2004 and its 2006 follow-up. The BPS: 04/06 series was sponsored by the U.S. Department of Education to create a national, comprehensive database concerning issues students may face in enrollment, persistence, progress, and attainment in postsecondary education (Cominole et al., 2007). The BPS: 04/06 follows a cohort of students first beginning their postsecondary career during the 2003-2004 academic year. The cohort was comprised of students initially selected to participate in the National Postsecondary Student Aid Study (NPSAS: 04) base-year study. The following section will describe the methods and procedures used in the initial data collection and first follow-up of the cohort of first-time beginning students involved in the BPS: 04/06 study.

BPS: 04/06 consists of individuals who first began postsecondary education in the 2003-2004 academic year, regardless of when they completed high school. This is unlike previous longitudinal age studies of high school age cohorts in that this student sample included nontraditional postsecondary students who delayed continuing their education after high school. These students were referred to as First-Time Beginners (FTBs) throughout the study. Through its design, the BPS study makes it possible to trace the paths of these FTBs through the entire system of postsecondary education over a number of years. As a result, BPS allows for the study of student persistence and attainment at any U.S. institution, whereas typical retention and attainment studies of entering
freshmen provide data at a single institution, or limited number of institutions (Cominole et al., 2007).

The purpose of the BPS: 04/06 follow-up is to monitor the academic progress and persistence in postsecondary education of 2003-2004 FTB students during the three years following their initial entry into a postsecondary institution. The data collection focused on degree completion (less than four-year) and continued education and experience, education financing, and the relationship between experiences during postsecondary education and various societal and personal outcomes (Cominole et al., 2007). The second follow-up, completed October 2009, will monitor students academic progress and assess completion rates in four-year programs.

The initial cohort for the BPS: 04/06 study consisted of all students who began their postsecondary education for the first time during the 2003-2004 academic year at any postsecondary institution in the United States or Puerto Rico that were eligible for the 2003-2004 National Postsecondary Aid Study (NPSAS: 04). The institutions eligible for NPSAS: 04 were required during the 2003-2004 academic year to meet all the requirements for distributing federal Title IV aid (Cominole et al., 2007). Out of the eligible institutions, eligible students were identified as FTB students at NPSAS sample institutions in the 2003-2004 academic year. Eligible students were required to be enrolled in either (a) an academic program; or (b) at least one course for credit that could be applied toward fulfilling the requirements for an academic degree; or (c) an occupational or vocational program that required at least 3 months or 300 hours of instruction to receive a degree, certificate or other formal award. Students who were
concurrently enrolled in high school or in a General Educational Development program were not eligible.

As the student sample for BPS: 04/06 was comprised of students in the NPSAS: 04 sample, the NPSAS sampling design is of interest in this study. The NPSAS: 04 sampling design was a two-stage design in which eligible institutions were selected at the first stage, and eligible students were selected at the second stage within eligible, responding institutions. The institutional sampling frame for NPSAS: 04 was constructed from the 2000-2001 and 2001-2002 Integrated Postsecondary Education Data System (IPEDS) Institutional Characteristics file and the 2000 and 2001 Fall Enrollment files. The sample of institutions was freshened using the 2002-2003 IPEDS to include a sample of eligible newly formed institutions (Cominole et al., 2007).

An institutional sampling frame was constructed that included nine institutional strata based on control and highest level of academic offering. This sampling frame and the n for each is shown in Table 3.2. The number of sample institutions was 1,670, of which 1,630 were determined to be eligible. Of those eligible institutions, 1,360 provided student enrollment lists (Cominole et al., 2007).

Table 3.2
NPSAS: 04 Institution Sample Sizes and Yield, by Institution Type: 2004

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Sampled Institutions</th>
<th>Eligible Institutions</th>
<th>Provided enrollment lists</th>
<th>Unweighted percent</th>
<th>Weighted percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public, less-than-2 year</td>
<td>70</td>
<td>60</td>
<td>50</td>
<td>76.6</td>
<td>74.3</td>
</tr>
<tr>
<td>Public, 2-year</td>
<td>380</td>
<td>380</td>
<td>320</td>
<td>85.4</td>
<td>77.6</td>
</tr>
</tbody>
</table>

(continued)
### Table 3.2 NPSAS: 04 Institution Sample Sizes and Yield, by Institution Type: 2004 (continued)

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Sampled Institutions</th>
<th>Eligible Institutions</th>
<th>Provided enrollment lists</th>
<th>Unweighted percent</th>
<th>Weighted percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public, 4-year, non-doctorate-granting</td>
<td>130</td>
<td>130</td>
<td>110</td>
<td>85.1</td>
<td>70.3</td>
</tr>
<tr>
<td>Public, 4-year, doctorate-granting</td>
<td>230</td>
<td>230</td>
<td>200</td>
<td>86.3</td>
<td>87.1</td>
</tr>
<tr>
<td>Private, not-for-profit, 2-year or less</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>89.0</td>
<td>92.6</td>
</tr>
<tr>
<td>Private, not-for-profit, 4-year, non-doctorate granting</td>
<td>280</td>
<td>270</td>
<td>220</td>
<td>81.9</td>
<td>78.1</td>
</tr>
<tr>
<td>Private, not-for-profit, 4-year, doctorate-granting</td>
<td>220</td>
<td>220</td>
<td>170</td>
<td>77.7</td>
<td>80.8</td>
</tr>
<tr>
<td>Private, for-profit, less than-2-year</td>
<td>170</td>
<td>160</td>
<td>140</td>
<td>84.0</td>
<td>82.3</td>
</tr>
<tr>
<td>Private, for-profit, 2-year or more</td>
<td>110</td>
<td>110</td>
<td>90</td>
<td>84.4</td>
<td>88.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,670</strong></td>
<td><strong>1,630</strong></td>
<td><strong>1,360</strong></td>
<td><strong>83.5</strong></td>
<td><strong>80.0</strong></td>
</tr>
</tbody>
</table>


The NPSAS: 04 student sampling design used two student sampling types for undergraduates; FTB and other undergraduates. The NPSAS: 04 sample sizes were determined based on NCES historical experience with an expected 70 percent response rate. Out of the total sample of students, total undergraduates (FTBs and other undergraduates) was comprised of 97,090 students, within that group 49,410 students were classified as FTBs out of a total sample of 109,210 including graduate and first-professional. Out of that group, 32,450 eligible students were sampled at public 2-year institutions, or community colleges.
Data collection for the NPSAS: 04 study included an institutional record abstraction, an online student interview, and record matching against several extant databases. BPS: 04 was included in the NPSAS: 04 survey. In the first follow-up, BPS: 04/06 was the first in the BPS series to offer students a self-administered web interview. The survey instrument was developed to be used in one of three ways: a self-administered interview, a computer-assisted telephone interview (CATI), and computer-assisted personal interview (CAPI). Prior to the start of data collection, a study website was designed for use by NCES to field test and full-scale sample members for updating contact information and accessing the self-administered instrument. Prompting calls, use of incentives, and refusal conversion techniques (the procedures that survey researchers use to gain cooperation from a respondent who has refused an initial survey request) were used to encourage high response rates. Table 3.3 provides the response rates by institution type.

Table 3.3

BPS: 04/06 First Follow-up Response Rates

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Responding students</th>
<th>Percent of total eligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public, less-than-2 year</td>
<td>470</td>
<td>77.3</td>
</tr>
<tr>
<td>Public, 2-year</td>
<td>4,870</td>
<td>76.2</td>
</tr>
<tr>
<td>Public, 4-year, non-doctorate-granting</td>
<td>1,340</td>
<td>83.4</td>
</tr>
<tr>
<td>Public, 4-year, doctorate-granting</td>
<td>2,670</td>
<td>86.4</td>
</tr>
<tr>
<td>Private, not-for-profit, 2-year or less</td>
<td>410</td>
<td>76.0</td>
</tr>
<tr>
<td>Private, not-for-profit, 4-year, non-doctorate granting</td>
<td>1,940</td>
<td>87.7</td>
</tr>
<tr>
<td>Private, not-for-profit, 4-year, doctorate-granting</td>
<td>1,390</td>
<td>87.6</td>
</tr>
<tr>
<td>Private, for-profit, less than-2-year</td>
<td>1,090</td>
<td>69.1</td>
</tr>
<tr>
<td>Private, for-profit, 2-year or more</td>
<td>740</td>
<td>70.1</td>
</tr>
<tr>
<td>Total</td>
<td>14,900</td>
<td>79.9</td>
</tr>
</tbody>
</table>

Source: Cominole, Wheeless, Dudley, Franklin, Wine, & Hunt-White, 2007)
Upon completion of data collection, the BPS: 04/06 data were checked and edited by NCES personnel. The checks were to confirm that the collected data reflected appropriate skip patterns, meaning that the survey software redirected respondents appropriately when they answered ‘no’ to a question. The data were also examined and specific values were substituted to indicate the reason for missing data. Missing data were coded as: 1 for ‘“don’t know”, 3 for “not applicable”, 6 for “out of range”, 8 for “item was not reached due to an error”, and 9 for “data missing.” All NCES data were perturbed to protect the confidentiality of specific individuals with the acknowledgement that data swapping and other forms of perturbation can lead to inconsistencies. NCES perturbation procedures preserve the central tendency estimates, but may result in slight increases in nonsampling errors (Cominole et al., 2007).

As mentioned in the Limitations section of Chapter One, there are two basic data collection problems encountered when collecting data via the method employed by NCES. First, the stratified multistage cluster sampling design may result in homogeneities within the sample. When NCES collects data, the process involves an initial selection of institutions representing the categories desired (e.g., less-than two-year, two-year, four-year public, etc.). Then, students within those institutions are sampled. This process may produce homogeneity in the data, because the students sampled are clustered in institutions, rather than random students sampled from the population of postsecondary students in the United States.

Additionally, NCES oversamples certain segments of the population in an effort to ensure adequate numbers of observations in all student segments. A simple random sample may not include an adequate number of a particular gender or ethnicity. As such,
NCES identifies underrepresented groups and makes a concerted effort to include an adequate number in the sampling pool. This oversampling of particular student groups provides a sample that is not completely random. This may be corrected for with the use of sampling weights.

By using sample weights, researchers can correct for unequal probabilities of selection caused by oversampling and multistage clustering, making the data a more accurate representation of the target population (Thomas & Heck, 2001). NCES provided predetermined statistical analysis weights to compensate for the unequal probability of selection of institutions and students in the NPSAS: 04 sample. The weights for analyzing the BPS: 04/06 data were derived from NPSAS: 04, because the BPS: 04/06 sample members are a subset of the NPSAS: 04 sample (Cominole et al., 2007).

In developing the NPSAS weights, the institution weight was computed, and then used as a component of the student weight. Weights were computed as the product of 8 weight components: a) institution sampling weight (WT1), b) institution multiplicity adjustment (WT2), c) institution poststratification adjustment (WT3), d) institution nonresponse adjustment (WT4), e) student sampling weight (WT5), f) student subsampling weight (WT6), g) first student multiplicity adjustment (WT7), h) student unknown eligibility adjustment (WT8).

The BPS: 04/06 sample used in this study contains both NPSAS respondents and nonrespondents. Therefore, the BPS: 04/06 base weight was relevant to this study, and required to mitigate effects caused by oversampling and clustering. The base weight was formed as the product of the first eight of these adjustment factors (Cominole et al., 2007). Specifically, for each student, the BPS: 04/06 base weight was computed as:
The overall weighted response rate for the main population of interest, students attending public two-year institutions, was 74.3\% (Cominole et al., 2007). This final weight is provided in the BPS: 04/06 dataset as variable WTA000, and was incorporated in the structural analysis of this study to mitigate the effects of oversampling and clustering of respondents.

Longitudinal studies such as BPS: 04/06 introduce another potential problem; participant attrition. When attempting to track specific students over a number of years, it is inevitable that some students who participated in the first sampling may not be available in future follow-ups. It is possible for sample weights to be used to address gaps in the data created by this attrition.

Another variation of nonresponse includes item nonresponse. In some cases study participants may not complete the survey or interview. In this case, item nonresponse
means the dataset may not include responses to every item by every participant. While the publicly available NCES datasets are imputed to fill missing data, the restricted use datasets have not been imputed. As such, the researcher must make a decision on how best to handle missing data. In this study, item nonresponse was not found to be an issue. Variable response frequencies will be discussed in more detail in the following chapter.

BPS: 04/06 is a rich dataset which has been used by a number of researchers. Continued analysis of the data provided within may help to enrich understanding of the complex issues facing higher education today. In this study, data from BPS: 04/06 was used to operationalize the constructs within the conceptual model presented in this chapter. Weighting was used in all phases of this analysis to correct for unequal probabilities of selection caused by oversampling and multistage clustering. Sample weights were provided by NCES, and used as required.

**Data Analysis Procedures**

The analysis presented in this study is based on a multi-step structural equation modeling (SEM) process, and factorial invariance analysis. The first step in the SEM process, involved evaluation of a measurement model, or a confirmatory factor analysis (CFA) to ensure that the latent constructs were properly represented by the factors outlined in the model. Following the CFA, a test of factorial invariance was performed, which is a method for investigating the degree of invariance across time points. Once the constructs were assessed, structural equation modeling was used to test the plausibility of the suggested interrelationships among the constructs, as well as their relationships to the indicators assessing them.
Structural equation models are based on theories that describe and explain the phenomena under investigation. As such, it is imperative that the proposed model be soundly based in theory. The process of structural equation modeling is many fold, it allows a researcher to explain a phenomena (i.e., explain influences on student persistence), describe that phenomena via a proposed model, and test that theory described in a model against empirical data (Raykov & Marcoulides, 2000). The process ultimately provides a degree of fit for the model to the data. The better the degree of fit, the better the model fits the data. However, the researcher must consider that a good measure of fit indicates that the model is only one way to describe the data. At the same time, it is possible that an entirely different model may also describe the data equally as well. The structural equation modeling process is simply a method to evaluate a proposed model, and how well the model works to describe a phenomenon. That is why it is so important that the model be soundly based in theory. It does not allow the researcher to exclaim the identification of the one and only solution, it must be considered that other solutions may exist that fit the data as well.

The process of SEM requires the researcher to think in terms of models. SEM programs, such as AMOS or Mplus require the researcher to provide a log of information about which variables are assumed to affect other variables, and the directionalities of these effects. These specifications reflect the researcher’s proposed model (Kline, 2005). Again, this is the reason that the proposed model must be rooted in theory. If the researcher is describing a phenomenon, the reasons for the phenomena must be clearly explained. In this study, the model describes the influences of behavioral variables on student persistence. There is directionality to the process. Students enroll in community
college, and engage in studies as they move toward their goals. As they engage in their studies the student’s decisions are influenced by their own behavior. The student's self-regulatory, self-efficacy, and cognitive abilities influence the decisions they make while moving through their education. In this model, the outcome, or persistence to a goal is thought to be influenced by conation, cognition, and affect.

Structural equation modeling is analogous to performing a simultaneous factor analysis and a path analysis, which serves to validate both the structural and measurement components of the model (Cabrera, Nora, & Castaneda, 1993). In addition, the process allows for consideration of direct, indirect, and total effects when exploring the relationships among exogenous and endogenous variables. Another major characteristic of structural equation models is that they explicitly take into account the measurement error that is unavoidable in most disciplines. This is achieved by including an explicit error term for each fallible measure. In the case of this proposed study, a certain degree of error is to be expected in measuring the proposed variables of conation, cognition, and affect. The variances of the error terms are parameters that must be estimated when any model is fit to data, in order to describe how well the data is describing the model (Raykov & Marcoulides, 2000).

Structural equation modeling techniques offer distinct advantages in disentangling the process of student learning and cognitive development. According to Voorhees (1997) the greatest advantage of structural equation modeling for analyzing relationships that affect student learning is its ability to simultaneously solve equations within a posited model. The structural equation modeling process of estimating and testing is mathematically complex and requires the application of structural equation modeling
programs. The most common include AMOS, LISREL, MPLUS, and EQS (Raykov & Marcoulides, 2000).

The following description is based on performing the structural equation modeling analyses with the Mplus software. Although Mplus is less user friendly because it requires the researcher to write a syntax to describe the relationships between the latent constructs and their indicator variables and to describe the relationships among the constructs and observed variables in a textual format, the benefit to Mplus is that it is able to accommodate sampling weights.

Although SEM is a primarily computer-driven technique, it involves a multi-step process. The process can be divided into four (sometimes five) steps. The steps are: specification, identification, estimation, and testing of model fit. An additional step of respecification may be considered. In this study, modification indices for respecification were produced, but the decision was made not to respecify the model. Reasons for this decision will be discussed further in this chapter.

The first step in the process, specification, involves establishing a measurement model for the specified variables. The purpose of this initial specification is to establish relationships among the latent constructs and their observed indicators. Essentially, specification is producing the model based on theory. Once the parameters to be estimated are specified, the model may be identified.

The process of identification involves ensuring that there is enough information to solve the model for a unique answer. Consider a linear equation $10 = a + b(x)$ where $x=2$. What are the values of “a” and “b”? There are several possible answers $a = 0$ and $b = 5$ is one option, another correct answer could be $a = 6$ and $b = 2$. This equation is
“underidentified.” There is not enough information to solve the equation for a unique answer (Hanneman, 2000). Structural equation models are sets of simultaneous linear equations which represent a hypothesis about how the observed variables are produced. To solve a set of simultaneous equations, the researcher must have enough information to estimate the values for the unknown parameters. This known information may take the form of known values or “constraints.” Constraints involve setting an unknown value to a specified value (i.e., 0 or 1). Before a researcher can begin to estimate the values of the parameters in a structural equation model, it must be demonstrated that the model is specified in such a way that it has an identified solution. This must be done because the researcher cannot be sure that the software will not find “a solution,” instead of “the right” solution if the equations are underidentified (Hanneman, 2000).

Estimation involves comparing the implied covariance matrix with the observed covariance. This comparison is done by the SEM software over and over until it arrives at a position where the two are very similar. It is based on primarily maximum likelihood and ordinary least squares that are used for the estimation of these parameters, and will be discussed further.

The evaluation of model fit involves determining how well the model fits the data. Absolute fit is where the model developed replicates the actual covariance matrix of the data. In other words, the model fits the data perfectly. In reality this rarely happens, and there is some degree of error involved which prevents a perfect fit. Goodness-of-fit indices range from 0 to 1 and, depending on the index, values that fall within a specified range indicate a good fit of the model to the data (Foster, Barkus, & Yavorsky, 2006).
Some sources include respecification, or model modification as a step in the SEM process. Model respecification comes into play primarily in exploratory settings, if the model does not fit the data it may be modified to produce better fit indices (Foster et al., 2006). In other words, if the model does not fit the data, respecification involves changing the model so that it does fit the data. SEM software offers options for the researcher to respecify the model. It is up to the researcher to determine if these options are suitable for using in the model. Many sources emphasize the delicacy of model respecification. If a model does not fit a particular dataset, revising the model to fit without cross-validation of a second dataset most likely will not produce a model that is consistent with reality (Hancock & Mueller, 2009).

A model that is based on a theoretical construct and respecified based on a single dataset will fit that particular dataset, but cannot be construed to represent reality; it can only represent the population represented in the dataset used. This study is intended to be a confirmatory rather than exploratory process. As such, respecification must be approached with extreme caution. Assuming a model has been firmly grounded in theory, respecifications or modifications that are not theoretically based may render the model illogical (i.e., changing the direction of a path from gender to socioeconomic status may imply that gender is determined by socioeconomic status).

Additionally, a further step in this study involved an evaluation of longitudinal data. The longitudinal data available in the BPS: 04/06 dataset was taken advantage of to measure within-group stability and change over time. It has been suggested that graduating from cross-sectional to longitudinal designs enables researchers to make more rigorous inferences about the causal relations implied by such models (Coyle & Maxwell,
There are two different ways to look at longitudinal models; the first involves focusing on stability and change of variables and relationships between variables across time, the second focuses on changes in scores of individuals (Maruyama, 1998). These two approaches are modeled differently. In this study, the goal was to look at the stability of relationships between indicator variables and their latent constructs. This stability of relationships would be another indication that the model is accurately representing the relationships between behavioral influences and student persistence. A longitudinal study of this type requires a substantial sample size otherwise attrition of participants over time would render the data useless. Generally, SEM is best suited for large sample sizes, \( n \geq 200 \) observations should be used (Foster, Barkus & Yavorsky, 2006). The BPS: 04/06 sample is comprised of approximately 1,800 students which is more than adequate for the analysis performed.

This multiple-step approach to SEM has been generally accepted and recommended by a number of researchers (Cabrera, Nora, & Castaneda, 1993; Mulaik & Millsap, 2000; Schumacker & Lomax, 2004). The analysis proposed for this study began with a confirmatory factor analysis (CFA) to ensure that the latent constructs were properly represented by the factors outlined in the model. Following the CFA, a test of factorial invariance was performed, which is a method for investigating the degree of invariance across time points. Finally, the structural model was evaluated to ascertain the relationships between the latent constructs as described by their observed indicators and the other variables outlined in the proposed model. An initial concern focused on the steps of the process. What if the CFA and/or factorial invariance did not produce desirable results, should the study continue? It was determined in advance that if the
CFA and factorial invariance analysis did indicate adequate factorial representation or instability of the factors across time the full model would still be tested to evaluate the structural relationships among the constructs.

** Constructs Defined **

In educational research, constructs that cannot be observed directly are termed *latent variables, factors* or *constructs*. Latent constructs are theoretical concepts for which there is no direct operational method for measuring or assessing their degree of presence. However, manifestations of that variable may be observed or recorded (Raykov & Marcoulides, 2000). Because latent constructs are not observed directly, they must be operationally defined in terms of behavior believed to represent it (Byrne, 2001). In this case, the Conative, Affective, and Persistence constructs are latent constructs comprised of several observed indicators.

Because this model is based on the latent constructs of Conative and Affective behavioral influences on student persistence, SEM is best suited for analysis of such constructs. Once the constructs have been assessed, structural equation modeling may be used to test the plausibility of hypothetical assertions about potential interrelationships among the constructs as well as their relationships to the indicators or measures assessing them (Raykov & Marcoulides, 2000). SEM, as a class of latent growth modeling, simultaneously focuses on changes in covariances, variances, and mean values over time, thus overcoming some of the limitations (e.g., assumptions of sphericity) of traditional analytic approaches (Hancock & Lawrence, 2006).

In other words, a thorough review of the literature on community college student persistence has led to a proposed model describing relationships between conative,
cognitive, and affective behavioral influences on student persistence. Conative and 
affective behaviors are latent constructs, as a student’s conation may not be directly 
measured, but may be indirectly evaluated by assessing students’ perceived self-
regulatory abilities by querying the student as to their participation in behaviors known to 
directly influence academic outcomes. Essentially, measuring the student’s use of self-
regulatory strategies stands as a basis for evaluating conation. As this section deals with 
an overview of proposed data analysis procedures, the specific structure of the latent 
constructs included in the model proposed in this paper will be outlined later in this 
chapter.

Following the formulation of latent constructs, it is necessary to conduct a factor 
analysis to determine the extent to which the observed variables are related to the latent 
constructs. Factor analysis is an approach that was first developed by psychologists as a 
way to represent latent (hypothetically existing) variables. Although the latent variables 
could not be directly measured, psychologists still wanted to handle them as if they were 
measurable. Factor analysis is an approach for expressing hypothetical constructs in the 
language of mathematics by using a variety of observable indicators that can be measured 
(Raykov & Marcoulides, 2000). In the case of this study, the constructs of Conation, 
Affect, and Persistence are represented by observable indicators. Factor analysis was 
used to test the relationships between the observed indicators and the latent constructs.

It is intended that items designed to measure the latent constructs will exhibit high 
loadings on their respective factors and low or negligible loadings on other factors. This 
loading pattern would indicate that the indicator variables properly represent the latent 
constructs. Factor analysis may be considered either confirmatory or exploratory,
depending on whether there is some basis for the underlying latent variable structure in either theory, empirical research, or both (Schumacker & Lomax, 2004). In the case of this study, the Conative, Affective and Persistence constructs are based on previous theoretical work. As such, this study was subjected to a *confirmatory factor analysis* (CFA).

Once the observed variables were determined to be accurate measures for the latent constructs, the full model was evaluated. The model is termed full or complete because it comprises both the measurement model and a structural model. The measurement model depicts the links between the latent constructs and their observed indicators, and the structural model depicts the links among the latent constructs themselves and other observed variables. Because the likelihood of a perfect fit between data and proposed model is extremely low, there will always be a differential between the two; this difference is termed the *residual*. The model-fitting process can be summarized as follows (Byrne, 2001):

\[
\text{Data} = \text{Model} + \text{Residual}
\]

A smaller residual indicates a better fit of the model to the data, and is the goal. A large residual indicates that there is a poor model/data fit, and the model does not adequately describe the population represented in the data.

**Endogenous variable.** The endogenous variable in this model is community college students’ persistence to goals. This is described as continued enrollment while actively pursuing goals, or having met self-defined goals as described throughout longitudinal study process. For the purposes of this study, goals have been merged into four categories: A) Associate’s degree or certificate, B) Professional development, C)
Personal development, and D) Transfer to another institution (either 2-year or 4-year).

Students in the BPS: 04/06 study were asked to identify their academic goals in the initial 2004 iteration of the NPSAS survey. They were asked if they intended to attain a certificate or Associate’s Degree at the institution in which they were enrolling; if they were attending to obtain job skills (professional development), attending for personal interest, or were planning to transfer to another institution (i.e., transfer to a four-year institution). In the 2006 survey they were asked if they had either met their goals, if were still enrolled and progressing toward those goals, and if they had left, the reasons for leaving. Although this variable is an endogenous variable, it is also a latent construct. It is considered an endogenous variable because it is only acted upon by other variables in the model. It is a latent construct because it is comprised of nine observed indicators from the BPS: 04/06 survey. This construct was derived from BPS: 04/06 variables ATTENDA, ATTENDB, ATTENDC, ATTENDD, ATTENDE, ATTENDF, ATTENDG, PROUT3, and RLV06G. See Table 3.4 for indicator variable details. These variables allow for categorization of students’ self-identified goals as described above when they first started college in 2003-2004 into the four pre-defined categories. They then allow for a measure of persistence toward those goals in 2006.
Table 3.4

Indicator Variables for the Persistence Construct

<table>
<thead>
<tr>
<th>BPS Number</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTENDA</td>
<td>The reason enrolled at NPSAS is to complete an associate’s degree.</td>
</tr>
<tr>
<td>ATTENDB</td>
<td>The reason enrolled at NPSAS is to complete a certificate.</td>
</tr>
<tr>
<td>ATTENDC</td>
<td>The reason enrolled at NPSAS is to learn job skills/prepare for a job.</td>
</tr>
<tr>
<td>ATTENDD</td>
<td>The reason enrolled at NPSAS is for personal interest or enrichment.</td>
</tr>
<tr>
<td>ATTENDE</td>
<td>Transfer to a 2-year college.</td>
</tr>
<tr>
<td>ATTENDF</td>
<td>Transfer to a 4-year college.</td>
</tr>
<tr>
<td>ATTENDG</td>
<td>Transfer to another college.</td>
</tr>
<tr>
<td>PROUT3</td>
<td>Persistence and attainment anywhere at the end of academic year 2005-2006.</td>
</tr>
</tbody>
</table>


Exogenous Variables. The exogenous variables include Conative, and Affective constructs, and the cognitive variable, as well as the mediating factors of faculty contact, financial aid, and employment hours. The purpose of this study is to analyze the effects (both direct and indirect effects) of Conative, Affective, and cognitive behaviors. The behaviors were measured by the following variables:

Conative. Conative behavioral characteristics, also be described as self-regulation, addresses individual differences in motivation and volition. The Conative construct is implicated whenever students select from alternative courses of action and maintain effort and persistence until their goals are achieved or abandoned for new goals (Pintrich, 2004; Spitzer, 2000; Zimmerman, 1989). Self-regulated learners would be more inclined to use active learning strategies (e.g., more highly conative). As self-regulated learners are more academic and socially integrated, frequency of academic and social interaction may serve as a measure of the latent Conative construct. For the
purposes of this study, the Conative construct was measured by the students’ self-described frequency of meeting with an academic advisor, participating in fine arts activities, school clubs, sports, and study groups. In all cases the student was asked to identify whether they participated never, sometimes, or always. The observed indicator variables that were used are summarized in Table 3.5.

Table 3.5

Observed Indicators of the Conative Construct

<table>
<thead>
<tr>
<th>BPS Number</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREQ04C/06C</td>
<td>The student met with advisor concerning academic plans during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>FREQ04D/06D</td>
<td>The student attended music, choir, drama or other fine arts activities during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>FREQ04E/06E</td>
<td>The student participated in school clubs during the 2003-04/05-06 academic year.</td>
</tr>
<tr>
<td>FREQ04F/06F</td>
<td>The student participated in varsity, intramural, or club sports during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>FREQ04G/06G</td>
<td>The student attended study groups outside of the classroom during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>COMSERV/06</td>
<td>Student performed community service or volunteer work during the 2003-2004/2005-2006 academic year.</td>
</tr>
</tbody>
</table>


**Affective.** Affective behavior may also be described as self-efficacious. Bandura (1997) described self-efficacy as an individual’s confidence in their ability to organize and execute a given course of action to solve a problem or accomplish a task. For the purposes of this study, self-efficacy is operationally defined as: self-evaluation of one’s ability and/or chances for success in the academic environment. Students with higher self-efficacy would be more inclined to set personal goals and engage in civic participation. As noted in the review of literature chapter (Chapter 2), an abundance of previous research has shown that goal-setting and self-efficacy influence student
As self-efficacy is reflective of affective behavior, this measure would serve to evaluate the Affective construct. The Affective construct was comprised of self-reported measures of personal goals and civic participation that were indicated as being very important to the students. The indicators, described in Table 3.6, include the importance of being a community leader, influencing political structure, importance of leisure time, and steady work. As a self-evaluative measure of success in the academic environment, the student was also queried as to the highest level of education the student expected to complete.

Table 3.6

Observed Indicators of the Affective Construct

<table>
<thead>
<tr>
<th>BPS Number</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGHLVEX/DGEVR06</td>
<td>Highest level of education that the student ever expects to complete.</td>
</tr>
<tr>
<td>IMPT04B/06B</td>
<td>Personal goals that are very important to the student in 2004/2006: Being a leader in the community.</td>
</tr>
<tr>
<td>IMPT04C/06C</td>
<td>Personal goals that are very important to the student in 2004/2006: being very well-off financially.</td>
</tr>
<tr>
<td>IMPT04E/06E</td>
<td>Personal goals that are very important to the student in 2004/2006: influencing the political structure.</td>
</tr>
<tr>
<td>IMPT04I/06I</td>
<td>Personal goals that are very important to the student in 2004/2006: being able to find steady work.</td>
</tr>
</tbody>
</table>


**Cognitive.** Previous research has shown that students with high self-efficacy show greater cognitive effort, intrinsic motivation, persistence, and self-regulation in their academic performance (Bandura, 1997; Schunk, 1994; Spitzer, 2000). For the purposes of this study, cognitive ability was measured by the students’ cumulative Grade...
Point Average. Although not included in the confirmatory factor analysis because it is not a latent construct, the interactions of this variable were included in the structural model evaluation.

**Mediating Variables.** In this model, the mediating variables were all endogenous; they were all thought to be acted upon by other constructs in the model. Outside employment, the availability of financial aid and faculty contact have all been identified in previous research as influencing student persistence (Fike & Fike, 2008; Heverly, 1999; Nora, Cabrera, Hagedory & Pascarella, 1996; Okun, Benin & Brandg-Williams, 1996; Opp, 2002; Schmid & Abell, 2003; St. John, Paulsen & Starkey, 1996; Tinto, 1997; Titus, 2004; Wessel, Bell, McPherson, Costello, & Jones, 2006; Zhai & Monzon, 2001). In this study, they were evaluated as mediating variables for the previously described behavioral variables. For example, would an otherwise self-efficacious student be less likely to persist toward their goals if they do not receive financial aid, or work full-time while they are enrolled?

Employment was evaluated as a continuous variable. The data indicated the number of hours the student worked per week during the academic year. Financial Aid was given as a continuous variable with Pell grant amounts ranging from $100 to a maximum of $4050. For this analysis, the data were coded to indicate Pell amounts of high, medium, and low. Faculty contact was evaluated in terms of academic contact. Specifically, the frequency with which the students were asked whether faculty contact occurred; never, sometimes, or often while the student was enrolled. These mediating variables are outlined in Table 3.7, and described in more detail in Appendix A.
Table 3.7
Endogenous Mediating Variables

<table>
<thead>
<tr>
<th>BPS Number</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOBHOUR2/HRSWK06</td>
<td>Average hours the student worked per week during the 2003-2004/2005-2006 academic year.</td>
</tr>
<tr>
<td>PELL04/06</td>
<td>Amount of Pell grant funds received in 2003-2004.</td>
</tr>
<tr>
<td>FREQ04B/06B</td>
<td>The student talked with faculty about academic matters outside of class time (including e-mail) during the 2003-2004/2005-2006 academic year.</td>
</tr>
</tbody>
</table>


Model Analysis

When considering statistical methodology, the researcher must be aware of assumptions that must be met. For SEM these assumptions include; a) correct specification of the model, b) multivariate normality, c) independence of exogenous variables, d) sufficiently large sample size, and e) no systematic missing data (Byrne, 2001).

Model Specification. According to Schumacker and Lomax (2004), model specification is the most difficult part of SEM. The model must be soundly based in theoretical reasoning. As such, structural models must be informed by previous research, and based upon a solid understanding of the issues surrounding the variables. The model presented here is rooted in widely accepted persistence theories, and the variables included have all been shown to be significant predictors of student persistence.

The task of model specification requires that the researcher specify a pattern of directional and/or non-directional relationships among the variables of interest. Each of these associations can be thought of as having a numerical value associated with it. Each variable in the system can be designated as either an exogenous variable or an
endogenous variable. Exogenous variables are not influenced by other variables in the
model, but they do influence other variables themselves (Foster, Barkus, & Yavorsky,
2006). An endogenous variable is influenced by some other variable in the model. An
important feature of endogenous variables is that they are generally not viewed as being
perfectly accounted for by those variables hypothesized to exert influences on the
endogenous variable, therefore endogenous variables are also described as being
influenced by an error term, or residual, which represents that part of the variable that is
not accounted for by the influences of the other variables in the system (Hoyle, 1995). If
the error terms or residuals are excessively large, then the relationships between the
endogenous and exogenous variables are not adequately explained by the model. These
large errors or residuals would indicate that the model does not fit the data, and is
therefore not a valid solution.

Model specification involves determining every relationship and parameter in the
model that is of interest to the researcher. Generally, a model will involve a proposed
pattern of linear relationships among a set of latent variables, with each latent variable
measured by multiple indicators. There are procedures available for the detection of
specification error. SEM programs provide modification indices, which offer suggested
changes to the model so if the researcher so desires, a more properly specified model may
be evaluated. As previously mentioned, respecification of a model must be approached
with great caution. As model specification is strongly rooted in theory, inappropriate
respecification may cause the researcher to deviate from accepted theory in an effort to
produce a model that “fits” the data (Hancock & Mueller, 2009). A given model is
properly specified when the true population model is found to be consistent with the
implied theoretical model being tested, however a perfect fit between the model and data is virtually impossible (Schumacker & Lomax, 2004). In this study, the decision was made to avoid respecification and evaluate the model as originally proposed. Model modification indices were reviewed as a matter of course, and found to be non-relevant to the study at hand.

**Model Identification.** Each potential parameter in a model must be specified to be either a free parameter, a fixed parameter, or a constrained parameter. A free parameter is a parameter that is unknown and therefore needs to be estimated. A fixed parameter is fixed to a specified value, either 0 or 1. If they are fixed to 0, no path is drawn. Fixed parameters do not change value when the model is fit to the observed data. Constrained parameters are unknown, but are constrained to equal one or more other parameters (Schumacker & Lomax, 2004).

The purpose of fixing a parameter would be to give the model scale. If the model is composed of latent variables, latent variables do not have a scale or unit of measure. By fixing one or more parameters, the model is given a scale, so the researcher may say a change in A causes a unit increase in B. Because the goal of the researcher is to estimate values of parameters representing associations among latent variables and between latent variables and measured variables, it is essential that each latent variable have a defined scale (Hoyle, 1995). The most common method of providing each latent variable with a scale is to fix the variance of one indicator of a latent variable at a specified numerical value, typically 1.0 (Hancock & Mueller, 2009). Establishing a scale for each construct in this way allows the researcher to interpret coefficients associated with directional
effects among latent variables as standardized regression weights, and those associated with nondirectional relationships as correlations.

A second procedure for establishing a scale for a latent variable is to fix the value of one parameter associated with a directional influence emitted by the given latent variable. This is recommended for each error term in the model (Hoyle, 1995). Essentially, this means the researcher assigns a value of 1.0 for the influence of each error term on its associated endogenous variable. This allows the researcher to determine how much variance in the associated endogenous variable is not accounted for by other influences in the model, or how large that residual is between the data and the model as previously discussed.

In order to confirm proper model identification, the researcher may compare the sample covariance matrix to the estimated population covariance matrix. This is accomplished by comparing the actual covariance matrices representing the relationships between the variables from the data (S) to the estimated covariance matrices of the proposed model (Σ). In this case, the proposed model is used to estimate its parameters for the population, assuming the model is true, these parameter estimates may then be used to create a hypothesized covariance matrix (Σ). This is a variation on the data model equation previously described. The equation:

\[
\text{Data} = \text{Model} + \text{Residual} \quad \text{or} \quad \text{Data} - \text{Model} = \text{Residual}
\]

becomes

\[
S \text{ (data)} - \Sigma \text{ (model)} = 0
\]

If S and Σ are very different, and do not equal 0, then the model does not adequately describe the data. This determination is made by the computation of model fit
indices. These fit indices as output by the software allow the researcher to determine how well the data fits the model.

**Model Estimation.** The estimation process involves the use of a particular *fitting function* to minimize the difference between $\Sigma$ and $S$. Estimation is done by one of several procedures in SEM software (Schumacher and Lomax, 2004). There are a number of estimation methods for structural models. The most commonly used default method, Maximum Likelihood Estimation (ML), assumes a multivariate normal distribution of data (Byrne, 2001). In recent years, research has shown that the ML method can be employed with data which exhibits minor deviations from normality. With more serious deviations from normality the Weighted Least Squares (WLS) method may be used as long as the sample is large (i.e., more than 10 times the number of free model parameters) (Raykov & Marcoulides, 2000). Nora, Cabrera and Castaneda (1993) describe weighted least squares as more robust than other estimation methods, and Kline (2005), and Schumacker and Lomax (2004) suggested WLS as the most appropriate estimation method for use with non-normal data. Weighted Least-Squares with Mean and Variance adjustment (WLSMV) is provided as an option in the Mplus software. The WLSMV estimator has been shown to perform well in cases of mild non-normality and missing data. WLSMV is also an optimal choice for categorical variables (Muthén, DuToit, & Spisic, 1997).

To summarize, the goal of model estimation is to obtain estimates for each of the parameters specified in the model which was used to produce the model covariance matrix ($\Sigma$). The intent is to obtain parameter estimates that yield a matrix ($\Sigma$) as close as possible to the data matrix ($S$). When elements in the matrix $S$ minus the elements in the
matrix \( \Sigma \) equal zero \( (S - \Sigma = 0) \), then a perfect model fit to the data is indicated and all values in \( S \) are equal to all values in \( \Sigma \) (Schumacker and Lomax, 2004).

**Model Fit.** Model testing is the next step in evaluating the proposed structural model. Model-fit evaluation involves determining the extent to which a model fits a data set. It was discussed earlier in this paper, that even if all possible fit indices point to an acceptable model, the researcher cannot claim to have found the true model that describes the phenomena being studied. Typically statistical methodologies are concerned with rejecting null hypothesis, SEM is most concerned with finding a model that does not contradict the data. Raykov and Marcoulides (2000) describe the process as one in which the researcher is interested in retaining the proposed model whose validity is the essence of the null hypothesis. In other words, when using SEM methodology, one is usually interested in not rejecting the null hypothesis. However, not rejecting a null hypothesis does not mean that it is true; model testing in SEM involves testing the fit of a model. Not rejecting a fitted model does not imply that it is the true model. In fact, just because a model fits a data set well does not mean that it is the only model that fits the data well. There could be another model that fits the data equally well, or even better.

When the model fit indices are acceptable (as described below), the proposed structural model is supported by the sample variance-covariance data \((S \text{ and } \Sigma)\) (Schumacker & Lomax, 2004). Evaluation of model fit is based on an inferential goodness-of-fit index, as well several of other criterion. The inferential index is called a chi-square value, and is the only statistical test of significance for testing the theoretical model. The chi-square value is used to test the null hypothesis that the model fits the analyzed covariance matrix perfectly (Raykov & Marcoulides, 2000). A chi-square value
of zero indicates a perfect fit, or no difference between values in the between S and Σ that was created based on the specified theoretical model (Schumacker and Lomax, 2004). A significant chi-square value relative to the degrees of freedom indicates that the data and model variance-covariance matrices differ. Chi-square is a test statistic that is defined as:

\[ T = (N - 1)F_{\text{min}} \]

Where N is the sample size and \( F_{\text{min}} \) is the computed minimal value of the fit function for the parameter estimation used (i.e., maximum likelihood, generalized least squares). When the proposed model is fit to the data in a SEM program, the program judges the obtained chi-square T value in relation to the model’s degrees of freedom, and output its associated p value. The p value may then be examined and compared with a preset significance level (often .05) (Raykov & Marcoulides, 2000).

In general, the more the data and model covariances differ (S and Σ), the bigger the chi-square statistic will be. If the covariances were identical, the chi-square statistic would be 0. The data would fit the model perfectly. However, SEM analysis is not simply a matter of checking to see if the chi-square statistic is significant. Since the data and model covariances are estimates, the researcher cannot expect them to be identical. SEM software outputs provide the chi-square statistic and its associated degrees of freedom, as well as a p-value as a display output on the path diagram (Arbuckle, 2007). These values for the model tested in this study are presented in Chapter 4.

The WLSMV estimator uses the asymptotic covariance matrix to calculate the chi-square value. The chi-square value from the WLSMV estimator is both mean- and variance-adjusted. Additionally, the WLSMV estimator does not calculate degrees of freedom in the standard way. Instead, the degrees of freedom are “estimated” to
approximate a chi-square distribution and are lower in value than standard degrees of
freedom (Hancock & Lawrence, 2006).

The chi-square is susceptible to over-inflation with large sample size (as in this
study), and as such increases the likelihood of failing to reject the null hypothesis (Kline,
2005). Conversely, a sample size that is too small is likely to result in rejection of a
correct null hypothesis. Therefore, researchers using SEM must not rely solely on the
chi-square statistic to determine appropriate model fit. It is recommended that the
researcher examine and report various model fit criteria to assess model fit, model
comparison, and model parsimony as global fit measures (Schumacker & Lomax, 2004).
Although chi-square values are reported in Chapter 4 of this study, they are considered in
terms of the fit indices provided.

The limitations of the chi-square value indicate the importance of alternative
indices to aid in the process of model evaluation. The descriptive-fit indices provide an
alternative family of indices that assess the goodness of fit of the proposed model based
on the particular sample at hand. (Raykov & Marcoulides, 2000). The goodness of fit
indicator (GFI) is a matrix proportion of explained variance which usually produces
results between 0.0 and 1.0, with 1.0 being a perfect fit between the data and model,
while numbers closer to zero suggest a very poor fit. A GFI > .90 usually indicates good
fit. Negative measurements are often associated with a sample size that is too small. The
GFI can be represented as follows:

\[
GFI = 1 - \frac{V_{res}}{V_{tot}}
\]

Where \( V_{res} \) represents the residual variance and \( V_{tot} \) is the total variance suggested
by the model (Kline, 2005). Although GFI has been widely accepted in the past, current
consensus suggests that this measure may be affected by sample size and can be large for models that are poorly specified or of a small sample size (Hoyle, 1995). Although still widely in use, it has been recommended that the researcher be aware of the potential limitations of this index in cases of poor specification or small sample size (Byrne, 2010; Kline, 2005; Reykov & Marcoulides, 2000; Schumacher & Lomax, 2004). Due to its limitations and lack of availability in the Mplus WLSMV estimator, the GFI index is not reported in this paper.

Also in the family of descriptive fit indices, are the normed fit index (NFI), and the nonnormed fit index (NNFI). Both are based on the idea of comparing the proposed model to a model in which absolutely no interrelationships are assumed among any of the variables. A model with no relationships is referred to the independence model, or the null model. The independence model is so severely and implausibly constrained that the researcher would expect it to provide a poor fit to any set of data (Arbuckle, 2007). If the chi-square value of the null model is compared to that of the proposed model, the researcher would get an idea of how much better the proposed model fits the data relative to how bad it could possibly be. This is the concept underlying the NIF and NNFI descriptive-fit indices (Reykov & Marcoulides, 2000).

The NFI is computed by comparing the difference of the chi-square value for the null model to the chi-square value of the proposed model. The NNFI is a variant of that process, but, in an effort to account for model complexity, it also takes into account the degrees of freedom of the proposed model. Models with NFI and NNFI close to 1 are considered to be more plausible means of describing the data than models for which these indices are further from 1 (Reykov & Marcoulides, 2000). However, the NFI was shown
to underestimate fit in small samples, as such, its creator P.M. Bentler revised the NFI to take sample size into account and proposed the Comparative Fit Index (CFI) (Bentler, 1990). CFI has become more widely accepted and is provided in the Mplus output with the WLSMV estimator. Values for both the NFI and CFI range from zero to 1.0 and are derived from the comparison of the hypothesized model with the independence (null) model (Byrne, 2010). Although a value > 0.90 was originally considered representative of a well-fitting model, a revised cutoff value close to 0.95 has more recently been advised (Hu & Bentler, 1999). CFI values for the model evaluated in this study are presented in Chapter 4.

In addition to the chi-square indices, it is common practice to evaluate the root mean-square error of approximation (RMSEA) values. RMSEA is a measure of lack of fit per degree of freedom. It is based on evaluating the extent to which the model fails to fit the data (Raykov & Marcoulides, 2000). Because a division by sample size occurs in RMSEA, it is believed that, unlike the chi-square index, the RMSEA is not dependent on sample size. Additionally, the use of degree of freedom allows the RMSEA to take into account model complexity. It is commonly accepted that an RMSEA value less than or equal to 0.05 is considered acceptable (Maruyama, 1998; Raykov & Marcoulides, 2000; Schumacker & Lomax, 2004).

Goodness-of-fit measures are offered in abundance by SEM software programs. According to Schumacker and Lomax (2004), “it has been suggested that a good fit index is one that is independent of sample size, accurately reflects differences of fit, imposes a penalty for inclusion of additional parameters, and supports the choice of the true model when it is known….No model fit criterion can actually meet all these criteria.” Byrne
(2010) suggests that an array of fit indices can give the researcher a good sense of how well their model fits the sample data, but the choice of which indices to choose in appropriately evaluating fit is not a simple one. Therefore, in choosing which goodness-of-fit indices to use in the assessment of model fit, the researcher must carefully consider such critical factors as; sample size, estimation procedure, model complexity, and/or violation of the underlying assumptions of multivariate normality and variable independence (Byrne, 2010).

The decision to reject or retain a model should always be based on multiple goodness-of-fit indices. Mplus provides several alternative measures of fit. Each fit measure is calculated for three models. “Your model” is the model specified by the researcher. The “independence model” is a model in which variables are assumed to be uncorrelated with the dependent(s), so if the fit for “your model” is no better than for the “independence model” then “your model” should be rejected. The “saturated model” is one with no constraints and will always fit any data perfectly, so normally “your model” will have a measure of fit between the saturated and independence models.

In addition to overall measures of fit, SEM programs offer information that may be used to address model misspecification; these results are commonly referred to as modification indices. Specifically, the indices involve an analysis of residuals. Model fit indices are summary measures of fit, and not all of them provide information about the fit of individual parts of the model. As a result, it is possible for a proposed model to be misspecified in some parts, but be very well fitting in other parts. To address this possibility, two types of residuals can be examined in most SEM models. Good-fitting models will usually display a stem-and-leaf plot of standardized residuals that resembles
a symmetric distribution (Raykov & Marcoulides, 2000). In this case, a graphical representation of the residuals (the difference between S and Σ) would be symmetrically distributed. If there is not a symmetric distribution in the plot, then it may be considered that the model does not fit the data well, and the researcher may wish to address the question of model respecification, or modification. SEM programs, Mplus offer modification indices which suggest changes to the model to make the model fit the particular data sample.

To summarize, model testing involves determining how well the sample data fit the theoretical model. In other words, answering the question: To what extent is the theoretical model supported by the sample data? Tests of model fit as a whole are available as well as the fit of individual parameters in the model. For models that are correctly identified, model fit indices will indicate a good model/data fit. For models that are not correctly identified, either in part or in whole, the fit indices will not indicate a good fit. In such a case, the software will offer respecification or modification suggestions which would improve model/data fit. The choice to modify the model is up to the researcher. Great care must be taken to ensure that if the model is modified that it is not done strictly to improve fit indices and takes the model out of the realm of theoretical relevance. In such a case, the model may fit that particular dataset well, but serves no relevant use in the research field. The decision was made that this study, as a confirmation of a theoretical construct would not be subjected to modification indices. If this study were exploratory in nature, modification indices would be incorporated into the model. However this study involves the evaluation of a model based on theoretical constructs. As such, it is confirmatory in nature and not intended to be modified.
Although modification indices were viewed in the output of the data, they were found to be irrelevant and not included in this paper.

**Testing Factorial Invariance Across Time.** As this study involves a longitudinal evaluation of the proposed model, the variables selected were included in both the 2004 and 2006 iterations of the BPS instrument. The value of a measurement model is greatly enhanced if the same model can be replicated across different groups or across time points. This model was be analyzed with an eye to evaluate the stability of the variable structure as described by students’ self-reported behaviors as they persist toward their educational goals, as well as evaluate the effects of those behaviors on persistence.

An important question considered in studies that involve repeated measurements of latent variables concerns the invariance of the indicators used across time. A test of invariance focuses on whether the construct measured at repeated assessment occasions remains the same or whether it changes its structure. If the nature of the construct assessed by an instrument changes with age, an instrument might require alteration to ensure that the same underlying construct is still assessed. This type of measurement invariance is termed factorial invariance within structural equation modeling (Widaman, Ferrer & Conger, 2010).

In a longitudinal analysis of a model, it becomes an issue when repeated measurement of the same measure produces two sources of common variance. One is due to the underlying construct, and the second is due to measure specific variance. The second source of variance would usually be apart of the unique variance of the measure; however, because the same measure is collected twice, that variance becomes part of the
common variance of the measure. Combining these two variances would yield an inaccurate assessment of the stability of the underlying variable. Factorial invariance in longitudinal models concerns whether relations between latent variables and their indicators are invariant across occasions. Essentially, the expected value of a person’s score on indicator variable $j$ at time $t$ should be a function of the respondent’s score on the latent variable and the associated unique factor at time $t$, and should not additionally depend on time of measurement (Widaman, Ferrer & Conger, 2010).

The key parameters involved in establishing factorial invariance are intercepts, factor loadings, and unique factor variances that reflect the relations of the latent factors with their indicators. According to Raykov and Marcoulides (2000) an examination of factorial invariance is possible by simply imposing an equality constraint on the factor structure and testing the resulting difference in the chi-square values for the two tested models for significance. There are generally four levels of factorial invariance: 1) Configural invariance displays the same pattern of fixed and free factor loadings across time; 2) Weak factorial invariance displays invariant factor loadings across time; 3) Strong factorial invariance displays invariant factor loadings and intercepts across time; and 4) Strict factorial invariance displays invariant factor loadings, intercepts and unique factor variances across time (Widaman, Ferrer & Conger, 2010).

In this study, after a thorough review of relevant research literature, I proposed a model which is soundly based on student persistence and behavioral theory. The proposed model incorporated factors that have been shown to influence student’s persistence decisions, and were most likely to be relevant in community college student persistence. As the variables that were included in the proposed model were latent, or not
directly observable, the structural equation modeling method was best suited to evaluate the model. Structural equation modeling with latent variables is most effective when performed with large datasets. As such, the Beginning Postsecondary Students survey performed by NCES in 2004 with a follow-up in 2006 provided a rich data source with an ample sample size.

The goal of this study was to use structural equation modeling to evaluate the proposed model through the processes of model identification, model estimation, and analysis of model fit. The initial goal was to establish a measurement model for the specified latent variables. The second step was an analysis of a structural model to establish relationships among the latent constructs and endogenous variables. Although, this is typically where a SEM analysis would stop, I included a further step in which the BPS: 04/06 longitudinal dataset was used to evaluate the model for stability and change of variables and relationships between variables across time via a factorial analysis.

**Summary**

The purpose of this chapter has been to provide an overview of the conceptual model derived from a thorough review of existing research, a review of the methods used by NCES to gather data for the NPSAS: 04 and BPS: 04/06, and a summary of the statistical methods used in structural equation modeling. The study presented in this paper began with a confirmatory factor analysis, followed by an analysis of factorial invariance and finally a structural equation model analysis. These three steps were intended to evaluate: 1) how well the latent constructs were represented by the proposed factors; 2) how stable the factors were across time points; and 3) evaluate the structural relationships between the variables proposed in the model. Although the steps were
sequential, further steps in the process were not limited by the previous steps. If the CFA did not indicate adequate representation of the factors, or factorial invariance did not indicate stability over time, the model was still to be evaluated using the SEM procedure in order to assess the structural relationships among the constructs.

This study was intended to contribute to the literature on student persistence at community colleges. To date, little has been done to evaluate the interrelationships between variables thought to influence community college student persistence. By examining the behavioral characteristics that influence student persistence and using data that represents a national cross-section of community college students, this study explored a gap in the current literature.
CHAPTER FOUR

Results

The purpose of this study was to test a proposed model of community college student persistence. In the model presented in this study, persistence to goals was suggested to be directly influenced by students’ cognitive, affective, and conative behaviors. In addition to direct effects, psychosocial behaviors were thought to be mediated through faculty contact, financial aid, and employment variables. This model was analyzed using national level data drawn from the Beginning Postsecondary Students Longitudinal Study 2004-2006 (BPS: 04/06). The results of the study are presented in this chapter in four parts. The first part of the results section includes descriptive statistics of the sample as it represents the population of interest. The second part of the results section presents the basic findings of the confirmatory factor analysis, or measurement model. Following the confirmatory factor analysis, an analysis of factorial invariance across time was performed, and finally an evaluation the structural models with measurement components.

Purpose of the Study

The purpose of this study was to determine how behavioral characteristics associated with motivation influence the persistence of community college students toward their goals. This study examined the structural relationships among three constructs: (1) behavioral variables associated with student motivation, (2) intervening
variables, (3) persistence toward goals. Student behavioral characteristics will be examined to determine their direct and indirect effects on community college students’ persistence toward goals and the direct and indirect effects of intervening variables on persistence to goals. By addressing similarities within the persistence, goal setting, and intrinsic behavior theories, a model was designed to link these theories as they related to community college student persistence. The research questions explored as they pertained to the model were as follows: 1) Does the model fit the observed data? 2) In the model, do student behavioral characteristics such as self-regulation, cognitive ability, and self-efficacy directly and/or indirectly affect student persistence? 3) In the model, does faculty contact mediate students’ behavior as they persist toward their goals? 4) In the model, does the availability of financial aid mediate students’ behavior as they persist toward their goals? 5) In the model, does outside employment mediate students’ behavior as they persist toward their goals?

It was hypothesized that the evaluation of multiple variables simultaneously would allow for an examination of the interrelationships between the variables which exist in real life and their influence on persistence decisions. This study was approached with the thought that students’ combined self-regulatory capacity, cognitive abilities, and self-efficacy would allow them to overcome external pull factors that have been shown to impede student persistence. It was thought that students who have higher levels of self-regulation, cognitive abilities, and self-efficacy persist even though they may not feel integrated into the institution academically. Additionally, a student faced with the pull of outside employment and/or inadequate financial aid, would rely upon their feelings of
self-efficacy and their capacity for self-regulation to enable them to persist toward their goals.

The study began with an analysis of descriptive statistics, followed by a confirmatory factor analysis, an analysis of factorial invariance and finally a structural equation model analysis. These four steps were intended to evaluate: 1) the normality, correlations, and missingness within the dataset, 2) how well the latent constructs were represented by the proposed factors; 3) how stable the factors were across time points; and 4) the structural relationships between the variables proposed in the model. Although the steps were sequential, further steps in the process were not limited by the previous steps. If the CFA did not indicate adequate representation of the factors, or factorial invariance did not indicate stability over time, the model was still evaluated using the SEM procedure in order to assess the structural relationships among the constructs.

The results presented in this chapter follow the structure of the study. The results begin with an evaluation of the descriptive statistics. Following the descriptive statistics, the confirmatory factor analysis will be presented. The analysis of factorial invariance is subsequent. To conclude, the results for the structural equation modeling analysis are presented in the same stepwise manner in which they were produced.

**Descriptive Statistics**

As the data used in this study was longitudinal secondary data and the collection process involved a series of phone, online, and personal interviews, analysis of missing data were performed. A descriptive analysis for the target population in the BPS: 04/06 dataset was estimated using SPSS 16.0. The percent missing for each are presented in table 4.1. The predominant cause of missing data was attrition of study participants.
between the 2004 and 2006 iterations of the surveys. This attrition was caused by the student either dropping out of school, relocating with no forwarding information, or refusal to participate in the study. The other cause of missingness may be found in the Persistence construct (reason left 2006: finished desired classes), and may be explained by the fact that the majority of students in the survey were still working on their desired classes, and as such had not yet left so that question was not answered in the 2006 data collection.

The Mplus software used in this analysis handles missing data by a default of listwise deletion. The general consensus for the number of participants needed for a one sample SEM analysis is 10 per estimated parameter (Schreiber, Nora, Stage, Barlow, & King, 2006). The model to be evaluated (Figure 3.2) specifies 54 parameters which would imply a desirable sample size of 540. The sample size, after listwise deletion for the variables impacted by missingness is 1,436. This value is well over the suggested minimum number of participants.

An attrition analysis was performed in which the cases with complete data were compared with those with missing data on background variables. In comparing the gender of respondents who were included in the listwise deletion with those included in the final analysis, a comparison of means indicated no significant difference with a value of: t(2158)=0.09, p=.37 (M=-.021, SD=0.23). A comparison of race-ethnicity means of deleted respondents with those included in final analysis produced a t-test with no significant difference t(2061)=1.68, p=0.09 (M=0.85, SD=0.51). No significant differences were found in the means of the background variables between participants with incomplete data, and those with complete data who were included in the SEM
analysis. This result allows for the assumption of generalizability among the study participants.

Before evaluating the model the data were evaluated for normality, multicolinearity, and the presence of outliers. Most statistics used in SEM assume that the multivariate distribution is normally distributed. Screening data for univariate normality can inform the researcher whether multivariate normality may be an issue (Weston, Gore, Chan, & Catalano, 2008). In this study, normality was evaluated by examining the skewness and kurtosis of the variable distributions. For the skewness index, absolute values greater than 2.0 are considered extreme (Curran, West, & Finch, 1996). Values over 7.0 for the kurtosis index suggest a problem (Curran et. al., 1996), and Values over 20.0 are considered extreme (Kline, 2005). Table 4.1 indicates which values for skewness and kurtosis fell outside of the acceptable range. Values falling outside of the acceptable range would indicate non-normality.

Table 4.1

<table>
<thead>
<tr>
<th>Construct and Year</th>
<th>Respondents (n = 1436)</th>
<th>Normality Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Skewness</td>
</tr>
<tr>
<td>Pell Grant 2005-2006</td>
<td>3.83</td>
<td>16.47</td>
</tr>
<tr>
<td>Importance of steady work 2004</td>
<td>-2.44</td>
<td></td>
</tr>
<tr>
<td>Frequency school clubs 2004</td>
<td>2.27</td>
<td></td>
</tr>
<tr>
<td>Frequency school sports 2004</td>
<td>2.93</td>
<td>7.07</td>
</tr>
<tr>
<td>Reason left 2006: finished desired classes</td>
<td>2.93</td>
<td>6.61</td>
</tr>
<tr>
<td>Reason enrolled: transfer to a 2-year college</td>
<td>3.15</td>
<td>7.94</td>
</tr>
<tr>
<td>Reason enrolled: transfer to another college</td>
<td>2.72</td>
<td>5.39</td>
</tr>
</tbody>
</table>

Although some skewness did exist over the cut-off of 2, the kurtosis values did not reach the extreme of 20, I chose to accept the variables as they were and used the
robust estimator Weighted Least-Squares with Mean and Variance adjustment (WLSMV) available in the Mplus software. The WLSMV estimator has been shown to perform well in cases of mild non-normality and missing data. WLSMV is also an optimal choice for categorical variables (Muthén, DuToit, & Spisic, 1997). The exception to the suggested usage of WLSMV would have been under conditions of small sample sizes and markedly skewed variables (Muthén & Curran, 1997), neither of which impacted this data analysis.

A review of variable response frequencies was performed to assess overall characteristics of survey participants. These frequencies, provided in Tables 4.2, 4.3, and 4.4 indicated an adequate response rate for the indicator variables used in the latent constructs. This meant that there was a sufficient sample size to perform a structural equation modeling analysis, and the study continued as planned.

Table 4.2

Conative Variable Frequencies

<table>
<thead>
<tr>
<th>Variables</th>
<th>Respondents (n = 1436)</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Met with academic advisor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>40.3%</td>
<td>26.3%</td>
<td></td>
</tr>
<tr>
<td>Sometimes/Often</td>
<td>59.7%</td>
<td>73.1%</td>
<td></td>
</tr>
<tr>
<td>System Missing</td>
<td>0.1%</td>
<td>0.6%</td>
<td></td>
</tr>
<tr>
<td>Attended fine arts activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>83.9%</td>
<td>77.4%</td>
<td></td>
</tr>
<tr>
<td>Sometimes/Often</td>
<td>16.0%</td>
<td>21.9%</td>
<td></td>
</tr>
<tr>
<td>System Missing</td>
<td>0.1%</td>
<td>0.6%</td>
<td></td>
</tr>
<tr>
<td>Participated in school clubs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>87.8%</td>
<td>84.9%</td>
<td></td>
</tr>
<tr>
<td>Sometimes/Often</td>
<td>12.1%</td>
<td>14.5%</td>
<td></td>
</tr>
<tr>
<td>System Missing</td>
<td>0.1%</td>
<td>0.6%</td>
<td></td>
</tr>
<tr>
<td>Participated in school sports</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>91.6%</td>
<td>87.8%</td>
<td></td>
</tr>
<tr>
<td>Sometimes/Often</td>
<td>8.4%</td>
<td>611.6%</td>
<td></td>
</tr>
</tbody>
</table>

(continued)
### Table 4.2 Conative Variable Frequencies (continued)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Respondents (n = 1436)</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System Missing</td>
<td></td>
<td>0.1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Attended study groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td></td>
<td>63.4%</td>
<td>53.3%</td>
</tr>
<tr>
<td>Sometimes</td>
<td></td>
<td>36.6%</td>
<td>46.0%</td>
</tr>
<tr>
<td>System Missing</td>
<td></td>
<td>0.1%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Community service performed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>71.0%</td>
<td>75.1%</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>29.0%</td>
<td>24.9%</td>
</tr>
</tbody>
</table>

### Table 4.3

Affective Variable Frequencies

<table>
<thead>
<tr>
<th>Variables</th>
<th>Respondents (n = 1436)</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective Variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of being a community leader</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>56.5%</td>
<td>61.8%</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>43.5%</td>
<td>38.2%</td>
</tr>
<tr>
<td>Importance of being financially well-off</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>19.4%</td>
<td>28.8%</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>80.6%</td>
<td>71.2%</td>
</tr>
<tr>
<td>Importance of influencing political structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>75.8%</td>
<td>74.5%</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>24.2%</td>
<td>25.5%</td>
</tr>
<tr>
<td>Importance of leisure time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>19.3%</td>
<td>19.4%</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>80.7%</td>
<td>80.6%</td>
</tr>
<tr>
<td>Importance of steady work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>11.4%</td>
<td>20.2%</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>88.6%</td>
<td>79.8%</td>
</tr>
<tr>
<td>Highest degree ever expected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No degree</td>
<td></td>
<td>1.1%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Certificate</td>
<td></td>
<td>2.4%</td>
<td>6.7%</td>
</tr>
<tr>
<td>Associate’s degree</td>
<td></td>
<td>15.0%</td>
<td>23.7%</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td></td>
<td>41.2%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Post-BA or post-master certificate</td>
<td></td>
<td>0.2%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Master’s degree</td>
<td></td>
<td>31.3%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Professional degree</td>
<td></td>
<td>6.3%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Doctoral degree</td>
<td></td>
<td>2.5%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>
### Persistence Variable Frequencies

<table>
<thead>
<tr>
<th>Variables</th>
<th>2004</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Persistence Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason enrolled: complete associate’s degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>59.1%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>40.9%</td>
<td>n/a</td>
</tr>
<tr>
<td>Reason enrolled: complete certificate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>81.5%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>18.5%</td>
<td>n/a</td>
</tr>
<tr>
<td>Reason enrolled: job skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>57.4%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>42.6%</td>
<td>n/a</td>
</tr>
<tr>
<td>Reason enrolled: personal interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>52.7%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>47.3%</td>
<td>n/a</td>
</tr>
<tr>
<td>Reason enrolled: transfer to a 2-year college</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>92.2%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>7.8%</td>
<td>n/a</td>
</tr>
<tr>
<td>Reason enrolled: transfer to a 4-year college</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>62.7%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>37.3%</td>
<td>n/a</td>
</tr>
<tr>
<td>Reason enrolled: transfer to another college</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>90.3%</td>
<td>n/a</td>
</tr>
<tr>
<td>Yes</td>
<td>9.7%</td>
<td>n/a</td>
</tr>
<tr>
<td>Persistence and attainment anywhere</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attained bachelor’s degree</td>
<td>n/a</td>
<td>0.1%</td>
</tr>
<tr>
<td>Attained associate’s degree</td>
<td>n/a</td>
<td>12.4%</td>
</tr>
<tr>
<td>Attained certificate</td>
<td>n/a</td>
<td>6.2%</td>
</tr>
<tr>
<td>No degree, still enrolled</td>
<td>n/a</td>
<td>38.3%</td>
</tr>
<tr>
<td>No degree, not enrolled</td>
<td>n/a</td>
<td>8.6%</td>
</tr>
<tr>
<td>No degree, left without return</td>
<td>n/a</td>
<td>34.4%</td>
</tr>
<tr>
<td>Reason left: finished desired classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>n/a</td>
<td>91.3%</td>
</tr>
<tr>
<td>Yes</td>
<td>n/a</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

Six observed variables were used to measure the Conative construct, all of which were based on frequency; meeting with academic advisor, attending fine arts activities, participating in school clubs and school sports, attending study groups, and performing
community service. Between 2004 and 2006, frequencies of meeting with an academic advisor dropped from 40.3% to 20.6%. The frequencies of sometimes or often meeting with an advisor in 2004 increased from 51.7% to 73.1% in 2006.

Affective behavior as a construct was composed of six observed variables, five of which students rated in terms of the importance of; being a community leader, being financially well-off, influencing political structure, leisure time, steady work, and finally the highest degree the student expected to attain. The factors of steady work, leisure time, and being financially well-off were of the highest importance to students in 2004 at 79.8%, 80.6%, and 71.2% respectively. Self-reported student aspirations for the highest degree expected declined somewhat with 41.2% of students in 2004 expecting to attain a bachelor’s degree decreasing to 35.9% in 2006. Students expecting to attain master’s degrees dropped from 31.3% to 17.4%, while the percentage of students expecting to attain an associate’s degree increased from 15.0% in 2004 to 23.7% in 2006.

The Persistence construct was comprised of 9 observed variables evaluating students’ reasons for enrolling and their persistence toward those goals. The highest percentage of enrollments among first-time beginners at community colleges in 2004 were for job skills (42.6%) and personal interest (47.3%), followed by the goal of an associate’s degree (40.9%) and intent to transfer to a 4-year institution (37.3%). Persisters, or students who had received a certificate, an associate’s degree, or continued to be enrolled accounted for 57% of all respondents, while 8.7% of students reported that they had left by 2006 because they had finished their desired classes.

The cognitive variable was identified by a single indicator, GPA. The average GPA for participating students decreased from 2.73 in 2004 to 2.68 in 2006. Three
additional variables in this model also had single indicators: Financial Aid, Faculty Contact and Employment. The indicator for Financial Aid was given by the amount of Pell Grant awarded to the students in 2004 and 2006. Faculty contact was evaluated by the student’s reported frequency of talking with faculty about academic matters outside of class. This reported faculty contact increased slightly between 2004 and 2006 with 11.8% of students often speaking with faculty in 2004 increasing to 17.5% in 2006. Employment was measured by the number of hours a student worked per week during the academic year. The average number of hours worked per week increased from 22.52 hours in 2004 to 25.91 hours worked per week in 2006.

Means and standard deviations are reported along with the correlations in Table 4.5. If indicator variables were found to be too highly correlated, they would be redundant indicators of the latent constructs. The correlation matrix identified no relationships with a large effect size (r < .5), which would have indicated excessive redundancy among the indicator variables of the latent constructs. Four relationships were found to have a medium effect size (r > .30), but the correlations were not unreasonable and therefore not excluded from the study. The first two correlations, importance of being a community leader (2004) and the importance of influencing political structure (r = .361, p < .01) were also reflected in the 2006 iteration (r = .398, p < .01), which consistently suggested a positive relationship between community and political activism. The second two correlations involved participation in school clubs and school sports with an r = .314, p < .01 in 2006, which suggested a positive relationship among extra-curricular activities. However, these values were not considered excessive and the variables were retained as indicators of the latent constructs.
Table 4.5

Inter correlations of Observed Variables

<table>
<thead>
<tr>
<th>2004 Conative Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents (n=1436)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Frequency: fine arts activities</td>
<td>--</td>
<td>.136**</td>
<td>.285**</td>
<td>.225**</td>
<td>.147**</td>
<td>.074**</td>
</tr>
<tr>
<td>2. Frequency: meet academic advisor</td>
<td>--</td>
<td>.181**</td>
<td>.092**</td>
<td>.283**</td>
<td>.097**</td>
<td></td>
</tr>
<tr>
<td>3. Frequency: school clubs</td>
<td>--</td>
<td>.295**</td>
<td>.215**</td>
<td>.088**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Frequency: school sports</td>
<td>--</td>
<td>.127**</td>
<td>.097**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Frequency: study groups</td>
<td>--</td>
<td>.128**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Volunteer: any community service</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1.16</td>
<td>1.60</td>
<td>1.12</td>
<td>1.08</td>
<td>1.36</td>
<td>1.29</td>
</tr>
<tr>
<td>SD</td>
<td>0.37</td>
<td>0.50</td>
<td>0.33</td>
<td>0.28</td>
<td>0.48</td>
<td>0.45</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

<table>
<thead>
<tr>
<th>2006 Conative Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents (n=1436)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Frequency: fine arts activities</td>
<td>--</td>
<td>.172**</td>
<td>.369**</td>
<td>.285**</td>
<td>.238**</td>
<td>.064</td>
</tr>
<tr>
<td>2. Frequency: meet academic advisor</td>
<td>--</td>
<td>.132**</td>
<td>.147**</td>
<td>.194**</td>
<td>.039</td>
<td></td>
</tr>
<tr>
<td>3. Frequency: school clubs</td>
<td>--</td>
<td>.314**</td>
<td>.288**</td>
<td>.078**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Frequency: school sports</td>
<td>--</td>
<td>.168**</td>
<td>.034</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Frequency: study groups</td>
<td>--</td>
<td>.050</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Volunteer: any community service</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1.21</td>
<td>1.72</td>
<td>1.14</td>
<td>1.11</td>
<td>1.45</td>
<td>1.25</td>
</tr>
<tr>
<td>SD</td>
<td>0.42</td>
<td>0.46</td>
<td>0.36</td>
<td>0.33</td>
<td>0.51</td>
<td>0.43</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

<table>
<thead>
<tr>
<th>2004 Affective Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents (n=1436)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Importance: being community leader</td>
<td>--</td>
<td>.142**</td>
<td>.361**</td>
<td>.112**</td>
<td>.088**</td>
<td>.156**</td>
</tr>
<tr>
<td>2. Importance: financially well-off</td>
<td>--</td>
<td>.087**</td>
<td>.154**</td>
<td>.141**</td>
<td>.056</td>
<td></td>
</tr>
<tr>
<td>3. Importance: influence political structure</td>
<td>--</td>
<td>.132**</td>
<td>.099**</td>
<td>.104**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Importance: leisure time</td>
<td>--</td>
<td>.226**</td>
<td>-.040</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Importance: steady work</td>
<td>--</td>
<td>.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Highest degree ever expected</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1.44</td>
<td>1.81</td>
<td>1.24</td>
<td>0.81</td>
<td>1.89</td>
<td>4.68</td>
</tr>
<tr>
<td>SD</td>
<td>0.49</td>
<td>0.40</td>
<td>0.43</td>
<td>0.40</td>
<td>0.32</td>
<td>1.45</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Table 4.5 Intercorrelations of Observed Variables

<table>
<thead>
<tr>
<th>2006 Affective Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents (n=1436)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Importance: being community leader</td>
<td>--</td>
<td>.203**</td>
<td>.398**</td>
<td>.179**</td>
<td>.199**</td>
<td>.114**</td>
</tr>
<tr>
<td>2. Importance: financially well-off</td>
<td>--</td>
<td>.161**</td>
<td>.210**</td>
<td>.235**</td>
<td>.066</td>
<td></td>
</tr>
<tr>
<td>3. Importance: influence political structure</td>
<td>--</td>
<td>.161**</td>
<td>.159**</td>
<td>.055</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Importance: leisure time</td>
<td>--</td>
<td></td>
<td>.272**</td>
<td>.068</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Importance: steady work</td>
<td>--</td>
<td></td>
<td></td>
<td>.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Highest degree ever expected</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>M</td>
<td>1.38</td>
<td>1.71</td>
<td>1.25</td>
<td>0.81</td>
<td>1.80</td>
<td>3.13</td>
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<tr>
<td>SD</td>
<td>0.49</td>
<td>0.45</td>
<td>0.44</td>
<td>0.39</td>
<td>0.40</td>
<td>1.90</td>
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<td>**. Correlation is significant at the 0.01 level (2-tailed).</td>
<td></td>
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<td></td>
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<table>
<thead>
<tr>
<th>Persistence Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents (n=1436)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Reason enrolled: complete associate’s degree</td>
<td>-</td>
<td>.090**</td>
<td>.186**</td>
<td>.041</td>
<td>.144**</td>
<td>.092**</td>
<td>.133**</td>
<td>.012</td>
<td>.065</td>
</tr>
<tr>
<td>2. Reason enrolled: complete certificate</td>
<td>--</td>
<td>.182**</td>
<td>.139**</td>
<td>.170**</td>
<td>.042</td>
<td>.158**</td>
<td>.017</td>
<td>.038</td>
<td></td>
</tr>
<tr>
<td>3. Reason enrolled: job skills</td>
<td>--</td>
<td>.109**</td>
<td>.101**</td>
<td>-.128**</td>
<td>.059</td>
<td>.050</td>
<td>.009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Reason enrolled: personal interest</td>
<td>--</td>
<td>.047</td>
<td>-.127**</td>
<td>.018</td>
<td>.028</td>
<td>.034</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Reason enrolled: transfer to 2-year college</td>
<td>--</td>
<td>.018</td>
<td>.167**</td>
<td>-.021</td>
<td>-.007</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Reason enrolled: transfer to 4-year college</td>
<td>--</td>
<td>.116**</td>
<td>-.025</td>
<td>.074**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Reason enrolled: transfer to another college</td>
<td>--</td>
<td>-.012</td>
<td>-.010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Persistence and attainment anywhere 2005-2006</td>
<td>--</td>
<td>.010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Reason left 2006: finished desired classes</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.41</td>
<td>0.18</td>
<td>0.43</td>
<td>0.47</td>
<td>0.08</td>
<td>0.37</td>
<td>0.10</td>
<td>5.63</td>
<td>0.09</td>
</tr>
<tr>
<td>SD</td>
<td>0.49</td>
<td>0.39</td>
<td>0.49</td>
<td>0.50</td>
<td>0.27</td>
<td>0.48</td>
<td>0.30</td>
<td>0.48</td>
<td>0.28</td>
</tr>
<tr>
<td>**. Correlation is significant at the 0.01 level (2-tailed)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
The Conative construct in 2004 showed significance in the correlation among all of the indicator variables. The correlation between the frequency of fine arts activities and school clubs ($r = 0.285, p < .01$) is outside of the moderate effects previously mentioned. The 2006 Conative construct also showed significant correlation between all of the indicator variables mimicking the highest correlations of 2004. With the frequency of fine arts activities and school club participation high ($r = 0.369, p < .01$), and the frequency of study groups correlating with meeting an academic advisor ($r = 0.283, p < .01$).

Within the construct Affective (2004), importance of being a community leader, being financially well-off, and influencing political structure were all significantly correlated with all other construct measures at the $p < .01$ level. The highest correlations being the importance of influencing political structure and being a community leader (as previously mentioned), followed by the correlation of the importance of steady work and leisure time with an $r$-value of 0.226. The importance of leisure time and steady work were significantly correlated with all other construct measures, except the highest degree expected.

The Persistence construct showed significant negative relationships ($p < .01$) among reasons for enrolling being job skills and personal interest negatively correlated with transfer to a 4-year college ($r = -0.128$ and $r = -0.127$) respectively. Negative relationships were found between reason for enrolling being transfer to a 2-year college ($r = -0.007$), a 4-year college ($r = -0.074$), or transfer to any other college ($r = -0.010$) and the reason for leaving in 2006 being finished desired classes, which is not unsurprising.
since these are the students who enrolled to complete a degree and would not have done so in the 2-year data collection window.

Overall, correlations were within an acceptable range. The correlation matrix was used to identify possible multicollinearity. Multicollinearity, as described by Weston, Gore, Chan, and Catalano (2008) refers to situations where measured variables are so highly related that they are essentially redundant. Weston et al, recommend following Kline (2005), who suggested that bivariate correlations higher than $r = 0.85$ can signal potential problems. As the highest correlation was 0.398, one could reasonably assume that redundancy due to multicollinearity did not exist for the observed indicator variables used in this study. These results would indicate that the observed indicator variables uniquely represent each factor, and redundancy was not an issue within the latent constructs. This is a desirable outcome for this portion of the analysis.

**Confirmatory Factor Analysis of Measurement Model**

A multi-step process to evaluate the proposed community college student persistence model was carried-out as described in the previous chapter. The first step, confirmatory factor analysis may be considered analogous to what is traditionally known as testing of the measurement model. The proposed model was somewhat complex with three latent variables, and three mediating variables. Attempting structural equation modeling on such a complex model without first evaluating the fitness of the individual components that make-up the model would have been akin to building a house with substandard bricks. The builder would run the risk of having the house fall-down if it was not properly and thoughtfully assembled. The structural equation modeler would run the risk of the model not fitting, but not be able to identify the reasons. By building the
model in a stepwise fashion, it is possible to identify errors in specification, or incorrectly written syntax as they may occur.

The first step to evaluate the fitness of the components involved performing a confirmatory factor analysis (CFA). This process involved evaluating each of the latent constructs, one at a time, to confirm that the observed variables adequately measured the latent constructs. In Mplus, the measurement model for CFA and the structural model for SEM is a multivariate regression model that describes the relationships between the set of observed dependent variables and the set of continuous latent variables. The observed dependent variables are referred to as factor indicators and the latent variables are referred to as factors. The relationships are described based on the level of measurement.

In this study, the factor indicators were categorical and were described by a set of probit or logistic regression equations as specified by Muthén & Muthén, 2010. The evaluation of any portion of a SEM model, including a CFA is accomplished by examination of the $\chi^2$ statistic, goodness-of-fit (model fit) statistics, factor loadings, and the $R^2$ statistic which describes the amount of variance accounted for by the respective factor as was described in Methods section of Chapter 3. In Mplus, the default estimator for a CFA with categorical factor indicators is the robust weighted least squares (WLSMV) estimator. This WLSMV estimator produces CFI and RMSEA as goodness-of-fit statistics. These two goodness-of-fit statistics are presented with the output in this chapter.

In a CFA the $\chi^2$ is actually a test of model misspecification. This is contrary to the typical use of chi-square ($\chi^2$) in statistical analysis. Thus, in this case, a significant $\chi^2$ suggests that the model does not fit the sample data. In contrast, a nonsignificant $\chi^2$
would indicate that the model-implied relationships between variables were not significantly different from those observed in the data (Weston et al., 2008). Even when significance does exist, a model may also be considered a good fit when $\chi^2 < 2\text{df}$ (Stahl & Pavel, 1992). However, as mentioned in the previous chapter, it is possible for chi-square values to be influenced by large sample sizes. This study involved a very large sample size and the chi-square values were consistently found to exceed two degrees-of-freedom, even when fit statistics indicated an excellent fit.

It is widely accepted in the structural equation modeling literature that model fit should not be evaluated by the $\chi^2$ statistic alone. Especially when considering the sensitivity of chi-square values to sample size. Because of this sensitivity, model fit indices must also be considered when evaluating model fit. Of the two goodness-of-fit indicators, the RMSEA suggests increasingly poor fit with higher values. The formulation of this index is able to correct for the complexity of a model. A reported RMSEA value of 0.00 would indicate that the model exactly fits the data. RMSEA values between 0.05 and 0.10 are generally considered acceptable (Weston et al., 2008). Some researchers suggest a cutoff of 0.06; however, Hu and Bentler (1999) indicate that appropriate cutoff values are impacted by sample size, model complexity and degree of misspecification. For the purposes of this study, a cutoff of 0.06 was used to indicate good model fit. Values above 0.06 would indicate poor model fit.

Bentler’s (1990) comparative fit index (CFI) is an incremental fit index. This index is used to compare the improvement of the fit of the researcher’s proposed model over a more restricted model, which is called an independence or null model. The independence or null model specifies no relationship among the variables. CFI values
may range from 0 to 1.0, with values closer to 1.0 indicating better fit (Weston et al., 2008). When evaluating model fit, all fit indices should be considered together to determine the overall model fit. In this study, the RMSEA and CFI values were considered together when determining the appropriateness of model fit.

Results for the first step, the CFA or measurement model of the Conative construct is presented in Table 4.6. The 2004 Conative latent variable provided a chi-square test of model fit of 118.24, with 9 degrees of freedom. This was significant with a p-value of 0.00, which is not desirable as a significant chi-square value relative to the degrees of freedom would indicate that the data and model variance-covariance matrices differ. However, as previously mentioned, the chi-square value is known to be susceptible to over-inflation with large sample size and it was recommended that the researcher must not rely solely on the chi-square statistic to determine appropriate model fit (Klein, 2005; Schumacker & Lomax, 2004).

In terms of model fit indices, the 2004 data provided a RMSEA value of 0.04, which did suggest an excellent fit of the factor model to the observed data. The 2004 CFI of 0.93 also suggested a very good fit. The Conative construct applied to the 2006 data provided a chi-square of 36.35 with 9 degrees of freedom, a better value, but still significant at a p-value of 0.000. This chi-square value normally would not suggest a good fit between the data and the model, however the RMSEA value of 0.02 and CFI of 0.98 did suggest a very good fit for the model to the observed data.
Table 4.6

Confirmatory Factor Analysis for Conative Construct

<table>
<thead>
<tr>
<th>Observed Variables</th>
<th>2004 Conative Variables</th>
<th>2006 Conative Variables</th>
<th>Goodness of fit statistics for CFA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Factor Loading (β)</td>
<td>β/S.E (β)</td>
<td>Standardized Factor Loading (B)</td>
</tr>
<tr>
<td>Met with academic advisor</td>
<td>1.00</td>
<td>--</td>
<td>0.53***</td>
</tr>
<tr>
<td>Attended fine arts activities</td>
<td>1.02***</td>
<td>13.97</td>
<td>0.54***</td>
</tr>
<tr>
<td>Participated in school clubs</td>
<td>1.47***</td>
<td>16.91</td>
<td>0.78***</td>
</tr>
<tr>
<td>Participated in school sports</td>
<td>1.31***</td>
<td>13.80</td>
<td>0.60***</td>
</tr>
<tr>
<td>Attended study groups</td>
<td>1.02***</td>
<td>15.24</td>
<td>0.54***</td>
</tr>
<tr>
<td>Volunteer: any community service</td>
<td>0.53***</td>
<td>8.62</td>
<td>0.23***</td>
</tr>
<tr>
<td>Met with academic advisor</td>
<td>1.00</td>
<td>--</td>
<td>0.47***</td>
</tr>
<tr>
<td>Attended fine arts activities</td>
<td>1.23***</td>
<td>13.17</td>
<td>0.56***</td>
</tr>
<tr>
<td>Participated in school clubs</td>
<td>1.75***</td>
<td>14.84</td>
<td>0.82***</td>
</tr>
<tr>
<td>Participated in school sports</td>
<td>1.37***</td>
<td>13.50</td>
<td>0.64***</td>
</tr>
<tr>
<td>Attended study groups</td>
<td>1.09***</td>
<td>13.41</td>
<td>0.51***</td>
</tr>
<tr>
<td>Volunteer: any community service</td>
<td>0.60***</td>
<td>7.20</td>
<td>0.28***</td>
</tr>
</tbody>
</table>

**Goodness of fit statistics for CFA**

- Df = 9
- χ² = 118.24
- RMSEA = 0.04
- CFI = 0.93

- Df = 9
- χ² = 36.35
- RMSEA = 0.02
- CFI = 0.98

*** p < .001
A confirmatory factor analysis is not completed by fit indices alone. In addition to evaluating the model fit as a whole, it is also important to look at the individual factor loadings to determine how well each factor indicator describes the latent factor. This may be accomplished by evaluating both the unstandardized and standardized estimates of factor loading. Each unstandardized estimate represents the amount of change in the outcome variable or factor (Conative) as a function of a single unit change in each of the observed variables (or factor indicators). It is assumed that the latent variables, in addition to some measurement error, are responsible for the scores of the six observed variables. In terms of the Conative construct, for each single unit change in the 2004 Conative latent factor, attendance of fine arts activities increased by 1.02 units. Additionally, the ratio of unstandardized estimate to standard error may be evaluated as a Z statistic, so values that exceed +1.96 or fall below -1.96 are significant below p=.05. Both the 2004 and 2006 Conative constructs had factor loadings greater than +1.96, so each factor loading was found to be statistically significant at the p < .001 level. This indicates that each observed indicator variable was an important component of the latent construct.

Standardized estimates are used to evaluate different measures that have different scales. In the case of the Conative construct, the first five indicators had the same measuring scale. However the last indicator (community service activity) was measured by a different scale. Standardized coefficients allow the researcher to compare the relative strength of associations across observed variables measured on different scales.

The standardized coefficients presented in Table 4.7 are standardized based on latent and observed variables’ variances. These coefficients represent the amount of
change in the Conative construct per standard deviation unit of each factor indicator. In
the Conative construct, the standardized factor loadings indicated that a students’
participation in school clubs best represented the Conative construct with values of 0.78
and 0.82 for 2004 and 2006 respectively. The students’ participation in community
service and volunteer activities least adequately described the Conative construct with
values of 0.23 and 0.28 respectively. These were the weakest of the observed indicator
variables for describing the Conative construct.

Finally, $R^2$ values are used to indicate the proportion of variability in the observed
variable that can be accounted for by the underlying factor. $R^2$ is the standardized factor
loading value squared. In this model, conation accounted for over 60% of the total
variance in participation in school clubs (61% in 2004 and 67% in 2006). However,
conation accounted for only 8% of the total variance in volunteerism and community
service in both 2004 and 2006. If this evaluation were designed as an exploratory, rather
than confirmatory factor analysis, it would be the choice of the researcher to eliminate the
volunteerism/community service observed variable from the construct in an effort to
improve the measures of model fit. However, as this analysis was designed as a
confirmatory process, the variable was be left as-is and the remainder of the model was
evaluated.

Model modification indices did not indicate any recommended changes to
improve model fit. However, after evaluating the factor loadings the community service
factor was found to display a very weak loading. An analysis of the Conative construct
with the weak loading factor removed was performed, and removal of that factor did not
improve overall fit. Removal of the weak loading community service indicator in the

2004 Conative construct maintained a chi-square value of 118, a CFI of 0.93, and RMSEA actually increased to 0.06, which indicated a worsening fit with the removal of that weak indicator. For the remainder of this study, the weak indicator was left in place.

Results for the CFA of the Affective construct are presented in Table 4.7. The 2004 Affective latent construct provided a chi-square test of model fit of 103.17, with 9 degrees of freedom. Like the Conative construct, this was significant with a p-value of 0.00, which would not be considered desirable. The 2004 data provided a RMSEA value of 0.04, which did suggest an excellent fit of the factor model to the observed data. The 2004 CFI of 0.91 also suggested a good fit. These results indicate that the construct as designed as an indicator for the latent Affective construct works quite well.

Table 4.7

Confirmatory Factor Analysis for Affective Construct

<table>
<thead>
<tr>
<th>Observed Variables (n = 1436)</th>
<th>Unstandardized Factor Loading (β)</th>
<th>β/S.E</th>
<th>Standardized Factor Loading (β)</th>
<th>S.E. (B)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 Affective Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of being community leader</td>
<td>1.00</td>
<td>--</td>
<td>0.78***</td>
<td>0.03</td>
<td>0.60</td>
</tr>
<tr>
<td>Importance of being financially well-off</td>
<td>0.46***</td>
<td>9.68</td>
<td>0.36***</td>
<td>0.03</td>
<td>0.13</td>
</tr>
<tr>
<td>Importance of influencing political structure</td>
<td>0.89***</td>
<td>11.99</td>
<td>0.69***</td>
<td>0.04</td>
<td>0.48</td>
</tr>
<tr>
<td>Importance of leisure time</td>
<td>0.48***</td>
<td>9.46</td>
<td>0.37***</td>
<td>0.03</td>
<td>0.14</td>
</tr>
<tr>
<td>Importance of steady work</td>
<td>0.58***</td>
<td>10.95</td>
<td>0.45***</td>
<td>0.02</td>
<td>0.20</td>
</tr>
<tr>
<td>Highest degree ever expected</td>
<td>0.20***</td>
<td>6.13</td>
<td>0.16***</td>
<td>0.2</td>
<td>0.02</td>
</tr>
<tr>
<td>Goodness of fit statistics for CFA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Df</td>
<td>9</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>χ²</td>
<td>103.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFI</td>
<td>0.91</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

(continued)
Table 4.7 Confirmatory Factor Analysis for Affective Construct (continued)

<table>
<thead>
<tr>
<th>Observed Variables</th>
<th>Unstandardized Factor Loading ($\beta$)</th>
<th>$\beta$/S.E</th>
<th>Standardized Factor Loading (B)</th>
<th>S.E. (B)</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 Affective Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of being community leader</td>
<td>1.00</td>
<td>--</td>
<td>0.73***</td>
<td>0.03</td>
<td>0.54</td>
</tr>
<tr>
<td>Importance of being financially well-off</td>
<td>0.65***</td>
<td>15.48</td>
<td>0.48***</td>
<td>0.03</td>
<td>0.23</td>
</tr>
<tr>
<td>Importance of influencing political structure</td>
<td>1.01***</td>
<td>19.90</td>
<td>0.74***</td>
<td>0.03</td>
<td>0.55</td>
</tr>
<tr>
<td>Importance of leisure time</td>
<td>0.79***</td>
<td>16.87</td>
<td>0.58***</td>
<td>0.03</td>
<td>0.34</td>
</tr>
<tr>
<td>Importance of steady work</td>
<td>0.78***</td>
<td>16.68</td>
<td>0.57***</td>
<td>0.03</td>
<td>0.33</td>
</tr>
<tr>
<td>Highest degree ever expected</td>
<td>0.16***</td>
<td>4.52</td>
<td>0.12***</td>
<td>0.03</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Goodness of fit statistics for CFA

<table>
<thead>
<tr>
<th>Df</th>
<th>$\chi^2$</th>
<th>RMSEA</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>150.41</td>
<td>0.05</td>
<td>0.92</td>
</tr>
</tbody>
</table>

* $p < .001$

The Affective construct applied to the 2006 data provided a chi-square of 150.41 with 9 degrees of freedom, still significant at a $p$-value of 0.00. This chi-square value alone would not suggest a good fit between the data and the model, however the RMSEA value of 0.05 and CFI value of 0.92 did suggest a reasonably good fit for the model. As previously mentioned, in addition to fit indices, factor loadings must also be evaluated to ascertain the strength of each indicator variable as they comprise the latent construct.

The unstandardized factor loadings indicated that the most influential factor within the Affective construct was the 2006 importance of influencing political structure, followed by the 2004 impact of the same variable with unstandardized values of 1.01 and 0.89 respectively. Both the 2004 and 2006 Affective constructs had factor loadings
greater than +1.96, so each factor loading was statistically significant at the p < .001 level. These results suggest that each indicator variable uniquely represents an aspect of the latent construct.

The standardized coefficients presented in Table 4.7 represent the amount of change in the Affective construct per standard deviation unit of each factor indicator. The standardized factor loadings indicated that the importance of being a community leader best represented the Affective construct with values of 0.78 and 0.73 for 2004 and 2006 respectively. These were closely followed by the importance of influencing political structure with values of 0.69 and 0.74 for 2004 and 2006. The students’ highest degree ever expected least adequately described the Affective construct with values of 0.16 and 0.12 for 2004 and 2006 respectively. $R^2$ values indicated that, in this model, affect accounted for the most variance in the importance of being a community leader in 2004 (60% of the variance was accounted for by this variable). Affect accounted for only 1% and 2% of the total variance in the highest degree ever expected in 2004 and 2006 respectively.

The final latent variable evaluated in this confirmatory factor analysis was the largest, with the Persistence construct being represented by a total of nine observed variables. Results for the CFA of the Persistence construct are presented in Table 4.8. The Persistence latent construct provided a chi-square test of model fit of 519.99, with 27 degrees of freedom. This value was significant with a p-value of 0.00, which was not desirable. The RMSEA value of 0.05 was within the acceptable range and did suggest a reasonable fit of the factor model to the observed data. The CFI of 0.77 also suggested a reasonable fit, although not as good as the Conative and Affective constructs.
Table 4.8

Confirmatory Factor Analysis for Persistence Construct

<table>
<thead>
<tr>
<th>Observed Variables</th>
<th>Unstandardized Factor Loading (β)</th>
<th>β/S.E</th>
<th>Standardized Factor Loading (B)</th>
<th>S.E. (B)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004 Persistence Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason enrolled: complete associate’s degree</td>
<td>1.00</td>
<td>--</td>
<td>0.52***</td>
<td>0.02</td>
<td>0.27</td>
</tr>
<tr>
<td>Reason enrolled: complete certificate</td>
<td>1.30***</td>
<td>20.16</td>
<td>0.68***</td>
<td>0.02</td>
<td>0.46</td>
</tr>
<tr>
<td>Reason enrolled: job skills</td>
<td>1.00***</td>
<td>18.72</td>
<td>0.52***</td>
<td>0.02</td>
<td>0.27</td>
</tr>
<tr>
<td>Reason enrolled: personal interest</td>
<td>0.54***</td>
<td>11.59</td>
<td>0.29***</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>Reason enrolled: transfer to 2-year college</td>
<td>1.34***</td>
<td>18.63</td>
<td>0.70***</td>
<td>0.03</td>
<td>0.49</td>
</tr>
<tr>
<td>Reason enrolled: transfer to 4-year college</td>
<td>0.43***</td>
<td>8.70</td>
<td>0.23***</td>
<td>0.03</td>
<td>0.51</td>
</tr>
<tr>
<td>Reason enrolled: transfer to another college</td>
<td>1.26***</td>
<td>19.68</td>
<td>0.66***</td>
<td>0.03</td>
<td>0.43</td>
</tr>
<tr>
<td>Persistence and attainment anywhere 2005-2006</td>
<td>-0.04</td>
<td>-0.99</td>
<td>-0.02</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Reason left 2006: finished desired classes</td>
<td>0.30</td>
<td>1.85</td>
<td>0.16</td>
<td>0.08</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Goodness of fit statistics for CFA

\begin{align*}
\text{Df} & = 27 \\
\chi^2 & = 519.99 \\
\text{RMSEA} & = 0.05 \\
\text{CFI} & = 0.77
\end{align*}

*** p < .001

The unstandardized factor loadings indicate that the most influential factor within the Persistence construct was the reason enrolled being to transfer to a 2-year college (1.34), followed by the reason enrolled being completion of a certificate. All but two of the factor loadings were significant at the p < .001 level. The two factor loadings that were not significant were persistence and attainment anywhere (-0.99), and reason for leaving being finished desired classes (1.85).
The standardized coefficients presented in Table 4.9 represent the amount of change in Persistence per standard deviation unit of each factor indicator. The standardized factor loadings indicate that the reasons for enrolling being transfer to a two-year college (0.70), transfer to another college (0.66), and completion of a certificate (0.68) best described the Persistence construct. The students’ persistence and attainment anywhere least adequately described the Persistence construct with a value of 0.16. \( R^2 \) values indicate that in this model Persistence accounted for the most variance in the reason for enrolling being transfer to a four-year college variable (51% of the variance was accounted for by this variable). Persistence accounted for a negligible amount of total variance in the persistence and attainment anywhere indicator variable and 2% of the variance in the reason for leaving being completion of desired classes indicator variable.

The Persistence variable exhibited the poorest fit of the latent variables evaluated, but the RMSEA value still indicated a reasonable fit within the bounds of confidence previously indicated in this chapter. Because this technique was designed as being confirmatory in nature, and there was no obvious theoretical reason to modify the constructs, the latent variables were evaluated as part of the structural equation model as they were. As such, the model evaluation process continued with an analysis of factorial invariance across time.

**Factorial Invariance Across Time**

Investigating behavior across time is predicated on satisfying a key assumption: For each construct of interest, the researcher must be assured that they are measuring the same thing in the same metric at each occasion. This would be accomplished by testing
the invariance of the measurement parameters across two time points. Such a
measurement serves to evaluate whether the nature of the constructs assessed by the
instrument changes with age, or across time points. If this is found to be so, an
instrument may require alteration to ensure that the same underlying constructs are still
being assessed (Widaman, Ferrer & Conger, 2010).

Factorial invariance tests involve the statistical comparison of model fit for a full
model with the parameters freely estimated in each group, and a nested (or reduced)
model where parameters are constrained to be equivalent across groups. The
measurement parameters to be tested include factor loadings, and intercepts (or
thresholds in the case of categorical data) of the factor indicators (Muthen & Muthen,
2010). A sequence of tests begins with no equivalency constraints, and in a series of
subsequent tests constraints are applied to the loadings and intercepts or thresholds. A
comparison of the constrained model with the less constrained model before it
(Bontempo & Hofer, 2007) determines whether there are variations across time. The data
used in this study involved categorical variables, so the terminology from this point on
will refer to thresholds rather than intercepts. The term intercepts would be used for
continuous variables.

The purpose of this portion of the study was to examine the measurement
invariance (including configural, metric, scalar, and residual invariances) and structural
invariance as represented by factor variance. The extent to which the factor model that
was designed to measure the Conative construct exhibited measurement invariance and
structural invariance between 2004 and 2006 was examined using Mplus. The WLSMV
estimator, including the Theta parameterization specified in Mplus was used to estimate
all of the models. Nested model comparisons were conducted using the DIFFTEST procedure. The first model to be tested is a configural invariance model. The configural invariance model was initially specified in which the latent Conative construct was estimated simultaneously at the 2004 and 2006 time points. This was performed as a multi-group analysis with the 2004 data comprising one group, and the 2006 iteration comprising the second group. In testing for configural invariance, the goal was to focus on the extent to which the number of factors and pattern of their structure were similar across the 2004 and 2006 iterations of data. The factor variance was fixed to 1 and the factor mean was fixed to 0 in each group for identification, such that all item factor loadings and thresholds were then freely estimated. The residual variances were not uniquely identified in the configural invariance model, and were constrained to 1 in both groups.

The configural invariance test was evaluated by goodness-of-fit statistics. The chi-square value was 237.92 with 18 degrees of freedom. The RMSEA value of 0.04 and CFI value of 0.99 indicate the hypothesized multi-group model of the Conative construct was found to have an excellent fit across the data collection period of 2004 to 2006.

Having established goodness-of-fit for the configural model the next step was to test for the invariance of factorial measurement and structure across both of the time points (Byrne, 2010).

In testing for configural invariance, the focus was on the extent to which the number of factors and pattern of their structure were similar across the 2004 and 2006 data collection cycles. Following the configural invariance test, testing for factorial invariance focused more specifically on the extent to which parameters in the
measurement and structural components of the model were equivalent across the two
time points. This is accomplished by introducing equality constraints on particular
parameters (i.e., the parameters were constrained equal across the 2004 and 2006 groups)
(Byrne, 2010).

This evaluation was intended to assess whether relations between latent variables
and their indicators were invariant across time. The primary test for the invariance of the
factor loadings relies on the results of chi-square difference tests. These chi-square
difference tests provide successive fit information for each model. These test statistic
values and their respective degrees of freedom are framed as a null hypothesis of no
significant difference between nested structural models. For each test in which the null
hypothesis is upheld, the more constrained model may be accepted (Anderson & Gerbing,
1988).

The chi-square difference tests in Mplus using the WLSMV estimator was
performed with the DIFFTEST procedure as specified in the Mplus manual to compare
successively constrained models. If the p-value for the DIFFTEST results were less
than .001, it would mean that the more restrictive model significantly worsened the fit of
the model. If the p-value was greater than .001, it would mean that the more restrictive
form did not significantly worsen the fit of the model (Muthen & Muthen, 2010). If the
fit of the more restrictive model was not significantly worse, the model could be said to
display measurement invariance. That is to say, the items relate to the latent factor
equivalently across the time points.

The next step in an analysis of measurement invariance involved a test of metric
invariance in which the loadings were constrained to be equal across time points. If an
indicator variable had equal loading for both time points, than it could be said that variable showed the same amount of increase on the latent construct in both 2004 and 2006 (Burns, Walsh, Gomez & Hafetz, 2006). The factor variance was fixed to 1 in 2004 for identification but was freely estimated in 2006; the factor mean was fixed to 0 at both time points for identification. All factor loadings were constrained equal across time points, all item thresholds were estimated, and all residual variances were constrained to 1 across time points. The metric invariance model fit significantly worse than the configural invariance model. The chi-square DIFFTEST value of 89.78 was significant at the p < .001 level. This result indicated that metric invariance did not hold across time points. In other words, the items did not relate to the latent factor equivalently across time points. With an unstandardized variance of 13.80 for the Conative construct in 2006, the data indicated that in 2006 there was more variability in the latent factor. Because metric invariance was not obtained, the results for scalar, residual, and structural invariance are not reported. The results for the configural invariance and metric invariance analyses for the Conative construct are presented in Table 4.9.

Table 4.9

<table>
<thead>
<tr>
<th>Model</th>
<th>(\chi^2) of model fit</th>
<th>Model df</th>
<th>(\chi^2) DIFFTEST value</th>
<th>DIFF df</th>
<th>P-value</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configural Model</td>
<td>237.92</td>
<td>18</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.99</td>
<td>0.04</td>
</tr>
<tr>
<td>Metric Model (factor loadings constrained)</td>
<td>320.77</td>
<td>23</td>
<td>89.78</td>
<td>5</td>
<td>0.000***</td>
<td>0.99</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*** p < .001, \(\chi^2\) DIFFTEST value obtained from Mplus WLSMV chi-square difference testing, using THETA parameterization.
The Affective construct was tested for measurement and structural invariance in the same way as described for the Conative construct. The configural invariance test of the Affective construct as evaluated by goodness-of-fit statistics provided a resultant chi-square value of 1333.81 with 20 degrees of freedom. This chi-square coupled with a RMSEA value of 0.10 and CFI value of 0.54 indicated that the hypothesized model of the Affective construct was not similar across the data collection period of 2004 to 2006. The extremely high RMSEA and low CFI values along with the significant chi-square value indicated that this model did not display configural invariance. Due to the poor fit of the configural invariance model, the output for the rest of the tests for Metric, Scalar, Residual, and Structural invariance are not reported in this paper. Since configural invariance was not found, it is logical to terminate the analysis and eliminate further testing of the construct. The output for the configural invariance test for the Affective construct is shown in Table 4.10.

Table 4.10

<table>
<thead>
<tr>
<th>Model</th>
<th>( \chi^2 ) of model fit</th>
<th>Model df</th>
<th>( \chi^2 ) DIFFTEST value</th>
<th>DIFF Df</th>
<th>P-value</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configural Model</td>
<td>1333.81</td>
<td>20</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.54</td>
<td>0.10</td>
</tr>
</tbody>
</table>

**Note:** \( \chi^2 \) DIFFTEST value obtained from Mplus WLSMV chi-square difference testing, using THETA parameterization.

**Structural Model**

In typical two-stage SEM analysis, the fit of the observed variables as measurements of the latent construct should be tested first. This was completed in the Confirmatory Factor Analysis phase of this study, and the latent constructs were found to be well indicated by the measured variables. Once this was completed, the structural
model was evaluated. Results of the SEM analysis of the structure model follow. In an effort to sensibly evaluate the model, it was assembled in a stepwise manner, beginning with a simple subset of the model, and successively adding constructs and mediators with model fit being evaluated after each addition.

The first step of the process evaluated the effect of the latent Conative and Affective constructs on the Cognitive (GPA) variable. This was accomplished in Mplus by defining the Conative and Affective constructs by their indicator variables and estimating their effect on the Cognitive (GPA) variable using the 2004 dataset. As in all other phases of this study, sample weights were included in the model specification. This portion of the model is shown in Figure 4.1 with standardized factor loadings. This model produced a chi-square value of 402.89 with 63 degrees of freedom. The CFI of 0.86 was slightly below the recommended cutoff of 0.90, however the RMSEA of 0.03 indicated a good fit for this portion of the model to the 2004 data.

Figure 4.1: Analysis of Structural Model Step 1

Step 2 further expanded the model. The employment and faculty contact variables were added to the model, although they were not yet mediators, because the Persistence construct was not present. This model produced a chi-square value of 912.35
with 84 degrees of freedom. The CFI of 0.83 and RMSEA of 0.04 both indicated a continued good fit of the model to the data.

The Step 2 model is shown in Figure 4.2. Significant factor loadings are indicated in the figure. The only factor loading not significant at the $p < .05$ level was the loading of the employment variable on the cognitive variable. Significant at the $p < .05$ level were the loadings of the cognitive to Conative construct (-0.11), the path of the Affective construct to the employment variable (0.05), and the cognitive to faculty contact path (0.10). All other loadings were significant at the higher stringency of the $p < .001$ level. Although loadings were found to be significant in this model, one must remember this is but a step in the building of the complete model, and interpretation should be withheld until the model is complete.

![Figure 4.2: Analysis of Structural Model Step 2](image)

Step 3 involved the addition of the Persistence construct to the model with the direct effects of the Conative and Affective constructs and the cognitive variable upon the Persistence construct, without the effects of the mediator variables. This model produced a chi-square of 2828.88 with 205 degrees of freedom. The CFI of 0.99 and RMSEA of
0.04 continue to indicate a very good fit of the model to the data. The model for Step three may be found in Figure 4.3.

Figure 4.3: Analysis of Structural Model Step 3

In the Step 3 model, the effect of the Conative construct on Persistence construct was found to be significant at the $p < .05$ level with a standardized loading of 0.02. The Affective construct also displayed a significant effect on persistence, at the more stringent $p < .001$ level with a standardized loading of 0.03. The effect of the cognitive variable on the Persistence construct was also significant at the $p < .001$ level with a standardized loading of 0.94.

The final model, Step 4 incorporated the direct and indirect effects of the cognitive variable and the Conative and Affective constructs on the Persistence construct as they were mediated by the faculty contact, employment and employment variables. Factor loadings for the latent constructs, standard errors and $R^2$ values for the Step 4 structural model indicated in Figure 4.3 are provided in Table 4.11. This full model
provided a chi-square of 3307.15 with 262 degrees of freedom. The CFI of 0.99 and RMSEA of 0.04 indicated an excellent fit of this model to the 2004 BPS data.

The direct effects on the persistence construct of the cognitive variable and the Affective construct were highly significant. All of the direct effects for the Step 4 model are presented in Table 4.12. The effect of the cognitive variable on the Persistence construct was significant at $p < .001$ with a standardized loading of 0.94. The direct effect of the Affective construct on the Persistence construct was also significant at $p < .001$ with a standardized loading of 0.03. The direct effect of the Conative construct on the Persistence construct was significant at a higher P-value, with a standardized loading of 0.03, $p < .05$. The indirect effects, presented in Table 4.13, were not found to be significant.

Figure 4.3: Analysis of Structural Model Step 4

The direct effects on the persistence construct of the cognitive variable and the Affective construct were highly significant. All of the direct effects for the Step 4 model are presented in Table 4.12. The effect of the cognitive variable on the Persistence construct was significant at $p < .001$ with a standardized loading of 0.94. The direct effect of the Affective construct on the Persistence construct was also significant at $p < .001$ with a standardized loading of 0.03. The direct effect of the Conative construct on the Persistence construct was significant at a higher P-value, with a standardized loading of 0.03, $p < .05$. The indirect effects, presented in Table 4.13, were not found to be significant.
Table 4.11

Structural Model Analysis Step 4 Model

<table>
<thead>
<tr>
<th>Construct Observed Variable</th>
<th>Unstandardized Factor Loading ($\beta$)</th>
<th>$\beta$/S.E</th>
<th>Standardized Factor Loading (B)</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conative Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Met with academic advisor</td>
<td>1.00</td>
<td>--</td>
<td>0.64***</td>
<td>0.40</td>
</tr>
<tr>
<td>Attended fine arts activities</td>
<td>0.78***</td>
<td>15.18</td>
<td>0.50***</td>
<td>0.25</td>
</tr>
<tr>
<td>Participated in school clubs</td>
<td>1.10***</td>
<td>15.23</td>
<td>0.70***</td>
<td>0.50</td>
</tr>
<tr>
<td>Participated in school sports</td>
<td>0.86***</td>
<td>15.23</td>
<td>0.54***</td>
<td>0.30</td>
</tr>
<tr>
<td>Attended study groups</td>
<td>0.89***</td>
<td>21.46</td>
<td>0.71***</td>
<td>0.31</td>
</tr>
<tr>
<td>Volunteer: any community service</td>
<td>0.39***</td>
<td>8.68</td>
<td>0.25***</td>
<td>0.06</td>
</tr>
<tr>
<td><strong>Affective Construct</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of being community leader</td>
<td>1.00</td>
<td>--</td>
<td>0.72***</td>
<td>0.52</td>
</tr>
<tr>
<td>Importance of being financially well-off</td>
<td>0.54***</td>
<td>10.39</td>
<td>0.39***</td>
<td>0.15</td>
</tr>
<tr>
<td>Importance of influencing political structure</td>
<td>0.99***</td>
<td>10.67</td>
<td>0.71***</td>
<td>0.51</td>
</tr>
<tr>
<td>Importance of leisure time</td>
<td>0.46***</td>
<td>8.64</td>
<td>0.33***</td>
<td>0.11</td>
</tr>
<tr>
<td>Importance of steady work</td>
<td>0.60***</td>
<td>10.45</td>
<td>0.43***</td>
<td>0.19</td>
</tr>
<tr>
<td>Highest degree ever expected</td>
<td>0.31***</td>
<td>7.29</td>
<td>0.22***</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Persistence Construct</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason enrolled: complete associate’s degree</td>
<td>1.00</td>
<td>--</td>
<td>0.97***</td>
<td>0.93</td>
</tr>
<tr>
<td>Reason enrolled: complete certificate</td>
<td>0.98***</td>
<td>270.14</td>
<td>0.98***</td>
<td>0.96</td>
</tr>
<tr>
<td>Reason enrolled: job skills</td>
<td>0.98***</td>
<td>332.13</td>
<td>0.96***</td>
<td>0.93</td>
</tr>
<tr>
<td>Reason enrolled: personal interest</td>
<td>0.94***</td>
<td>366.61</td>
<td>0.95***</td>
<td>0.90</td>
</tr>
<tr>
<td>Reason enrolled: transfer to 2-year college</td>
<td>0.94***</td>
<td>278.32</td>
<td>0.99***</td>
<td>0.98</td>
</tr>
<tr>
<td>Reason enrolled: transfer to 4-year college</td>
<td>0.90***</td>
<td>362.60</td>
<td>0.95***</td>
<td>0.90</td>
</tr>
<tr>
<td>Reason enrolled: transfer to another college</td>
<td>0.95***</td>
<td>279.76</td>
<td>0.99***</td>
<td>0.97</td>
</tr>
<tr>
<td>Persistence and attainment anywhere 2005-2006</td>
<td>-0.10***</td>
<td>-4.04</td>
<td>-0.16***</td>
<td>0.03</td>
</tr>
<tr>
<td>Reason left 2006: finished desired classes</td>
<td>0.16**</td>
<td>3.27</td>
<td>0.26**</td>
<td>0.07</td>
</tr>
</tbody>
</table>

*** p < .001, ** p < .05

(n = 1436)
Table 4.12

Structural Model Direct Effects Step 4 Model

<table>
<thead>
<tr>
<th>Effects:</th>
<th>Unstandardized Factor Loading (β)</th>
<th>β/S.E</th>
<th>P-Value</th>
<th>Standardized Factor Loading (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conative on:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty contact (FREQ04B)</td>
<td>0.56***</td>
<td>20.71</td>
<td>0.00</td>
<td>0.55***</td>
</tr>
<tr>
<td>Financial Aid (PELL04)</td>
<td>0.12***</td>
<td>7.32</td>
<td>0.00</td>
<td>0.13***</td>
</tr>
<tr>
<td>Employment (JOBHOUR2)</td>
<td>-4.11***</td>
<td>-6.83</td>
<td>0.00</td>
<td>-0.16***</td>
</tr>
<tr>
<td>Persistence</td>
<td>0.08***</td>
<td>1.96</td>
<td>0.05</td>
<td>0.03***</td>
</tr>
<tr>
<td><strong>Affective on:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty contact (FREQ04B)</td>
<td>0.14***</td>
<td>6.48</td>
<td>0.00</td>
<td>0.17***</td>
</tr>
<tr>
<td>Financial Aid (PELL04)</td>
<td>0.04**</td>
<td>2.20</td>
<td>0.02</td>
<td>0.04**</td>
</tr>
<tr>
<td>Employment (JOBHOUR2)</td>
<td>1.10**</td>
<td>2.02</td>
<td>0.04</td>
<td>0.05**</td>
</tr>
<tr>
<td>Persistence</td>
<td>0.07***</td>
<td>4.55</td>
<td>0.00</td>
<td>0.03***</td>
</tr>
<tr>
<td><strong>Cognitive on:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty contact (FREQ04B)</td>
<td>0.00</td>
<td>1.87</td>
<td>0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>Financial Aid (PELL04)</td>
<td>0.00**</td>
<td>-3.23</td>
<td>0.001</td>
<td>-0.05**</td>
</tr>
<tr>
<td>Employment (JOBHOUR2)</td>
<td>0.01</td>
<td>1.44</td>
<td>0.15</td>
<td>0.03</td>
</tr>
<tr>
<td>Persistence</td>
<td>0.02***</td>
<td>4.15</td>
<td>0.00</td>
<td>0.94***</td>
</tr>
<tr>
<td>Faculty contact (FREQ04B) on Persistence</td>
<td>-0.04</td>
<td>-1.14</td>
<td>0.25</td>
<td>-0.01</td>
</tr>
<tr>
<td>Financial Aid (PELL04) on Persistence</td>
<td>0.02</td>
<td>1.95</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Employment (JOBHOUR2) on Persistence</td>
<td>0.001</td>
<td>0.95</td>
<td>0.34</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*** p < .001, ** p < .05 (n = 1436)
### Table 4.13
Structural Model Total and Total Indirect Effects Step 4 Model

<table>
<thead>
<tr>
<th>Effects from:</th>
<th>Unstandardized Factor Loading ($\beta$)</th>
<th>$\beta$/S.E</th>
<th>P-Value</th>
<th>Standardized Factor Loading (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conative to Persistence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effects</td>
<td>0.06**</td>
<td>2.55</td>
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*** p < .001, ** p < .05
(n = 1436)

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**Summary**

In order to create policies and programs that support student success and enable students to meet their educational goals, it is important for community colleges to understand the issues that both foster and impede student persistence, and to understand
whether or not students are persisting to their goals. The majority of persistence research
to date has focused on traditionally-aged students attending four-year institutions.
Although researchers and policy-makers have attempted to generalize these results to
include all college students, this practice has led to an incomplete understanding of
persistence at two-year colleges. The open enrollment policy found at community
colleges provides the opportunity for many non-traditional students to attend. As
institutions cannot control outside factors commonly influencing the non-traditional
student, such as working hours or family responsibilities, insight into the influence of
such factors would allow administrators and policy-makers to better serve their students.
Many of the variables researched in past persistence studies do not contribute to any
intervention strategies to increase community college student retention.

The roles both situational variables and dispositional variables play in producing
behavior has been widely accepted. Factors that have been associated with persistence in
community college settings include both environmental variables (e.g., faculty-student
interaction and student services) and psychosocial variables (e.g., goals and self-efficacy).
If that is the case, which variables should community colleges target in order to solve the
problem of low retention rates among their students? Different students with similar
demographic backgrounds (i.e., low SES, minority, and low parent educational
attainment) and the same responsibilities (i.e., work, family, and finance) may differ in
their outcomes of college education. Some may decide to stay in college, while the others
may decide not to. The conceptual model proposed in this paper was derived from a
thorough review of existing research. It was the intent of this study to utilize national
level data to operationalize and test the major constructs of the proposed model.

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The purpose of this study was to determine how the behavioral characteristics associated with motivation influence the persistence of community college students toward their goals. A series of statistical analyses were conducted to examine the structural relationships among three constructs: (1) the behavioral variables associated with student motivation, (2) three intervening variables, (3) student persistence toward goals. Behavioral characteristics were examined to determine their direct and indirect effects on community college students’ persistence toward goals and the direct and indirect effects of intervening variables on persistence to goals. The intent of this study was to provide generalizable results regarding student persistence that could offer a more thorough understanding of the unique nature of community college students. By considering how motivational factors influence student persistence, administrators and policy-makers might better consider how resources may best be used to foster student success among a major population of college students.

The model proposed in this paper uniquely integrated the latent constructs of student conation, cognitive abilities, and affect with student persistence. Additionally, this model included the effects of faculty contact, financial aid, and the number of hours a student worked in the evaluation of the influences on community college student persistence. The model evaluation process included a confirmatory factor analysis to ensure that the latent constructs were adequately described by their indicator variables, an analysis of factorial invariance to ensure that the latent constructs were consistent over time, and finally a structural equation analysis of the full model to ascertain how well the model fit data collected in the BPS: 04/06 surveys.
The latent constructs were found to be adequately described by their indicator variables in the confirmatory factor analysis, with model fit indicators within accepted ranges. The factorial invariance was able to confirm configural invariance for the Conative construct, but not for the Affective construct. These analyses showed that partial measurement invariance was obtained across time points for the Conative construct. However, the frequency of participation in fine arts activities, school clubs, and school sports were lower in 2006 than in 2004 at the same level of Conative ability. These analyses also showed that structural invariance was obtained indicating that there was not significant factor variance across time points. Finally, a step-wise progression of structural equation analysis found the model to fit the data quite well. Overall, this model fits the BPS: 04/06 data quite well and describes some influences on community college student persistence. The implications of this are considered more fully in the final chapter.
CHAPTER FIVE

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS FOR FUTURE RESEARCH

Introduction

Over 11 million students are enrolled in community colleges across the United States. Like all students, they bring with them their background, their financial obligations, their outside influences, and their preconceived ideas. Unlike their traditional four-year counterparts, community college students are more likely to be older, have dependent children, be financially independent, work full-time, and be attending school part-time. As community college students initiate and proceed through their educational experience, they process and reevaluate their educational goals. This process of persistence toward their goals is impacted by sociocognitive variables such as beliefs in self-efficacy, self-regulatory abilities, and capacity for self-motivation. External variables such as academic and social integration, faculty accessibility and feedback, and pull from family and work have been shown in previous research to be strong influences on community college student persistence.

One of the most important predictors of student persistence for community college students was thought to be a clear goal for the future. As mentioned earlier, community college students enroll in school for various reasons, and the more concrete those reasons are, the more likely they will endeavor to achieve them. Previous research has indicated that one of the strongest predictors of either academic achievement or
failure is the aspiration for success. This aspiration is represented by the recognition of achievement goals. As students develop achievement goals, those goals act as cognitive representations for what the students are striving for. Studies on goal theory have clearly found that having a goal will increase motivation. Students who have goals are more likely to experience a sense of self-efficacy when attaining those goals, and are more likely to engage in activities that will help them attain those goals.

Two-year colleges serve diverse student bodies that have widely differing needs, experiences, and expectations. As such, it is imperative that research models and methodology carefully consider the impact of the unique characteristics of community college students. Previous research on persistence among community college students had focused on demographic risk factors, such as age, ethnicity, past academic performance, financial status, and registration behaviors. However, recent developments showed that environmental factors such as faculty-student interaction and student services were also associated with student persistence. Previous research has been limited in providing adequate information about the interrelationships between the diverse variables shown to influence student persistence. Much of the research has focused on one part of the problem by examining a few variables at a time so the overall picture of student retention at the community college level has not been clear.

The conceptual model proposed in this paper was derived from a thorough review of existing research. It was the intent of this study to utilize national level data to operationalize and test the major constructs of the proposed model. This chapter begins with a brief overview of the purpose of this study, a summary of research methods, and the key findings of the study as they pertain to the research questions. A discussion of
the results as they pertain to community college student persistence follows. An overview of limitations concerning this study will be addressed. Finally, this chapter will conclude with suggestions for future research, recommendations for community college policy-makers and administrators, and implications for community college student persistence.

**Purpose of the Study**

Surprisingly, there is little integration of the educational and motivational literatures when looking at college outcomes. This lack of integration limits a full understanding of the relative predictive validity across academic performance, psychosocial behavior, and mediating variables highlighted in educational persistence and motivational models focusing on community college students. The purpose of this study was to determine how behavioral characteristics influence the persistence of community college students as they move toward their goals.

A thorough series of statistical analyses were conducted to examine the relationships among the behavioral variables associated with student motivation. Behavioral characteristics were examined to determine their direct and indirect effects on community college students’ persistence toward goals, and the direct and indirect effects of intervening variables on persistence to goals. The intent of this study was to provide insight into community college student persistence. By considering the motivational factors thought to influence student persistence, administrators, and policy-makers might better consider how resources may be used to foster student success. A summary of the research and findings follows and is presented around the six research questions addressed by this research.
Research Summary and Findings

A thorough review of extant research literature identified factors found in motivational and persistence theories, as well as models combining motivation and ability constructs (Bean, 1985; Pintruch, 2004; Robbins, 2004; Schunk 1994; Tinto, 1993). Within the motivational literature, motives such as self-regulation, goals, and expectations (self-efficacy) were constructs associated with attainment and outcome research. Within the persistence literature academic engagement and contextual influences (financial support and outside employment) were frequently researched. The study presented in this paper integrated current theories by combining relevant constructs from motivational and persistence models.

By addressing similarities within the persistence, goal setting, and intrinsic behavior theories a model was proposed linking these theories as they related to community college student persistence. The goal of this study was to determine if the Conative and Affective behavioral constructs and the cognitive variable, as proposed in the model, were statistically significant predictors of student persistence. The six research questions upon which this study was based were: (1) Did the proposed model fit the observed data? (2) In the proposed model, did student behavioral characteristics such as self-efficacy, self-regulation, and cognitive ability directly and/or indirectly affect student persistence? (3) In the proposed model, did the availability of financial aid mediate students’ behavior as they persisted toward their goals? (4) In the proposed model, did faculty contact mediate students’ behavior as they persisted toward their goals? (5) In the proposed model, did outside employment mediate students’ behavior as they persisted toward their goals?
It was hypothesized in this study that the examination of the interrelationships between the behavioral variables which exist in real life would provide insight into the factors that influence student persistence. This study was approached with the thought that students’ combined cognitive abilities, self-efficacy, and self-regulatory capacities would allow them to overcome external pull factors that have been shown to impede student persistence. It was thought that students who have higher levels of cognitive abilities, self-efficacy, and self-regulation persist even though they may not feel integrated into the institution academically. Additionally, a student faced with the pull of outside employment and/or inadequate financial aid, would rely upon their capacity for self-regulation and their feelings of self-efficacy to enable them to persist toward their goals.

These hypotheses were evaluated using the structural equation modeling technique. SEM models are based on theories that describe and explain the phenomena under investigation. As such, it is imperative that the proposed model be soundly based in theory. The process of structural equation modeling is many-fold, it allows a researcher to explain a phenomenon such as student persistence, describe that phenomenon via a proposed model, and test that theory described in a model against empirical data. The process ultimately provides a degree of fit for the model to the data. The better the degree of fit, the better the model fits the data. However, the researcher must consider that a good measure of fit indicates that the model is only one way to describe the data. At the same time, it is possible that an entirely different model may also describe the data equally as well.
Structural equation modeling techniques offer a distinct advantage in disentangling the process of student learning and cognitive development by simultaneously solving equations within a posited model. The technique is analogous to performing a simultaneous factor analysis and a path analysis, which serves to validate both the structural and measurement components of the model (Cabrera, Nora, & Castaneda, 1993). This integrated process allows for consideration of direct, indirect, and total effects when exploring the relationships among the variables.

The process requires the researcher to think in terms of models. SEM programs require the researcher to provide information about which variables are assumed to affect other variables, and to specify the directionalities of these effects. These specifications reflect the proposed model. In this study, the model described the influences of behavioral variables on student persistence. There was directionality to the process. Students enroll in community college, and engage in studies as they moved toward their goals. As they engaged in their studies the student’s decisions were influenced by their own behavior. The student's self-regulatory, self-efficacy, and cognitive abilities influenced the decisions they made while moving through their education. In this model, the outcome, or persistence to a goal was thought to be influenced by cognition, conation, and affect.

Using data from the Beginning Postsecondary Students Postsecondary Students Longitudinal Study of 2004 and 2006, the proposed persistence model was tested. Testing the model occurred in several phases. The first phase involved evaluating the fit of the measurement model, essentially evaluating how well the latent constructs were described by their measured indicators. The second phase involved testing the stability of
the latent constructs over time. The third phase focused on evaluating the fit of the structural model to the data. It was in this third phase that the specific research questions were addressed.

The first phase of analysis, evaluation of the measurement model or Confirmatory Factor Analysis indicated that the Conative and Affective constructs displayed good fit, with reasonable factor loadings. The measurement variables were found to be good indicators of the Constructs. The Persistence construct was somewhat weaker with less than optimal fit indices and weaker factor loadings. The Persistence variable exhibited the poorest fit of the latent variables evaluated, but the fit indices fell within the bounds of confidence previously indicated. Because this technique was confirmatory in nature, and there was no obvious theoretical reason to modify the constructs, the latent variables were evaluated as part of the structural equation model as they were.

The second phase of the analysis involved an evaluation of factorial invariance across time. The Conative construct was found to exhibit partial measurement invariance across time points. That is, the relationships of the items to the Conative construct were equivalent across time points. However, the frequency of participation in fine arts activities, school clubs, and school sports were found to be lower in 2006 than in 2004 at the same level of Conative ability. These analyses also showed that structural invariance was obtained indicating that there was not significant factor variance across time points for the Conative construct. The Affective construct was tested for measurement and structural invariance in the same way. The results indicated that the construct did not display configural invariance. Due to the poor fit of the configural invariance model the output for the remaining tests of invariance were not reported. Although the Affective
construct was not found to display factorial invariance across time, the third step, evaluation of the structural model was completed. Even though factorial invariance was not found for all of the constructs, it was still a potentially valuable and viable option to test the relationships described in the model. Acknowledging that the factors comprising the latent constructs displayed excessive variance between both time points, the dataset and full model were still expected to still be an important resource to describe the interrelationships between motivational variables, mediating variables, and persistence.

Evaluation of the structural model was undertaken in a stepwise fashion, with the model being built-up, or increasing in complexity with each step. The final, full model was found to be an excellent fit to the data with fit indices well-within the prespecified range. In addition to evaluating the fit of the model as a whole, the factor loadings were evaluated as outlined in the research questions.

*Question One: Do the measured indicators adequately represent the latent constructs?*

The first step to evaluate the fitness of the components involved performing a confirmatory factor analysis. For the Conative construct, the 2004 data provided a RMSEA value of 0.04 and a CFI of 0.93, which indicated a very good fit. The Conative construct applied to the 2006 data provided a RMSEA value of 0.02 and CFI of 0.98. The 2004 Affective latent construct provided a RMSEA value of 0.04 and CFI of 0.91. The Affective construct applied to the 2006 data provided a RMSEA value of 0.05 and CFI value of 0.92 which confirms a good fit for the model. The Persistence latent construct provided RMSEA value of 0.05, which was within the acceptable range and did suggest a reasonable fit of the factor model to the observed data. The CFI of 0.77 was lower than the threshold value. However, with the borderline RMSEA value, the choice
was made to continue the evaluation with the Persistence construct. These results indicate that the constructs as designed as an indicator for the latent Conative and Affective constructs work quite well.

A confirmatory factor analysis is not completed by fit indices alone. In addition to evaluating the model fit as a whole, it is also important to look at the individual factor loadings to determine how well each factor indicator describes the latent factor. Both the 2004 and 2006 Conative constructs had factor loadings greater than +1.96, so each factor loading was found to be statistically significant at the p < .001 level. Both the 2004 and 2006 Affective constructs had factor loadings greater than +1.96, so each factor loading was statistically significant at the p < .001 level. All but two of the factor loadings on the Persistence construct were significant at the p < .001 level. The two factor loadings that were not significant were persistence and attainment anywhere (-0.99), and reason for leaving being finished desired classes (1.85). These results suggest that each indicator variable uniquely represented an aspect of the latent constructs.

The Persistence variable exhibited the poorest fit of the latent variables evaluated. Because this technique was designed as being confirmatory in nature, and there was no obvious theoretical reason to modify the constructs, the latent variables were evaluated as part of the structural equation model as they were originally proposed.

*Question Two: Does the proposed model fit the observed data?*

Both the structural model and measurement models conceptualized in Chapter Three appeared to fit the data from the Beginning Postsecondary Students survey quite well. The structural model, with a chi-square of 3307.15 and 262 degrees of freedom
explained 88% of the variance in the persistence construct. The CFI of 0.99 and RMSEA of 0.04 indicate a very good model fit.

As stated previously, SEM is a simultaneous factor analysis and path analysis. This means that all model parameters are estimated with respect to all other specified parameters in the model. Any changes in the model may produce wholly different results. This structural analysis produces factor loadings, standard errors, and measures of variance related to the constructs and their interactions with one another. For this reason values may differ slightly from those expressed in the measurement model (CFA). Most notable of these changes involves an increase in significance of the student’s reason for leaving and persistence and attainment indicators found in the Persistence construct. The newly significant standardized loadings of 0.26, p < .05 of reason for leaving in 2006, and -0.16, p < .001 represent the most prominent change from the CFA analysis in that the Persistence construct now displays significant loadings of all indicator variables.

The structure of this study as a theoretically-based confirmatory analysis was not intended to incorporate model modification. Although model modification indices were evaluated throughout the model-fitting process, it was deemed neither appropriate nor necessary to incorporate the changes recommended by the Mplus software. The excellent fit of the model to the data as it was proposed indicate a successful model. Although it is not being suggested that the model evaluated in this study is the only solution for evaluating the influences of motivational behavior on community college student persistence, it certainly stands as a valid option.
Question Three: In the proposed model, do student behavioral characteristics such as self-efficacy (Affective construct), self-regulation (Conative construct), and cognitive ability directly and/or indirectly affect student persistence?

Direct effects were found to be significant at the $p < .001$ level between the Conative construct and the faculty contact variable (0.55 standardized), the financial aid variable (0.13 standardized), and the employment variable (-0.16 standardized). In this study, the employment variable was a continuous variable with higher numbers indicating higher weekly working hours. Thus, the negative direct effect suggests that for a given level of conative behavior, students who work more hours exhibit less frequency of such behaviors as meeting advisors, participating in school clubs, sports, and study groups. This would not be an unexpected result, as students who work more hours have less time to meet academic advisors or participate in extracurricular activities.

Direct effects of the Affective construct were less significant with only the effect of Affective behavior on the faculty construct being significant at the $p < .001$ level (.017 standardized). The financial aid variable (.04 standardized) and employment variable (.05 standardized) were significant at the $p < .05$ level. Like the Conative construct, the largest effect for the Affective construct was the importance of affective behavior in initiating faculty contact.

The cognitive variable displayed the least significant direct effects on the mediator variables. The path between GPA and amount of Pell funds received was significant at the $p < .05$ level with a standardized loading of -0.5. The negative value indicates that students with lower GPA received higher Pell funds. The path between GPA and faculty contact was not significant with a standardized loading of .03, but was
interesting to note. This result would indicate that students with higher cognitive levels (a higher grade point average) would be more likely to seek faculty contact.

The direct effects of the Conative and Affective constructs and the cognitive variable on the Persistence construct were much stronger with the cognitive variable indicating the strongest influence with a standardized loading of 0.94, p < .001. The Conative construct (standardized loading 0.03, p < .05) and the Affective construct (standardized loading 0.03, p < .001) indicate conative and affective behaviors were significant influences on Persistence.

*Question Four: In the proposed model, does the availability of financial aid mediate students’ behavior as they persist toward their goals?*

The paths from the Conative and Affective constructs to the Persistence construct via the financial aid variable were not significant. The effect of cognition on the Persistence construct was also not significant. Interestingly, a significant direct effect was found on the cognitive variable by the financial aid variable. This effect was significant at the p < .001 level with a standardized loading of -0.12. The inverse effect of the negative loading indicates that the higher the financial aid allotted to the student, the lower the student’s cumulative GPA.

*Question Five: In the proposed model, does faculty contact mediate students’ behavior as they persist toward their goals?*

In this study, faculty contact did not mediate student’s persistence toward their goals. The indirect effects of the Conative and Affective constructs and the cognitive variable were not significant. Although none of the effects were significant, it was interesting to note that the factor loadings for both the Conative and the Affective
constructs effects on Persistence as mediated by faculty contact were negative, indicating an inverse relationship. This result was supported by the direct effect of faculty contact on persistence. Although the direct effect of faculty contact on persistence was not significant, it was negative. It is interesting to consider the reasons that higher faculty contact would result in lower persistence rates. Perhaps students who are struggling academically are more likely to seek faculty contact, but that contact is not sufficient to alter the student’s decision not to persist.

*Question Six: In the proposed model, does outside employment mediate students’ behavior as they persist toward their goals?*

Outside employment did not mediate student’s persistence toward their goals. The indirect effects of the Conative and Affective constructs and the cognitive variable were not significant. This result would indicate that outside employment is not a factor in student persistence decisions based on motivational constructs.

**The Big Picture**

The results of this study recognize the complexity of variables that intertwine to influence the ultimate persistence behavior of students. When multiple variables are investigated simultaneously, the interrelationships between the variables which exist in real life may be identified. In this study, it was found that students’ combined cognitive ability, self-efficacy, and self-regulatory capacities do allow them to overcome external pull factors that have traditionally been shown to impede student persistence. Students who have higher levels of cognitive abilities, self-efficacy, and self-regulation persist even though they may not feel integrated into the institution academically as indicated by faculty contact. If a student is faced with the pull of outside employment and/or
inadequate financial aid, their capacity for self-regulation and their feelings of self-efficacy appear to enable the student to persist toward their goals. The results of this study have shown that more than any other factor, motivation may indeed be the key to community college student persistence.

These findings may be used to foster success among community college students. The significant positive relationships between levels of self-efficacy, self-regulation and cognitive factors suggest that greater motivational skills are instrumental in promoting educational gains among a diverse sample of first-time beginning community college students in the United States. At a time of limited funding, training and interventions focused on addressing and improving student self-efficacy and self-regulation may serve to aid student retention and help students persist until they meet their goals.

**Discussion**

The next section of this chapter examines the findings from the analysis performed in this research study in the context of community college student persistence literature. This study evolved from an exhaustive review of persistence literature. As a framework for evaluating extant literature, the concept of the trilogy of mind was used as an orientation point. The trilogy of mind refers to a division of mind that defines three areas: conation, cognition, and affect (Hilgard, 1980; Mayer, 2003). Clearly, self-generated behaviors, as organized by the trilogy of mind influence the performance of students in an academic setting. It would stand to follow that these behavioral influences factor into student’s persistence decisions.

Research has suggested that the synergistic relationship of self-efficacy, motivation, self-regulation, and academic performance influence student persistence.
While each variable alone has been shown to predict academic performance, it had been suggested that they may be most effective in combination (Bandura & Locke, 2003; Kitsantas, 2002; Zimmerman, 2008). As self-efficacy has been associated with personal goals in the literature, goals involving financial well being, personal influence, leadership skills, and confidence in future employment served as measures of the Affective construct. Similarly, self-regulated learners had been shown to be independent, self-initiated learners with the ability to use a variety of strategies to accomplish their goals. Students who are more highly self-regulated would be more likely to be proactive in behavior, and would be more likely to meet with academic advisors, participate in clubs or out of class activities, including sporting or arts-related activities, as well as participate in study groups or community service work. These factors served as indicators of the Conative construct. Traditional persistence theories focused on the role of the academic and social life of the institution (academic and social integration). The research presented in this paper addressed the role of the motivational factors of self-efficacy, self regulation and cognitive ability as portrayed in the trilogy of mind.

**Affective Construct**

Self-efficacy and goals together contribute to academic attainment (Zimmerman et al., 1992). In order for students’ strategic actions to be described as self-regulated, one must know their academic goals and perceptions of efficacy (Zimmerman, 1989). Several previous studies have demonstrated that self-efficacy influences performance in academic domains, including college student academic achievement (Pajares, 1996; Pajares & Miller, 1994; Spitzer, 2000; Wood & Locke, 1987). Self-efficacy has been found to be positively related to college adjustment (Chemers, Hu & Garcia, 2001)
college student academic achievement (Pajares, 1996; Zimmerman, 2000), and student persistence (Robbins, Lauver, Le, Davis, Langley & Carlstrom, 2004). The relationships between self-efficacy and student outcomes have been shown to be salient in community college settings (Gore, 2006; Grimes & David, 1999; Hagedorn et al., 2000, Silver, Smith, & Greene, 2004). In studies of college students pursuing engineering and science majors, self-efficacy and certain other social cognitive variables have been found to be good predictors of students’ interests, goals, persistence and performance (Hackett, Betz, Casas, & Rocha-Singh, 1992; Lent, Brown, & Larken, 1986; Lent, Brown, Schmidt, Brenner, Lyons, & Treistman, 2003; Lent, Larkin, & Brown, 1989; Nauta, Epperson, & Kahn, 1998).

In 1993 Peterson sought to explore the relationship between career decision-making self-efficacy and student integration. Noting a relationship between self-efficacy and persistence, Peterson used correlation to evaluate the relationship between students’ perceived career decision-making self-efficacy, integration with their educational institution, and their initial goals and commitments. Career decision-making self-efficacy was found to be moderately correlated with goals and commitments, and moderately correlated with overall integration. However, career decision-making self-efficacy had a stronger relationship with academic integration than with social integration. As such, career decision-making self-efficacy explained about 12 percent of the variance in social integration and about 18 percent of the variance in overall integration and academic integration.

Additionally, Peterson (1993) found moderate correlation between goals and commitments and overall integration. An evaluation of intercorrelation between career
decision-making self-efficacy and integration proved to be significant for both genders. Students who were not employed perceived a significant and strong relationship between career decision-making self-efficacy and integration. Peterson asserted that there was sufficient evidence to warrant inclusion of the variable, career decision-making self-efficacy as an individual characteristic in further studies of integration. The next logical step was to include self-efficacy as a variable in a persistence study like the one presented in this paper.

Allen (1999) sought to examine the structural relationships among motivational factors, student background factors, academic performance, and persistence at a four-year institution. Using a motivation assessment instrument designed to assess desire to finish college, institutional impression, and family emotional support, Allen used a two-step structural equation modeling procedure to test the model. Goodness-of-fit indices lent support for Allen’s model. Of the variables thought to impact persistence, direct effects were observed for desire and GPA. The largest total effect on persistence was exerted by GPA, with the second largest total effect coming from a tie between desire and high school rank. The model presented in this paper, confirms those results, motivational factors show an influence on persistence decisions.

A 2000 study by Spitzer evaluated predictors of college success in terms of impact on GPA for traditional and nontraditional age college students. Spitzer performed a multiple regression analysis of a model that included academic self-efficacy, self-worth, social acceptance, social support, motivation and self-regulation as predictors of GPA. The model had a significant $R^2$. The weights indicated that academic self-efficacy was
the strongest positive predictor of GPA, while self-regulation and social support also made positive contributions to GPA.

In a longitudinal study of first-year college student adjustment that examined the effects of academic self-efficacy on academic performance (Chemers, Hu, & Garcia, 2001) used predictor variables (high school GPA, academic self-efficacy and optimism) and moderator variables (academic expectations and self-perceived coping ability) that were measured at the end of the students’ first academic quarter. They then related those variables to classroom performance, personal adjustment, stress, and health as measured at the end of the school year. Using structural equation modeling, they tested the fit of data from a four-year institution. The authors found significant direct effects of self-efficacy on academic performance. There were also significant mediated effects of self-efficacy on academic. They asserted that there was compelling support for the role of self-efficacy and optimism in first-year college students’ success and adjustment. Self-efficacy directly and indirectly showed strong relationships to academic performance and personal adjustment of the first-year students studied.

A 2001 study by Torres and Solberg tested a path model of Latino college student outcomes. The model integrated self-efficacy, stress, family support, and social integration into an evaluation of persistence intentions and health. They hypothesized that college self-efficacy was associated directly with stronger persistence intentions and associated with better health. Students from a two-year technical college, and a four-year university were given a survey designed to measure level of confidence in performing various academic tasks associated with college success, a stress inventory, and an evaluation of social integration and persistence intentions. Path analysis results
supported a number of significant paths indicating self-efficacy directly predicted social integration, persistence intentions, and stress. Overall, the results indicated that self-efficacy served as an important determinant in educational outcomes.

A 2005 research study by Zajacova, Lynch and Espenshade investigated the combined effects of academic self-efficacy and stress on academic performance. Zajacova et al. estimated structural equation models to assess the importance of stress and self-efficacy in predicting three academic performance outcomes; first-year college GPA, the number of accumulated credits, and retention after the first year. A strong limitation in their study involved the applicability of structural equation modeling with such a small sample size. The models fit the data well based on measures of model fit. Self-efficacy had a significant and positive effect on both credits accumulated and GPA while stress had none. The internal reliability of stress and self-efficacy scales was high. Academic self-efficacy and stress were found to be negatively correlated. The results suggested that academic self-efficacy is a more robust and consistent predictor than stress of academic success.

In an examination of the role academic self-efficacy beliefs play in predicting college success, Gore (2006) performed two incremental validity studies to determine the extent to which academic self-efficacy beliefs could account for variance in college outcomes beyond that accounted for by standardized test scores. Using hierarchical linear regression to evaluate the degree to which ACT scores and perceived self-efficacy could predict college GPA, Allen found that scores collected at the end of the first semester were a significant predictor of GPA, with significant variance accounted for. An additional 4% of the variance in third semester GPA was also accounted for by self-
efficacy. Gore found self-efficacy to be the most consistent predictor of college GPA. In a second validity study, Gore (2006) used a stratified sample of four-year institutions who agreed to a longitudinal two-year commitment to determine the relationship between academic self-confidence and college outcomes. Using hierarchical linear and logistic regression, Gore found that a model containing academic self-confidence scores was superior to a model utilizing ACT standardized test scores alone to describe first- to second-semester retention.

In a 2008 meta-analytic path analysis of social cognitive career theory’s academic performance model and academic persistence models, Brown and his colleagues evaluated data from a sample of full-time college students enrolled at four year institutions. They found that goals related significantly to retention in an academic persistence model. They also found that self-efficacy beliefs derived from the cognitive variables high school GPA and ACT/SAT scores were predictive of academic persistence. Their research supported the theory that self-efficacy beliefs are substantially related to academic goals. However, they did not find that goals contributed to grade-point averages that students attained in college. Rather, the effect of self-efficacy on academic performance appeared to be more direct than being mediated by goal mechanisms. Although this study effectively described the role of cognitive variables, self-efficacy and goals on student persistence, the meta-analytic path analytic technique using data that perhaps did not describe the variables well hindered its predictive capabilities.

The research summarized above indicated that a students’ perceived efficacy to achieve motivates academic attainment both directly and indirectly by influencing personal goal setting. In this study, the Affective construct was intended to evaluate
self-efficacy as a factor in community college student’s persistence toward goals. Confirmatory factor analysis produced a CFI value of 0.91 and RMSEA value of 0.04 which suggest the measured variables supported the Affective construct very well. The standardized factor loadings indicated that the importance of being a community leader best represented the Affective construct with values of 0.78 and 0.73 for 2004 and 2006 respectively, closely followed by the importance of influencing political structure with values of 0.69 and 0.74 for 2004 and 2006. The students’ highest degree ever expected least adequately described the Affective construct with values of 0.16 and 0.12 for 2004 and 2006 respectively. R² values indicated that in this model, affect accounted for the most variance in the importance of being a community leader in 2004, with 60% of the variance accounted for by this variable.

Unmediated effects of the Affective construct in the full SEM model found the effect of the Affective construct on the Persistence construct to be significant at the p < .001 level. Total effects of the Affective construct were also significant at the p < .001 level. These results would confirm Allen’s 1999 study which indicated that motivational factors influence persistence at four-year institutions, as well as Torres and Solberg’s 2001 study of Latino students. It also confirms the results of Zacajova, Lynch and Espenshade’s 2005 study in which self-efficacy was found to be a robust predictor of academic success and Brown’s 2008 study which indicated self-efficacy, cognitive variables and goals predicted persistence. Both Zacajova, Lynch and Espenshade’s (2005) and Brown’s (2008) study focused on four-year college students. The study presented in this paper focused exclusively on community college students. This study was also much more...
more extensive than previous studies in that it used a national dataset, rather than an institutional focus.

Indirect effects mediated by faculty contact, financial aid, and employment were not found to be significant in the model presented in this paper. If faculty contact is viewed as an indicator of academic integration, these results would seem to contradict Peterson’s 1993 study showing a correlation between self-efficacy and academic integration. Although not significant, it was interesting to note the indirect effect mediated by faculty contact was negative in this study, indicating an inverse effect of Affect on Persistence when mediated by faculty contact. Previous research has indicated that faculty contact should exhibit a positive effect on persistence. The inverse effect shown in this study is somewhat contradictory to previous results. Future research into this effect may address the idea that students community college students who seek faculty contact outside of class may already be struggling and therefore, less likely to persist than their better-performing classmates.

**Conative Construct**

In addition to self-efficacy, self regulation had been shown in a number of studies to be an influence in performance outcomes of college students. Academic self-regulation is concerned with the degree to which students metacognitively, motivationally, and behaviorally proactivate their own learning process. Self-regulated learners would not only be distinguished by their proactive orientation and performance, but also by their self-motive capabilities (Zimmerman et al., 1992). According to Zimmerman (2000), self-regulated learners display three important characteristics: They use a variety of self-regulated strategies (active learning processes that involve agency
and purpose); they believe they can perform efficaciously; and they set numerous and varied goals for themselves. Furthermore, research had indicated that self-regulated learners engage in three important processes: self-observation (monitoring of one’s activities); self-judgment (evaluation of how well one’s own performance compares to a standard or to the performance of others); and self-reactions (reactions to performance outcomes).

A number of previous research studies had demonstrated the significance of self-regulation in academic contexts (Pintrich & DeGroot, 1990; Schunk, 1989; Tabachnick, Miller & Relyea, 2008; Zimmerman, 2000). However, the research relating self-regulation to college student persistence was severely limited. Given that theory widely recognizes the self-regulated learner as someone who can assess the requirements of the learning task at hand, and one who can identify and deploy appropriate learning strategies, it would stand to reason that self-regulation would play a role in persistence.

In a 2008 study focusing on task instrumentality and goals in a college student population, Tabachnick, Miller and Relyea found that future goals had significant direct and indirect relationships to the goal of college graduation, perceived task instrumentality and self-regulation strategies. In the study, involving a path analysis, self-regulation strategies were directly predicted by task instrumentality and both directly and indirectly by future goals. Although the study population was comprised second-year students at a large Southern university, one may postulate as to the relationships between self-regulation strategies and goals of community college students.

Kitsantas, Winsler, and Huie (2008) evaluated the predictive validity of student prior academic ability self-regulatory processes, and motivational beliefs over freshmen
and sophomore years of college. In that study, correlations were used to examine the relationships among the college GPA, prior ability (SAT scores), self-regulation, and motivation variables. The strongest correlation with self-regulation variables was directly with time and study environment, and indirectly with later GPA, task-value and self-efficacy. In a regression analysis of self-regulation strategies and motivation variables, the data revealed that when predicting second-semester academic performance, time management and self-regulation contributed significantly to the model.

In the study presented in this paper, six observed variables comprised the Conative construct, which was designed to represent self-regulation. All six variables were based on frequency; meeting with academic advisor, attending fine arts activities, participating in school clubs and school sports, attending study groups, and performing community service. This structure was based on the theory that students who display higher levels of academic self-regulation are independent, self-initiated learners with the ability to use a variety of learning strategies to accomplish specific learning goals (Kitsantas, 2002; Zimmerman, 2008). As such, students who are more highly self-regulated would be expected to be more likely to be motivationally and behaviorally proactive regulators and may be distinguished by their self-motive capabilities. These students were expected to be more likely to meet with academic advisors, participate in clubs or out of class activities, including sporting or arts-related activities. Other indicators of self-regulation were expected to include participation in study groups or community service work.

The CFA for the Conative construct provided an RMSEA value of 0.04, and CFI of 0.93 which indicate an excellent representation of the construct by the observed
variables. In the CFA of the Conative construct, the standardized factor loadings indicate that a students’ participation in school clubs best represented the Conative construct with values of 0.78 and 0.82 for 2004 and 2006 respectively. The students’ participation in community service and volunteer activities least adequately describe the Conative construct with values of 0.23 and 0.28 respectively. In this model, conation accounted for over 60% of the total variance in participation in school clubs. Conation accounted for only 8% of the total variance in volunteerism and community service in both 2004 and 2006. Although model modification indices did not indicate changes to improve model fit, the factor loadings the community service factor displayed a very weak loading. Analysis of the Conative construct with the weak loading factor removed actually worsened overall fit.

The Conative construct in the full SEM model provided an unmediated effect significant at the p < .05 level on the Persistence construct. This result is consistent with the 2008 studies of Tabachink, Miller, and Relvea in which self regulatory strategies were found to be predicted by goals, and Kitsantas, Winsler, and Huie in which time management and self-regulation were found to predict academic performance. However both of those studies were performed with data from traditional students at four-year institutions. This was the first study of its type to focus exclusively on community college students.

The Conative effects mediated by faculty contact, financial aid, and employment were not significant. The relationship between faculty contact and persistence did display an inverse relationship. Like the Affective construct, it is possible that students who are struggling academically and are therefore already less likely to persist are
seeking faculty contact as a last ditch effort before they choose to abandon their academic goals. However, this theory is not supported by the finding significant effect of the cognitive variable on faculty contact. That would indicate that students who are performing better academically are more likely to seek faculty contact, but students who seek faculty contact are less likely to persist. This possibility will be discussed further in the Recommendations for Future Research section of this paper.

**Cognitive Variable**

Cognitive ability, the third component in the trilogy of mind concept was represented in this study by the cumulative GPA reported by the student. Unmediated effects of the cognitive variable on the Persistence construct were significant at the p < .001 level with a very strong standardized loading of 0.94. Indirect effects mediated by employment, financial aid, and faculty contact were not significant in this model.

In a 2008 meta-analytic path analysis of social cognitive career theory’s (SCCT) academic performance model and academic persistence models, Brown and his colleagues evaluated used data from a sample of full-time college students who were enrolled in four year institutions. They found that goals related significantly to retention in an academic persistence model. More importantly, the researchers found that self-efficacy beliefs derived from the cognitive variables high school GPA and ACT/SAT scores were predictive of academic persistence.

In this study, the cognitive variable displayed the least significant direct effects on the mediator variables. Most interestingly, the path between GPA and amount of Pell funds received was significant at the p < .05 level with a standardized loading of -0.5. This negative value would indicate that students with lower GPAs received higher Pell
funds. This result could raise a number of interesting questions pertaining to the academic preparedness of lower income students.

The path between GPA and faculty contact was not with a standardized loading of .03, however, it indicates that in this portion of the model students with higher cognitive levels (a higher grade point average) may be more likely to seek faculty contact. However, the path from faculty contact to the Persistence construct is negative (-0.14), albeit not significant. Although that path is not significant, it is a very interesting finding which appears to contradict the conventionally accepted notion that faculty contact and academic integration should increase student persistence.

The direct effects of the cognitive variable on the Persistence construct were very strong with a standardized loading of 0.94, p < .001. This result confirms widely held assumptions that students who are more academically capable are most likely to persist. In selective institutions, the most capable students are chosen for admissions. In community colleges with open admissions policies, the students may not always be the most academically capable. It is that simple fact that provides the basis for the study presented in this paper. What can a community college administrator do to help students of lower cognitive abilities persist? A number of previous significant studies have related self-efficacy and self-regulation to, and implied that they are predictive of achievement. Other studies have significantly related self-efficacy and self-regulation to academic performance and persistence outcomes. The relationships between self-efficacy and student outcomes have been shown to be salient in the community college setting as well. Grimes and David (1999) investigated underprepared community college students and
concluded that motivational factors (e.g., self-efficacy) influence student success and persistence.

On the whole, findings from this study support the research that indicates that self-efficacy, self-regulation, and cognitive ability influence student persistence. The findings from this study, when examined in the context of the literature, clearly show that variables widely accepted to influence academic achievement and/or student persistence are significant factors in the persistence of community college students as they persist toward their goals. Relationships identified in this study, including some interesting inverse relationships open the doors to other potential areas of focus in addressing the persistence of community college students. Although this study is subject to limitations, a number of interesting possibilities for community college administrators and policy-makers emerge.

Limitations

The structural equation modeling process is simply a method to evaluate a proposed model, and how well the model works to describe a phenomenon. That is why it is so important that the model be soundly based in theory. It does not allow the researcher to assert the identification of the one and only solution, it must be considered that other solutions may exist that fit the data as well.

The purpose of this study was to explore the relationships of motivational and behavioral variables in community college students as they persist toward their goals. This study was designed as a structural equation modeling analysis of a proposed model of student persistence. Although the model was shown to fit the data set used in this evaluation quite well, it is not to be interpreted as the only solution. This interpretation is
simply a limitation of the structural equation modeling technique. The analysis relates to
the model and the particular data set utilized. Changes to the model, or use of an
alternate data set may not provide the same results. While the evaluation of this model
proved quite successful, it should be noted that several limitations exist which must be
considered when interpreting the results of this study.

One of the most prominent limitations involves the use of secondary data. While,
the BPS: 04/06 dataset provides a rich resource of national-level, longitudinal data of a
scope which would be impossible to collect for an individual study, the data is also a
limiting factor in this study. Most notably, the ability to fully operationalize the
constructs is limited by both the survey questions asked and the data that are reported.
While the latent Affect and Conative constructs in this study were shown in the CFA to
be adequately represented by the specified indicator variables, the Persistence construct
was not as encompassing as this researcher would have hoped. The effort to create a
Persistence construct represented by entering student’s intentions and their persistence
outcomes proved to be more challenging than anticipated, and resulted in several very
weak loading variables on the latent construct which could not be remedied with the data
available.

As in all longitudinal studies, participant attrition was a factor in this study as well.
The factorial invariance portion of this study was encouraging with the Conative
construct, but the Affective construct did not display invariance over time. While this
invariance cannot be solely attributed to the attrition of study participants, it may have
been a mitigating factor.
Another limitation involves the time period encompassed by the BPS:04/06. The first survey of students occurred in 2004 for students enrolled in 2003, students who were beginning postsecondary education in the 2003-2004 academic year. The first follow-up to that survey occurred in 2006 during the 2005-2006 academic year. The third follow-up occurred in September 2009 for the 2009-2010 academic year. The purpose of the follow-ups was to monitor the academic progress of students during the three years and six year following their initial entry into postsecondary education. The data for the 2009 collection was not yet available at the time of this study. This study used data from the 2004 and 2006 data collection periods. The expected completion time for an Associate’s degree is typically two years, with a 150% buffer students may have just been completing their degrees by the first follow-up. Although this was most likely not enough time for all of the degree seeking students to have meet their goals, it did fall within the commonly accepted 150% completion time period.

The structure of this study focused on the persistence of community college students toward their goals, rather than measuring persistence strictly as a rate of graduation, transfer, or drop-out. The latent Persistence construct proved to be weaker than desired. The rate of response for one variable in particular, reason left 2006: finished desired classes, dropped to an n=1,436. An attrition analysis was performed in which the cases with complete data were compared with those with missing data on background variables. No differences were found, which allows for the assumption of generalizability among the study participants.

Finally, the latent Persistence construct displayed standardized values very close to 1.0 for 7 of the 9 indicators. A standardized value over 1.0 is known as a Heywood
case, and would indicate an error in the analysis. Standardized values over 1.0 can indicate a correlation very near 1.0. While none of these values exceeded 1.0, 7 of the 9 indicators were almost uncomfortably close to 1.0. Heywood cases occur frequently when too many factors are used to represent a latent construct, or the sample size is too small. The BPS: 04/06 sample size is not too small, so it must be considered that restructuring the Persistence construct might provide better standardized values. Variables that would ideally comprise the Persistence construct would include specific questions around goal attainment. If a student identified their goal upon enrollment as job skills, specifically asking when that student leaves the institution if they met that particular goal would serve to strengthen the construct. The same holds true for any other goal specified upon enrollment.

**Recommendations for Community College Administrators**

Community colleges are faced with a broad mission as well as a broad and diverse student base. An expected increase of older returning adults and fast growing underprepared populations are causing concern among college leaders who predict their state’s community colleges do not have sufficient capacity to serve current and projected numbers of students (Katsinas & Tollefson, 2010). For many students, community colleges are the only feasible entry point to higher education. Low cost and open admissions allow many students who would not otherwise consider higher education an option to enter college. However, elevated dropout rates observed at community colleges suggest that many students are not succeeding at this entry point to higher education (Marti, 2007).
This study sought to provide some valuable insight into the factors that influence the persistence of community college students. The findings of this study may be constructively used to foster success among community college students. The next section of this chapter presents a number of recommendations for community college administrators and policy-makers that would ideally be used to promote the persistence of future community college students.

The significant positive relationships between levels of self-efficacy, self-regulation, and cognitive factors suggest that greater motivational skills are instrumental in promoting educational gains among a diverse sample of first-time beginning community college students in the United States. At a time of limited funding, training and interventions focused on addressing and improving student self-efficacy and self-regulation may serve to aid student retention and help students persist until they meet their goals.

1. **Know your students.**

Students are routinely evaluated for placement into math, reading, English, and science. Selective institutions may use high-school transcripts, SAT or ACT scores, as well as a variety of other methods to assess students’ readiness. Community colleges often rely on single test scores for course placement. Several studies have shown that the use of multiple measures results in better outcomes than the use of single measures (Armstrong, 2000; Marwick, 2004). Placement tests typically focus on cognitive measures. The addition of non-cognitive characteristics, such as self-efficacy and self-motivation would provide a more complete picture of entering students. This additional information would enable student services professionals to better assist students. Based
on the results of this study, training targeted toward enhancing self-efficacy and self-regulatory skills for students lacking in those areas would serve to improve student persistence toward their goals.

A number of instruments designed to measure academic self-efficacy have been developed. Researchers studying academic self-efficacy have developed instruments that measure individuals’ confidence in their ability to perform a wide range of tasks. Some academic self-efficacy measures evaluate students’ confidence in specific content domains, others evaluate students’ confidence in their ability to perform academic tasks. The most useful instruments for community college administrators seeking to evaluate entering students’ perceptions would be those designed to assess students’ self-efficacy beliefs for more generalized academic behaviors. Pintrich and De Groot’s (1990) Motivational Strategies for Learning Questionnaire (MSLQ) includes a self-efficacy scale with items that assess students’ confidence in their ability to master course material, perform well on course tasks, and receive a high grade.

A scale known as the Student Readiness Inventory (SRI) developed by Le, Casillas, Robbins, and Langley (2005) was designed to evaluate motivation (including self-efficacy and self-regulation), academic-related skills, and social engagement. The MSLQ is included in the SRI instrument. An instrument designed to specifically test self-regulation and self-efficacy among community college students has yet to be developed and tested for validity. The instruments and scales mentioned above have been shown to be useful for evaluating motivational factors in academic settings. Although their use specifically in community college settings has yet to be evaluated, the
MSLQ and the motivational components of the SRI may be a useful starting point for community college seeking to identify motivational skills in entering students.

In addition to familiarizing themselves with students’ motivational capacities, community college institutional research offices are ideally suited to evaluate student goal attainment. If not already doing so, a community college would be well advised to utilize existing data to model goal attainment. A model designed to evaluate the effectiveness of goal progress support strategies (such as orientation classes, academic advising, student engagement, learning communities, mentoring, etc.) may be used to suggest momentum tipping points and benchmarks for students which may be analyzed in more depth for correlation with goal progress and completion. A model outlined by the Office of Institutional Research at Prince William Sound Community College for tracking student goal attainment over a nine-year period may serve as a useful resource for institutions seeking to familiarize themselves with student goal setting, progress, and attainment (Prince William Sound Community College Office of Institutional Research, 2010).

2. **Know yourself.**

Higher education is a labor-intensive industry, and investments in instruction are particularly expensive. The reliance of community colleges on part-time faculty is unlikely to change in coming years. All too often, the faces of the part-time faculty members are those the students see on a daily basis. They are often the primary source of information, encouragement, and feedback. More evidence is needed on what kinds of professional development and support for faculty translate into student success.
The results of this study indicate an inverse relationship between faculty contact and student persistence. Although contrary to commonly accepted standards, the reasons for this relationship should be studied further. Is this a case of too little, too late in terms of students seeking contact as a last resort? Are faculty members unable or unequipped to assist struggling students?

Given that a preponderance of previous research suggests a positive relationship between student-faculty interaction and persistence, it seems to be imperative to focus research on the characteristics of student-faculty interactions. Perhaps a redesign of faculty training to focus on relationship-building, and methods of enhancing student conative and affective behaviors is in order.

Faculty professional development addressing student motivational behaviors may focus on the following recommendations for faculty-student interactions. Encourage specific learning strategies. Faculty should give students a concrete plan of attack, rather than simply turning them loose. This may apply to overall study skills or to a specific exam, assignment, or project. Encourage faculty to capitalize on students’ interests. Tying course material or concepts to student interests enhances understanding and retention. Give frequent, focused feedback and encourage accurate attributions. Rather than allow students to feel inadequate, help them to understand that perhaps they are struggling because they didn’t follow instructions, spend enough time on the task, or they didn’t follow through on the learning strategy. Further research will confirm successful faculty interventions, but indications that faculty who develop more personal relationships with students, and are encouraged to engage in small group interaction
focusing on course content may be successful to encouraging positive interactions (Cejda & Hoover, 2011; Karp, Hughes, & O’Gara, 2011).

A faculty development workshop on student goal setting and attainment would be useful. Faculty members are frequently offered training opportunities focusing on teaching and learning, teaching tips, and best practices. Rarely though, does training focus on student motivation, goal setting, and goal attainment. A faculty development workshop should be designed to address short-term and long-term goal setting, the interactions of student self-efficacy with goal completion, and information on helping students develop the self-regulatory skills required to attain their goals. This sort of training will prepare faculty to develop more meaningful relationships with their students, and put them in a position to help students to attain their goals.

3. *Encourage specific goal-setting and tracking when students enter community college with regular progress reviews until the goal is attained.*

It is widely accepted that goals increase people’s cognitive and affective reactions to performance outcomes because goals specify the requirements for personal success (Zimmerman, Bandura, & Martinez-Pons, 1992). As community college students initiate and proceed through their educational experience, they process and reevaluate their goals until they either persist to their goal or attrit. When students develop achievement goals the goals act as cognitive representations for what the students are striving for (Pintrich & Schunk, 2002). Studies on goal theory state that having a goal will increase motivation (Bandura, 1997), and students who have clear, attainable goals are more likely to experience a sense of self-efficacy when attaining those goals, and are more likely to engage in activities that will help them attain those goals (Pintrich & Schunk, 2002).
When students enter community college, advisors should assist students in setting clear, attainable goals. Setting and measuring goals is an effective technique to increase student confidence. When students achieve short-term goals, they gain an initial sense of self-efficacy for performing well, which is later substantiated as they observe progress toward their longer-term goals.

Using these goals as a guide, Schunk and Pajares (2002) identify the importance of establishing specific short-term goals that will challenge the student, yet are still viewed as attainable. Goals are effective in two ways. They give direction for student effort, and they provide a way to measure and acknowledge achievement. The goals that students set should be challenging, but realistic. Underachieving students may set unattainable goals as a protective mechanism. Working with students to set goals that are meaningful and accomplishable allow students to gain confidence and skills and encourage them to set more challenging goals. Goals should be regularly reviewed with an advisor or faculty member and students should lay-out a specific learning strategy and verbalize their plan.

4. *Encourage pedagogic strategies that foster self-efficacy.*

Research has shown that learning environments and teaching methods can improve self-efficacy in classroom settings (Bandura, 1997). Bandura’s focus on cooperative learning strategies has been shown to improve both self-efficacy and academic achievement. This type of classroom environment was confirmed by Fencel and Scheel (2005) in a study describing the evaluation of teaching methods as they pertained to classroom climate and self-efficacy. In a nonmajors’ physics course, students indicated that a question and answer format, inquiry-based lab activities, and conceptual
(rather than quantitative) problems had a significant effect in creating a positive climate in the classroom. In addition to those pedagogies, collaborative learning and the use of electronic applications showed a positive correlation with increased self-efficacy.

Margolis and McCabe (2006) suggest a number of strategies to improve self-efficacy for struggling students. Strategies include, using peer models and teaching specific learning strategies to give students a concrete plan of attack for working on an assignment. They also suggested that frequent, focused feedback, and allowing students some flexibility in assignment options, self-determined due dates, and flexible grading. Faculty may encourage student self-efficacy by providing students with opportunities before, during, and after instruction to metacognitively evaluate the learning process and exercise some control over their learning. This strategy of planning what is to be done, monitoring progress, and evaluating results is known to be an effective way to help students take more control over their educational processes, thereby improving perceived self-efficacy.

Community college administrators and policy-makers would also be well served in endowing teachers with a high sense of self-efficacy. Woolfolk Hoy (2003) suggested that faculty self-efficacy translates into pedagogical performance. Woolfolk Hoy contends that highly efficacious faculty members tend to be more open to new ideas, more willing to experiment with new methods to better meet the needs of their students, and more committed to teaching. These faculty members are more likely to persist when things do not go smoothly and are more resilient in the face of setbacks. Woolfolk Hoy also notes that efficacious teachers tend to be less critical of students who make errors and are able to work longer with a student who is struggling.
5. **Encourage implementation of self-regulatory strategies for successful goal pursuit.**

Self-regulated students are known to be metacognitively, motivationally, and behaviorally active in their own learning processes and in achieving their own goals (Zimmerman, 1989). As such, students’ perceptions of themselves as learners and their use of various processes to regulate their learning can be critical factors in analysis of academic achievement. Self-regulation strategies are known to improve student self-discipline. Strategies known to encourage sustained self-discipline include mental contrasting and implementation intentions.

Relating to the first recommendation in this section, mental contrasting involves the cognitive elaboration of a goal (or desired future) with the relevant obstacles of present reality. When entering students set their goal, addressing obstacles and strategies for overcoming potential obstacles may empower students by improving both self-efficacy and self-regulation. Along those lines, implementation intentions involve the identification of actions a student will take when a goal-relevant opportunity arises. Duckworth, Grant, Loew, Oettingen, and Gollwitzer (2011) addressed these strategies in a study and found a significant improvement in short-term academic performance. These processes work by building student’s confidence, thereby inspiring them to commit effort. That effort becomes the foundation for increased self-confidence in future goal attainment.

6. **Consider collaborations designed to deliver psychosocial interventions.**

Research on the motivational influences in community college persistence is a very new and limited area. The results of this study indicate significant influences of psychosocial or motivational variables on persistence. Implementation of interventions
designed to enhance student perceptions of self-efficacy, self-regulatory capacity, and cognitive ability require a specialized approach to student services.

Recent recommendations addressing the delivery of social-psychological interventions that target students’ thoughts, feelings, and beliefs in and about education have acknowledged the potential for lasting effects (Yeager & Walton, 2011). These interventions are not intended to teach students academic content but instead target students’ psychology, such as their beliefs that they have the potential to improve their intelligence or that they belong and are valued at their institution. However, the delivery of such interventions on a large scale is very new to the field of community college research and administration.

An education research and development enterprise created by the Carnegie Foundation for the Advancement of Teaching has formed a network of community colleges and researchers focused on the improvement of outcomes for remedial math students. One part of this team’s strategy involves psychological interventions. This collaboration and others like it between researchers and practitioners will help ensure the likelihood that training and interventions will be appropriate in local contexts (Bryk, 2009).

7. **Integrate psychosocial professionals into training for student services personnel.**

Theoretical experts can assess whether potential modifications lead an intervention to hit or miss its intended psychological mark. By recognizing psychosocial interventions as powerful but context-dependent tools, administrators will be better equipped to deliver them on a large scale. A recent review of research by Yeager and Walton (2011) suggest that a professional trained in experimental methodology and
psychology theory, and who understands how to alter psychological dynamics may work with student affairs professionals to cross the theory-real world divide could reach students in an efficient and effective manner. Such a professional could design and implement interventions, evaluate their effects, and troubleshoot interventions that do not produce their intended effect.

As community colleges work to help students meet their academic, career, and personal goals, they come into contact with a variety of student affairs and academic professionals. Student affairs practitioners are ideally placed to act as a bridge between student and academic affairs. While recognizing that student affairs professionals are already highly trained in a broad range of areas ranging from student learning and development, advising, law, policy, governance, and leadership, a professional with a specific focus on motivational and behavioral development would be ideally placed to recognize issues pertaining to student persistence early.

Research presented in this paper indicates that interventions designed to address personal motivation and goals should serve to influences student persistence. However, for interventions to be successful they may be delivered in a way that influences student cognitive, conative and affective processes. As this area of research is so new to community college settings, they may most efficiently be delivered by a motivational and behavioral expert. Integrating student affairs professionals with psychological experts focused on behavioral and motivational theory may open the door for designing effective and efficient interventions to community college students.
Recommendations for Community College Policy-Makers

At the White House Summit on Community Colleges in October of 2010, community colleges were deemed essential to the nation’s economic recovery. Educators and administrators were challenged to boost waning college completion rates. The US Department of Education and Department of Labor house the community college initiative accommodated by the Health Care and Education Reconciliation Act. A part of that initiative includes funding to support personalized services to help community college students plan their careers, stay in school, and meet their goals. Continuing funding directed toward training and support for programs designed to enhance student self-efficacy and self-regulatory capacities as described above may serve to enhance persistence rates.

Providing access to higher education has long been known to be essential for the development and sustainability of the American middle class. Without access, the gap between socio-economic classes continues to widen, poverty rates continue to climb. However, providing access to higher education by itself is not enough. Community colleges must spend more time thinking about how to monitor student progress and provide support in the initial weeks of enrollment. Consider innovative designs and new approaches to teaching with the goal of preparing students to be lifelong learners. Certificates and degrees may be perceived as incremental goals, leading to higher certifications and degrees. The study presented in this paper has confirmed the importance of student goals and the factors involved in attaining those goals. The relationships between monetary investments and student outcomes are far from conclusive, and community colleges, like all public institutions in higher education, face
significant budget constraints. Incentives should be provided to colleges to focus on retention and persistence. This may provide some enhanced opportunities to assess how colleges may impact persistence rates.

A change in philosophy is needed in American community colleges in order to meet the lofty goals set-forth in at the White House Summit, and by the Health Care and Education Reconciliation Act. All stakeholders must engage: policy-makers, presidents, trustees, faculty, staff, administrators, students, corporate, and community leaders must all assess their individual efforts in supporting student goals and persistence. Community colleges rely on state and local appropriations for up to 55 percent or more of their funding to keep them within the financial reach of students. The average state appropriations for community colleges have increased by an average of 1.8% from fiscal year 2010 to fiscal year 2011. This study has found significant effects for financial aid and employment variables as mediators of student persistence. It is well known that finances are often a determining factor for student persistence decisions, and over 46 percent of community college students receive financial aid to assist with their college costs.

Recent trends in performance funding have tied state funding directly to institutional performance on specific indicators such as persistence rates, graduation, and job placement. However, despite the popularity of performance funding state adoption has been erratic. Only half of the U.S. states have adopted performance funding, and of those half have later eliminated it. Of the states that have maintained performance funding, Tennessee has been the most successful. Although successful, the Tennessee system has undergone many changes over the years. The most recent change being the
incorporation of momentum-point performance indicators. The adoption of momentum-points opens the door for a wider set of recognized student outcomes. One of the purposes of this paper involved the evaluation of student persistence to goals, while acknowledging that student goals frequently do not tie into recognized persistence indicators.

If states are to incorporate momentum-points into performance funding, those points should be aligned with student goals. Currently, most states do not consider student transfer rates in institutional performance to be a positive outcome. Community colleges often do not receive credit for students who transfer to other institutions, but transferring may very well be the intended goal of the student when the registered. While the transfer represents a success for the student, it should also be recognized as a success for the institution. Performance funding models should understand and allow transfer as a momentum-point.

Course completion may also be considered a momentum-point. If a student enters community college with the intention of completing one or more courses, without attaining a degree, certificate, or transfer the completion of those courses should be recognized as a success. Any successful grade (A, B, C, D, P, or Audit) earned by the student represents goal progress, and consequently some level of value-added by the institution. Remediation may be another frequent goal of students enrolling in community colleges. When students complete remediation, and move into mainstream curriculum those successes should be rewarded. Community colleges often serve at-risk students (first-generation, low-income, and students who are employed). Performance
funding for community colleges should receive credit for taking at-risk students and moving them to a satisfactory level.

By linking community college funding to student goals, student and institution successes may be more effectively recognized and rewarded. Modeling student goals and intent as mentioned in the *Know your students* item of the Recommendations for Community College Administrators section of this chapter would allow institutions to accurately recognize and track the goals of their students and provide them the opportunity to be funded for those accomplishments.

Reverse transfer policies being implemented in Texas and Massachusetts, allow transfer students to earn their final credits at a four-year university, then have those credits sent back to the community college. Data-sharing agreements allow the university to track down students who have completed a minimum of 25% of their degree at a community college. Those students can fulfill the balance of the associate-degree requirements at the university, and then receive their degrees from the community college while still enrolled at the university (Ekal & Krebs, 2011). This system allows students to incrementally work toward their goals being while rewarded along the way. Rewards have been shown to boost student motivation. Motivation has been shown in this study to improve student persistence. Finally, reverse transfer programs allow community colleges to be recognized for student successes as well.

Opportunities also exist for community colleges to reach-out to previously underserved populations through partnerships with local industries or non-profit organizations. Partnerships of businesses and community colleges designed to address the dual problems of high unemployment and the difficulty many employers face in
finding workers with the right skills by connecting employers to community colleges and workforce partners so students can be better equipped with the skills necessary to find and retain jobs in a 21st century economy (Sutton, 2011). Students in these programs are enrolling in community college with a very specific goal; the program is designed to support that goal. Reiterating the link between motivation, persistence and goals, these programs result in higher graduation rates as well as documentable successes for community colleges which may be linked back to funding measures.

Research and funding for research on factors that influence the success of community college students is just blossoming. The potential for better allocation of valuable resources lies with the results of that research. It is important for research in this area to be encouraged and funded so that the community colleges may better address the needs of their students.

While this paper is not intended to be a handbook for community college best practices, the study presented herein provides some valuable resources for college administrators and policy-makers. The significant relationships identified in this study clearly associate cognition, self-efficacy, and self-regulation with community college student persistence. Other studies have shown that relatively simple self-regulation strategies and self-efficacy building opportunities may dramatically improve community college students’ ability to attain long-term academic goals. Although much more work is needed to develop interventions, curricula, and programs around these aims, the potential benefits, particularly in terms of improving student persistence recommend energetic efforts in this direction. Increasing success in the community college setting
will require reforms directed at multiple levels, and cannot be achieved with either student- or institution-focused initiatives alone.

**Recommendations for Future Research**

The community college is playing an ever increasing role in the delivery of higher education to a diverse array of students. Persistence research seems to have balked at investigating behavioral variables in community college student persistence. Community colleges are open access, available to all and as such are unable to select students who are most likely to succeed. Student behavior is typically outside the reach of student orientation, advising and retention programs. It is not an easy policy question to address. Finding influence of behavioral variables puts community college personnel in a difficult position of recognizing students who may not be motivated enough to complete a degree or self-efficacious enough to attend to their coursework. However, for policy decisions to be made, all factors that affect persistence must be addressed, and although it is not an easy question for policy-makers to address student behaviors, the simple fact that a variable exerts an important influence on persistence should make its study valid.

It is clear from the literature that persistence at the two-year college has not been studied as extensively as persistence at four-year institutions. Future work is needed to test comprehensive theoretical models for explaining community college outcomes incorporating traditional and motivational factors. This would be a timely extension and elaboration of previous research on models. The following section details recommendations for future research that seek to increase the depth of analysis, improve the generalizability, and expand the understanding of important constructs as they pertain to community college students.
First, sophisticated statistical analysis using large numbers of variables require large sample sizes. The BPS: 04/06 data set provides a unique opportunity to evaluate data collected from a national sample of students. There were 6,349 respondents who were designated as community college students. However the survey is designed first and foremost as a policy tool, which results in a major focus on financial variables, with a minor focus on persistence. A number of important variables related to persistence are absent from the database and limited the predictive power of the model. Other variables addressing persistence toward goals would strengthen the Persistence construct and would enhance the strength of the model. Future iterations of NPSAS and BPS should seek to include a representative array of items addressing factors known to influence student persistence. Items that specifically identify the goals and intentions of students when they enroll with follow-up questions inquiring about goal completion would be a useful addition to the BPS instrument. These items should identify the students’ final educational goals, along with incremental goals that may be met as they proceed through their education.

Second, an interesting result of this study involved the inverse relationship between financial aid and grade-point average. Although a great deal of previous research has linked the availability of financial aid to student persistence, and studies have linked grade point average to persistence. Influence of financial aid on grade point average may provide a new way to look at persistence in future research.

Third, although the effects of the Conative and Affective constructs on the Persistence construct mediated by faculty contact were not found to be significant in this model, it was interesting to note that the factor loadings for both the Conative and
Affective constructs were negative, indicating an inverse relationship. This result was supported by the direct effect of faculty contact on the Persistence construct. Although this relationship was not significant, it was also negative. It is interesting to consider reasons for higher faculty contact would result in lower persistence. This result runs counter to nearly all previously published research. It may be worth considering the reasons for the inverse effect found in this study. Are students waiting until they are struggling and therefore less likely to persist to seek-out faculty contact? Are the community college faculty not properly equipped or trained to assist struggling students? Given the predominance of part-time, or contingent faculty in community colleges perhaps the issue is related to an inability of the part-time faculty to properly direct students to institutional resources or to keep students connected. Several studies have shown a negative effect of part-time or contingent faculty versus full-time faculty on student persistence, perhaps the result reported in this study is indeed consistent with those results.

Another consideration involves the type of interaction occurring. Are the faculty members failing to form meaningful relationships with the students? The BPS: 04/06 survey limited the item response to the degree of faculty contact in terms of time. However, a quick question in the hallway between classes is very different from an in-depth discussion. It is likely that the degree of faculty contact reported in the study involved quick greetings, rather than an opportunity for the student to form bonds with the faculty and institution.

Fourth, a study specifically designed to measure the latent constructs would go a long way to reinforce the findings reported in this paper. The confirmatory factor
analysis for the Conative and Affective constructs returned good results. The output for the Persistence factor analysis was not as strong. The fact that the standardized values for 7 of the 9 observed indicators forming the persistence construct was very close to the Heywood level of 1.0 suggests that indicators designed specifically to represent the construct might produce better values. Considering the factors comprising the latent constructs were assembled based on availability in the BPS: 04/06 survey, an instrument created exclusively to evaluate the Conative, Affective and Persistence constructs would confirm and reinforce the results of this study.

Fifth, it is widely accepted that the majority of community college students are non-traditional students. They may be older students, returning to school or students who put-off college. They may be displaced workers returning for retraining, or workers attending for employment-related training. Expanding the study beyond the first-time beginning community college students included the BPS: 04/06 survey would be very useful in providing insight into the effects of motivational variables on persistence decisions of non-traditional college students.

This study has uncovered substantial evidence supporting the need for reform in the way community college persistence is addressed. Unfortunately, evidence on what type of reform would work best is thin. Further studies addressing specific policies and procedures would go a long way to address the needs of community college students. Based on the results of this study, interventions addressing motivational factors would be a good place to begin.
Summary

College student persistence has been actively studied for decades. Bean and Metzner (1985) first drew attention to the non-traditional student. Since that time, the definition of the non-traditional student has been expanded in several studies, with Berkner, Horn, and Clune (2000) demonstrating that students attending two-year colleges are significantly more likely than their four-year peers to be non-traditional. However, studies evaluating community college students have focused on models created for students attending four-year institutions.

Research focused on understanding the unique nature of community college students and how their motivational and social needs interact with their diverse educational goals fills a gap in extant research literature. The findings in this study support the point of view that self-efficacy, self-regulation, and cognitive ability appear to be significant factors contributing to academic achievement. In concert with other studies published linking psychosocial variables to academic attainment, these results provide an opportunity to further address issues pertaining to community college student persistence.

The model proposed in this paper uniquely integrated the latent constructs of student conation, affect, and cognitive abilities with student persistence. Additionally, this model included the effects of faculty contact, financial aid, and the number of hours a student worked in an evaluation of the influences on community college student persistence.

The goal of this study was to use structural equation modeling to evaluate the proposed model with a large, national dataset. The initial goal was to establish a
measurement model for the specified latent variables. The second step involved an analysis of a structural model to establish relationships among the latent variables and endogenous variables. The model was found to describe the community college student population of the BPS: 04/06 survey very well. These results indicate that cognitive, conative and affective behaviors do indeed impact community college student persistence. The results of this study serve to provide an alternative lens through which to view community college student persistence. This viewpoint has not been extensively considered in the extant research literature up to this point. The model presented in this study breaks from most traditional persistence models with the inclusion of psychosocial variables, and was found to be useful in identifying factors not commonly thought to be involved in student persistence.

Therefore, this study adds to the limited body of knowledge and addresses the gap in literature regarding differences in factors relating to persistence of community college students. The findings should have important implications for research and instruction within the community college environment. Such data could serve to reduce community college student attrition by: (1) aiding in the development of educational programs, (2) institutional and public policy to sustain effective student support initiatives, and (3) target students, for whom specific policies should be developed to encourage persistence. By considering how community college students’ needs and goals interact, federal, state, and college-level policy-makers might better consider how scarce resources may best be used to foster student success and persistence among the nation’s fastest growing college sector.
REFERENCES


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Tabachnick, S.E., Miller, R.B., & Relyea, G.E. (2008) The relationships among students’ future-oriented goals and subgoals, perceived task instrumentality, and task-


### Appendix A

#### Observed Indicator Variable Names and Definitions

<table>
<thead>
<tr>
<th>BPS Variable Name</th>
<th>Definition</th>
<th>Variable Location</th>
<th>BPS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Filter Variable</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>First Institution Type 2003-2004</td>
<td>First enrollment at Public two-year</td>
<td>Institution: Type</td>
<td>FSECTOR9</td>
</tr>
<tr>
<td><strong>Endogenous Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Persistence Construct</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose 2004: complete associate’s degree</td>
<td>The reason enrolled at NPSAS is to complete an associate’s degree (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDA</td>
</tr>
<tr>
<td>Purpose 2004: complete certificate</td>
<td>The reason enrolled at NPSAS is to complete a certificate (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDB</td>
</tr>
<tr>
<td>Purpose 2004: job skills</td>
<td>The reason enrolled at NPSAS is to learn job skills/prepare for a job (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDC</td>
</tr>
<tr>
<td>Purpose 2004: personal interest</td>
<td>The reason enrolled at NPSAS is for personal interest or enrichment (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDD</td>
</tr>
<tr>
<td>Purpose 2004: transfer to 2-year</td>
<td>Transfer to a 2-year college (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDE</td>
</tr>
<tr>
<td>Purpose 2004: transfer to 4-year</td>
<td>Transfer to a 4-year college (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDF</td>
</tr>
<tr>
<td>Purpose 2004: transfer to another college</td>
<td>Transfer to another college (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>ATTENDG</td>
</tr>
<tr>
<td>Persistence and attainment anywhere 2005-06</td>
<td>Persistence and attainment anywhere at the end of academic year 2005-2006. (1 = Attained bachelor’s degree, 2 = Attained associate’s degree, 3 = Attained certificate, 4 = No degree, still enrolled, 5 = No degree not enrolled, 6 = No degree, left without return)</td>
<td>Education: Attainment</td>
<td>PROUT3</td>
</tr>
<tr>
<td>Reason left 2006: finished desired classes</td>
<td>The reason why the student decided to leave school: finished taking desired classes. (0 = No, 1 = Yes)</td>
<td>Education: Reasons</td>
<td>RLV06G</td>
</tr>
</tbody>
</table>

(continued)
Observed Indicator Variable Names and Definitions (continued)

<table>
<thead>
<tr>
<th>BPS Variable Name</th>
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<th>Variable Location</th>
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<tr>
<td><strong>Exogenous Variables</strong></td>
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</tr>
<tr>
<td><strong>Conative Construct</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Participated in school sports 2003-2004</td>
<td>The student participated in varsity, intramural, or club sports during the 2003-2004 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ04F</td>
</tr>
<tr>
<td>Participated in school sports 2005-2006</td>
<td>The student participated in varsity, intramural, or club sports during the 2005-2006 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ06F</td>
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<tr>
<td>Attended study groups 2003-2004</td>
<td>The student attended study groups outside of the classroom during the 2003-2004 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ04G</td>
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<tr>
<td>Attended study groups 2005-2006</td>
<td>The student attended study groups outside of the classroom during the 2005-2006 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ06G</td>
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<tr>
<td>Community service 2003-2004: performed</td>
<td>Student performed community service or volunteer work during the 2003-2004 academic year. (0 = No, 1 = Yes)</td>
<td>Public Service: Participation</td>
<td>COMSERV</td>
</tr>
<tr>
<td>Community service 2005-2006: performed</td>
<td>Student performed community service or volunteer work during the 2005-2006 academic year. (0 = No, 1 = Yes)</td>
<td>Public Service: Participation</td>
<td>COMSRV06</td>
</tr>
<tr>
<td>Met with academic advisor in 2003-04</td>
<td>The student met with advisor concerning academic plans during the 2003-04 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ04C</td>
</tr>
<tr>
<td>Met with academic advisor in 2005-06</td>
<td>The student met with advisor concerning academic plans during the 2005-06 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ06C</td>
</tr>
<tr>
<td>Attended fine arts activities in 2003-04</td>
<td>The student attended music, choir, drama or other fine arts activities during the 2003-2004 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ04D</td>
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Observed Indicator Variable Names and Definitions (continued)

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<tr>
<td><strong>Conative Construct (cont.)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attended fine arts activities in 2005-06</td>
<td>The student attended music, choir, drama or other fine arts activities during the 2005-2006 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ06D</td>
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<tr>
<td>Participated in school clubs 2003-2004</td>
<td>The student participated in school clubs during the 2003-2004 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ04E</td>
</tr>
<tr>
<td>Participated in school clubs 2005-2006</td>
<td>The student participated in school clubs during the 2005-2006 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ06E</td>
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<td><strong>Affective Construct</strong></td>
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</tr>
<tr>
<td>Highest degree expected, 2003-2004</td>
<td>Highest level of education that the student ever expects to complete. (1 = No degree or certificate, 2 = Certificate, 3 = Associate’s degree, 4 = Bachelor’s degree, 5 = Post-BA or post-master certificate, 6 = Master’s degree, 7 = Doctoral degree, 8 = First-professional degree)</td>
<td>Education: Future</td>
<td>HIGHLVEX</td>
</tr>
<tr>
<td>Highest degree expected, 2006</td>
<td>Highest level of education the student ever expects to complete. (1 = No degree or certificate, 2 = Certificate, 3 = Associate’s degree, 4 = Bachelor’s degree, 5 = Post-BA or post-master certificate, 6 = Master’s degree, 7 = Doctoral degree, 8 = First-professional degree)</td>
<td>Education: Future</td>
<td>DGEVR06</td>
</tr>
<tr>
<td>Importance 2004: being community leader</td>
<td>Personal goals that are very important to the student in 2004: Being a leader in the community. (0 = No, 1 = Yes)</td>
<td>Background: Goals</td>
<td>IMPT04B</td>
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<tr>
<td>Importance 2006: being community leader</td>
<td>Personal goals that are very important to the student in 2006: Being a leader in the community. (0 = No, 1 = Yes)</td>
<td>Background: Goals</td>
<td>IMPT06B</td>
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Observed Indicator Variable Names and Definitions (continued)

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<td><strong>Exogenous Variables</strong></td>
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</table>

**Affective Construct (cont.)**

| Importance 2004: being financially well off | Personal goals that are very important to the student in 2004: being very well-off financially. (0 = No, 1 = Yes) | Background: Goals | IMPT04C |
| Importance 2006: being financially well off | Personal goals that are very important to the student in 2006: being very well-off financially. (0 = No, 1 = Yes) | Background: Goals | IMPT06C |
| Importance 2004: influence political structure | Personal goals that are very important to the student in 2004: influencing the political structure. (0 = No, 1 = Yes) | Background: Goals | IMPT04E |
| Importance 2006: influence political structure | Personal goals that are very important to the student in 2006: influencing the political structure. (0 = No, 1 = Yes) | Background: Goals | IMPT06E |
| Importance 2004: steady work | Personal goals that are very important to the student in 2004: being able to find steady work. (0=No, 1 = Yes) | Background: Goals | IMPT04I |
| Importance 2006: steady work | Personal goals that are very important to the student in 2006: being able to find steady work. (0=No, 1 = Yes) | Background: Goals | IMPT06I |

**Cognitive**

| Cumulative Grade Point Average as of 2003-2004 | Student cumulative Grade Point Average (GPA) in academic year 2003-2004 (Continuous scores = GPA x 100 ranges from 4 to 400). | Education: Performance | GPA |
| Cumulative Grade Point Average as of 2006 | Student cumulative Grade Point Average (GPA) as of 2006. (Continuous scores = GPA x 100 ranges from 70 to 400). | Education: Performance | GPA06 |

**Employment**

| Job 2003-04: hours worked while enrolled | Average hours the student worked per week during the 2003-2004 academic year. (Continuous variable ranges from 1 to 70). | Employment: While Enrolled | JOBHOUR2 |

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<table>
<thead>
<tr>
<th>BPS Variable Name</th>
<th>Definition</th>
<th>Variable Location</th>
<th>BPS Number</th>
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</thead>
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<tr>
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</tr>
<tr>
<td><strong>Faculty Contact</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Job while enrolled 2006: hours worked per week</td>
<td>Average hours the student worked per week during the last term of enrollment at school. (Continuous variable ranges from 1 to 60).</td>
<td>Employment: While Enrolled</td>
<td>HRSWK06</td>
</tr>
<tr>
<td>Talked with faculty outside of class on academics 2003-2004</td>
<td>The student talked with faculty about academic matters outside of class time (including e-mail) during the 2003-2004 academic year. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ04B</td>
</tr>
<tr>
<td>Frequency 2006: faculty talk outside class</td>
<td>The student talked with faculty about academic matters outside of class time (including e-mail) while enrolled. (0 = Never, 1 = Sometimes, 2 = Often)</td>
<td>Education: Experiences</td>
<td>FREQ06B</td>
</tr>
<tr>
<td><strong>Financial Aid</strong></td>
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</tr>
<tr>
<td>Pell Grant amount in 2003-2004</td>
<td>Amount of Pell grant funds received in 2003-2004. (Continuous variable ranges from 100 to 4050. To be recoded to ordinal (0 = No Pell grant funds received, 1 = $1 - $2999, 2 = $3000 - $4050)).</td>
<td>Aid: Federal Grants</td>
<td>PELL04</td>
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<tr>
<td>Pell Grant 2005-2006</td>
<td>Amount of Pell grant funds received in 2005-2006. (Continuous variable ranges from 106 to 4050. To be recoded to ordinal (0 = No Pell grant funds received, 1 = $1 - $2999, 2 = $3000 - $4050)).</td>
<td>Aid: Federal Grants</td>
<td>PELL06</td>
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</table>