# The Personal Readiness Evaluation for Postsecondary (PREP):

# A Development and Validation Study

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## Abstract

The purpose of this study was to develop and establish validity evidence for the Personal Readiness Evaluation for Postsecondary (PREP), a tool designed to measure personal readiness for college of high school students early enough in the students' journey to college that the information can be used to inform interventions that can in turn increase the students' readiness for success in postsecondary education. Personal readiness for college was defined as the dimension of college readiness pertaining to students' self-regulated learning ability including their self-efficacy and their ability to engage in academic behaviors such as planning, setting learning goals, managing their time, using study skills, putting forth effort, and persisting in the face of challenges.

This study was conducted in three phases: Phase I – instrument development, Phase II - pilot study and instrument refinement, and Phase III – testing of the refined instrument. The study consisted of one sample of $7^{th}$-$12^{th}$ graders ($n$ = 451) and three separate samples of 9-$12^{th}$ grade students (sample 1: $n$ = 1643, sample 2: $n$ = 497, and sample 3 $n$ = 385), all in a Midwestern state. Analyses utilized included confirmatory factor analysis, correlation analysis, reliability analysis, and chi-square tests.

Validity evidence gathered included evidence based on theory, content, internal structure, and relations to other variables. Findings from the study suggest that the PREP can be used appropriately with high school students to measure their self-efficacy and expectations, effort and persistence, and self-regulated learning (aspects of personal readiness for college), and that information obtained through students' completion of the PREP can provide students, parents, and teachers with an indicator of whether or not the students are in need of extra support in developing personal readiness for college.

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# Chapter 1

## Introduction

Three fundamental goals of education include: 1) "equipping all students to meet high standards and continue their education beyond high school;" 2) "preparing students for employment that is both sufficient for financial security and personally fulfilling;" 3) "providing the students the knowledge and skills to function as good citizens and constructive participants in their communities" (Hornbeck and Conner, 2009, p. 67). Research has demonstrated that the competencies, knowledge, and skills necessary for education beyond high school are essentially the same as those necessary for career readiness and a successful transition to adulthood (ACT, 2006; Lippman, Atienza, Rivers, & Keith, 2008), and that education beyond high school is now a prerequisite for obtaining employment that can maintain a middle-class lifestyle (Callan, 2008). K-12 schools therefore need only focus on one aim, college readiness, in order to help ensure all three aims of education are eventually achieved. By ensuring that all students graduate from high school prepared for further education, schools are also ensuring that students are leaving with the competencies, knowledge, and skills that will open doors to future educational, career, and life possibilities.

### Statement of the Problem

Despite this pressing need for schools to prepare all students for college rather than simply the top students (as was traditionally the case), a great divide continues to exist between what it takes to graduate from high school, what it takes to be accepted into college, and what it takes to be ready to succeed in college. In other words, high school competencies do not necessarily match the competencies valued for admission to college,

and meeting the requirements for admission does not ensure preparedness for meeting college expectations. Conley (2005) made the distinction between college-eligible students and college-ready students, defining college-eligible as able to meet admissions requirements and college-ready as able to meet expectations in college courses.

Approximately 70% of high school graduates nationally and 70% of high school graduates in Minnesota go on to some form of postsecondary institution the fall after their graduation (Aud et al., 2012; Minnesota Office of Higher Education, 2010). This leaves almost a third who do not go on to postsecondary education right after high school, indicating that they are meeting the standards for graduation, but are leaving high school neither college-eligible nor college-ready. And while the students that do go on to postsecondary education may be college-eligible, they are not necessarily college-ready, as evidenced by retention rates and graduation rates. Of the students entering 4-year institutions for the first time in 2009, 79% of full-time students and 45% of part-time students returned the following year, while at 2-year institutions, 61% of full-time and 42% of part-time students returned (Aud, et al., 2012). The retention rates in Minnesota mirror the national rates with 79% of students entering 4-year colleges in 2008 and 59% of students entering 2-year colleges not returning for a second year (Minnesota Office of Higher Education, 2011).

Graduation rates for postsecondary institutions also indicate that although students may be accepted into these institutions, they are not prepared to complete a degree or certificate program. Nationally, only 45% of students who enrolled in a 2-year college in 2007 earned a degree or transferred within three years and 58% of students who enrolled in a 4-year college in 2004 earned a degree within six years (Aud et al.,

2012). In Minnesota, 61% of students who entered a 4-year institution in 2004 graduated within 6 years of their enrollment (Minnesota Office of Higher Education, 2010). For 2-year institutions in Minnesota, on average, 53% of students who enrolled in 2007 had graduated or transferred within three years (Minnesota Office of Higher Education, 2011).

These startling retention and graduation rates have led educational researchers, K-12 and higher education administrators, and educators to seek measures for predicting success in college so that they can ensure they are graduating college-ready students at the high school level and admitting college-ready students at the postsecondary level. The most common methods for predicting readiness for success in the first-year of postsecondary education and retention to the second year are academic measures including high school grade point average (GPA) and standardized tests such as the ACT and SAT. However, research has demonstrated that such measures predict only a portion of the variance (approximately 20-25%) in performance in the first year of postsecondary education and retention to the next school year (e.g. Wolfe and Johnson, 1995; Zwick and Sklar, 2005).

Researchers attempting to account for more of the variance in first-year college performance and retention to the second year have found a number of psychosocial factors that contribute to the variance in students' first-year GPA and retention above and beyond the traditional predictors of standardized test scores and high school GPA (Robbins, Lauver, Le, Davis, and Langley, 2004). The strongest psychosocial predictors of first-year college success identified included: academic goals (defined as "one's persistence with and commitment to action," p. 267), academic self-efficacy (defined as

"self-evaluation of one's ability and/or chances for success in the academic environment," p. 267), achievement motivation (defined as "one's motivation to achieve success," p. 267), and academic-related skills (defined as "cognitive, behavioral, and affective tools and abilities necessary to successfully complete task, achieve goals, and manage academic demands," p. 267).

Other researchers have linked college success to similar psychological variables such as self-regulated learning, including planning, self-monitoring, and self-evaluating (e.g. Schmitz &Wiese, 2006; VanderStoep; Pintrich, & Fagerlin, 1996); academic discipline or persistence (Robbins, Allen, Casillas, Hamme Peterson, & Le, 2006); goal orientation (e.g. Harackiewicz, Barron, Tauer, & Elliot, 2002; Kahn, & Nauta, 2001); self-efficacy (e.g. Brown, et al., 2007; Kitsantas, Winsler, & Huie, 2008); study skills (e.g. Butler, 1998; Proctor, Prevatt, Adams, Hurst, & Petscher, 2006); and time management (e.g. Britton & Tesser, 1991; Kitsantas et al., 2008; Tuckman, 2003).

Research such as the aforementioned has demonstrated that academic readiness is not enough to ensure success in college, and that personal readiness, such as students' ability to regulate and manage their own learning, is related to students' completion of a postsecondary certificate or degree program. Unfortunately, studies such as those that examine the relationship between psychosocial variables and first year college outcomes are conducted with students already in college. Students' personal readiness for college such as their motivation, self-regulation, effort, persistence, and self-efficacy is not measured in any standardized way prior to enrollment in college. Measuring a student's personal readiness for college once the student has already begun college means that it is often too late to intervene to help the student develop the skills needed to succeed in

college. So while academic measurements such as high school GPA and standardized tests such as the E-PAS system (EXPLORE, PLAN, and ACT), PSAT, and SAT are administered as early as eighth grade and inform academic college readiness interventions at the secondary level, few such assessment-to-intervention links for personal readiness for college exist. Therefore, assessments must be developed that measure students' personal readiness for college while they are still in high school, with the intention that these measurement tools can be used to inform intervention as well as advance the research on personal readiness for college.

**Study Purpose**

The purpose of this study was to fill a gap identified through review of the literature by developing Personal Readiness Evaluation for Postsecondary (PREP) and establishing validity evidence for the inferences drawn from the PREP, a tool designed to measure personal readiness for college of high school students early enough in the students' journey to college that the information can be used to inform interventions that can in turn increase the students' readiness for success in postsecondary education. The overarching research question addressed in this study was: to what extent do evidence and theory support the inferences drawn from the Personal Readiness Evaluation for Postsecondary (PREP) for ninth-twelfth graders? Inferences to be validated included 1) the PREP measures critical aspects of students' personal readiness for college such as their use of self-regulated learning strategies, their self-efficacy, and their effort and persistence; and 2) the PREP can be used to identify students in need of additional support in developing aspects of personal readiness for college. In this study, validity

evidence gathered included evidence based on theory, content, internal structure, and relations to other variables (AERA, APA, & NCME, 1999).

More specific research questions included:

**Phase I. Instrument Development**

1. What is the evidence of content validity?

**Phase II. Pilot Study and Instrument Refinement**

2. Can the intended factor structure of the PREP be confirmed? What is the fit of the model?
3. Does the PREP demonstrate internal consistency?

**Phase III. Testing of the Refined Instrument**

4. Can the intended factor structure of the PREP be confirmed? What is the fit of the model?
5. What is the evidence of convergent validity? Are the three factors interrelated?
6. What is the evidence of discriminant validity?
    a. Is there adequate discrimination between the three factors?
    b. Is the PREP distinct from measures of college readiness such as the PLAN, ACT, and grade point average?
7. Does the PREP demonstrate internal consistency?
8. Is the PREP able to distinguish between groups based on grade point average?
9. Can the PREP be used to identify groups of students in need of intervention to promote self-efficacy and expectations, effort and persistence, and self-regulated learning?

## Organization of the Dissertation

The literature review that follows presents a definition and overview for the construct of personal readiness for college along with an in-depth look at the dominant aspect of personal readiness for college, self-regulated learning, and its supporting theoretical and empirical research. Additionally, the literature review will include an overview of measurement tools currently available to measure personal readiness for college and self-regulated learning. Following the literature review, the methods used in this study including the participants, instrument development, procedures, and analyses, are described. Results from the analyses organized by research question are then presented followed by a discussion summarizing and interpreting the results to conclude.

# Chapter 2

## Literature Review

This chapter will 1) define college readiness and, more specifically, personal readiness for college; 2) focus in on self-regulated learning, a dominant subconstruct of personal readiness for college, including its definition, theoretical perspectives, its components, and the research demonstrating the relationship between these components and educational outcomes at both the secondary and postsecondary levels; and 3) review measurement tools currently available to measure personal readiness for college as well self-regulated learning and its components.

### College Readiness

In this paper the terms *college* and *postsecondary* are used interchangeably to represent all educational options students have open to them after graduating from high school, including community and technical college, four-year institutions, and career colleges. It should also be noted that though this paper focuses on college readiness, research has demonstrated that the competencies, knowledge, and skills necessary for education beyond high school are essentially the same as those necessary for career readiness and a successful transition to adulthood (ACT, 2006; Lippman, et al., 2008), and so career readiness is not being disregarded. Instead *college readiness* is the term chosen to represent the competencies, knowledge, and skills that students must possess in order to graduate from high school with meaningful educational, career, and life possibilities open to them.

College readiness can be defined as "the level of preparation a student needs in order to enroll and succeed—without remediation—in a credit-bearing general education

course at a post-secondary institution that offers a baccalaureate degree or transfer to a baccalaureate program" (Conley, 2007, p. 5). "'Succeed' is defined as completing entry-level courses at a level of understanding and proficiency that makes it possible for the student to consider taking the next course in the sequence or the next level of course in the subject area" (Conley, 2007, p. 5).

Conley (2007) described college readiness as multifaceted, suggesting that four main facets make up college readiness: key cognitive strategies (habits of the mind such as intellectual openness, inquisitiveness, critical thinking, and problem solving), key content knowledge (the academic knowledge and skills traditionally focused on in preparation for college), academic behaviors (the behaviors necessary for student success including self-monitoring and study skills), and contextual skills and awareness (understanding of the college context as well as the often confusing process for getting into college). Preparing students to be college-ready entails preparing them in each of the four facets of college readiness.

**Differences between high school and college.** Unfortunately, as evidenced by poor postsecondary retention and completion rates, students are leaving high school unprepared for success in postsecondary education. High schools too often focus on the "key content knowledge" or academic readiness aspect of college readiness and ignore the other aspects of college readiness (Conley, 2007). In doing so, high schools are not preparing their students to meet the very different expectations that colleges hold for their learning, not just in the academic rigor of the coursework but in the demands placed on students for managing their own learning. Figure 1 delineates some of the differences in expectations students can expect to encounter between high school and college.

| How College is Different From High School | |
|---|---|
| **FOLLOWING THE RULES IN HIGH SCHOOL** | **CHOOSING RESPONSIBLY IN COLLEGE** |
| High school is *mandatory* and usually *free.* | College is *voluntary* and *costs money.* |
| Time is somewhat structured by others. | Students manage their own time. |
| Parents and teachers remind students of their responsibilities and guide them in setting priorities. | Students must balance their responsibilities and set priorities themselves. |
| Each day students proceed from one class directly to another, spending 6 hours each day in class. | Class times vary throughout the day and evening and students spend only 12 to 16 hours each week in class. |
| Classes are, for the most part, arranged for students. | Students arrange their own schedules. |
| ***Guiding principle: Students will usually be told what to do how to behave.** | ***Guiding principle: Students are responsible for themselves and their decisions.** |
| **GOING TO HIGH SCHOOL CLASSES** | **SUCCEEDING IN COLLEGE CLASSES** |
| Students study outside of class as little as 0 to 2 hours a week. | Students need to study at least 2 to 3 hours outside of class for each hour in class. |
| Students seldom need to read anything more than once, and sometimes listening in class is enough. | Students need to review class notes and text material regularly. |
| Students are expected to read short assignments that are then discussed, and often re-taught, in class. | Students are assigned a lot of reading and writing, which may not be directly addressed in class. |
| ***Guiding principle: Students will usually be told in class what they need to learn from assigned readings.** | ***Guiding principle: It's up to students to read and understand the assigned material; assignments proceed from the assumption that they've done so.** |
| **HIGH SCHOOL TEACHERS** | **COLLEGE PROFESSORS** |
| Teachers check students' completed homework and remind them of incomplete work. | Professors may not always check completed homework or remind students of incomplete work. |
| Teachers approach students and offer assistance. | Students are expected to ask for help if they need it. |
| Teachers provide students with information they've missed when absent. | Professors expect students to get from classmates any notes from classes they've missed. |
| Teachers present material to help students understand the material in the textbook. | Professors expect students to relate the classes to the textbook readings. |
| Teachers often write information on the board to be copied in students' notes. | Professors lecture and expect students to identify the important points to include in their notes. |
| Teachers often take time to remind students of assignments and due dates. | Professors expect students to read, save, and consult the course syllabus (outline) |
| Teachers carefully monitor class attendance. | Professors may not take attendance, but they are likely to know whether or not students attended. |
| *** Guiding principle: High school is a teaching environment in which students acquire facts and skills.** | *** Guiding principle: College is a learning environment in which students are responsible for learning and applying what they have learned.** |

*Figure 1.* Comparison of high school and college (Adapted from Southern Methodist University, n.d.)

Perhaps the most notable difference in expectations is in the level of responsibility students must take in their own learning. In the K-12 school system, students' learning is closely guided and monitored by individuals including teachers, parents, counselors, and administrators. In college, students generally are expected to complete their work and monitor their progress independently. Independent learning, or self-regulated learning, requires students to plan, manage their time, use study skills, put forth effort, maintain belief in their ability to succeed, stay motivated, and persist in the face of challenges. "High school preparation for such independent learning is often very limited and many students find it difficult to survive in college" (Zimmerman & Paulsen, 1995, p. 14). These habits and skills of self-regulated learning, which Conley (2007) labeled *academic behaviors*, are directly aligned with the psychosocial variables that researchers have found to be associated with college success.

**Psychosocial predictors of college success.** Research on the factors that influence students' college readiness and eventual success has been conducted for decades across the fields of psychology and education. Much of the work has focused on correlations between college outcomes and either status characteristics (i.e. SES, race, gender) or academic and cognitive variables (i.e. GPA, class rank, standardized test scores, intelligence test scores). Fewer studies have examined the relationship between psychosocial factors and college outcomes. Findings from examples of such studies have demonstrated that factors such as goal orientation (Harackiewicz, et al., 2002; Kahn, & Nauta, 2001); self-efficacy (Brown, et al., 2007; Kitsantas et al., 2008); study skills (Proctor et al., 2006); and time management (Britton & Tesser, 1991; Kitsantas et al., 2008; Tuckman, 2003) are all linked to college outcomes.

Robbins and colleagues (2004) sought to bring together the research from psychology and education to investigate the relationship between college outcomes and psychosocial, academic, and status variables as a whole rather than in discrete studies. They conducted a meta-analysis of 109 studies to examine the relationships between the variables socio-economic status (SES), high school GPA, ACT/SAT scores, and psychosocial factors (achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills, and contextual influences) and the outcomes of first-year performance (freshman GPA) and retention from the first year to the second year of college. Moderately weak, positive relationships were found between retention and academic goals ($\rho$ = .34), academic self-efficacy ($\rho$ = .36), academic-related skills ($\rho$ = .37), institutional commitment ($\rho$ = .26), social support ($\rho$ = .26), and social involvement ($\rho$ = .22). When examining the incremental contributions of these psychosocial factors above and beyond traditional predictors in predicting retention and controlling for SES, high school GPA, and ACT/SAT, all of the psychosocial factors were equal to or better at predicting retention than traditional predictors (academic goals $\beta$ = .17, institutional commitment $\beta$ = .21, social support $\beta$ = .18, social involvement $\beta$ = .13, academic self-efficacy $\beta$ = .14, and academic-related skills $\beta$ = .26). When combined with traditional predictors in a regression model to predict retention, 17.1% of the variance in retention could be accounted for by the combined predictors (versus 9% for traditional predictors alone).

In regard to predicting first-year GPA at a 4-year institution, analysis of the incremental contributions of psychosocial factors beyond traditional predictors

demonstrated that academic self-efficacy ($\beta$ = .22) and achievement motivation ($\beta$ = .14) were the strongest psychosocial predictors, but were not as strong as traditional predictors (Robbins et al., 2004). When combined with traditional predictors in a model to predict GPA, the combined predictors accounted for 26% of the variance in GPA (compared to 22% for traditional predictors alone).

Robbins and colleagues (2006) conducted a study to further examine the effects of psychosocial variables on first-year academic performance and retention at 4-year and 2-year institutions. Through hierarchical linear regression modeling, they found that the strongest predictors of first-year GPA at both types of institutions, after adjusting for test scores and institutional effects, were high school GPA ($\beta$ =.28 for 4-year institution, $\beta$ = .24 for 2-year), ACT scores ($\beta$ = .30 for 4-year, $\beta$ = .18 for 2-year), and academic discipline ($\beta$ = .21 for 4-year, $\beta$ =.16 for 2-year). Similarly, through hierarchical logistic modeling, they found that the strongest predictors of retention were ACT ($\psi$ = 1.28 at 4-year, $\psi$ = 1.24 at 2-year), high school GPA ($\psi$ = 1.25 at 4-year, $\psi$ =1.24 at 2-year), academic discipline ($\psi$ = 1.14 at 4-year, $\psi$ =1.14 at 2-year), and commitment to college ($\psi$ = 1.19 at 4-year, $\psi$ =1.11 at 2-year).

**Personal readiness.** Results from these studies on psychosocial factors suggest that aspects of self-regulated learning (as represented by a combination of the academic discipline, general determination, self-efficacy, academic-related skills, academic goals, and achievement motivation variables in the two studies) account for differences in first-year college performance and in student retention.

The construct of self-regulated learning defined as, “an active, constructive process whereby learners set goals for their learning and then attempt to monitor,

regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment" (Pintrich, 2000, p.453) aligns near perfectly with Conley's (2007, 2012) component of college readiness known as academic behaviors, or what he has more recently coined, *key learning skills and techniques*. Conley (2012) identified two categories of skills and techniques: *ownership of learning* and *learning techniques*, and then further delineated the skills and techniques that correspond with each. Ownership of learning includes goal setting, persistence, self-awareness, motivation, help seeking, progress monitoring, and self-efficacy. Learning techniques include time management, test-taking skills, note-taking skills, memorization/recall, strategic reading, collaborative learning, and technology proficiency.

Drawing on the psychosocial predictors of college success identified by Robbins and his colleagues (2004, 2006) and Conley's (2007, 2012) conception of academic behaviors, the term *personal readiness for college* will be used throughout this paper to represent the dimension of college readiness pertaining to students' self-regulated learning ability including their self-efficacy and their ability to engage in academic behaviors such as planning, setting learning and future goals, managing their time, using study skills, putting forth effort, maintaining belief in their ability to succeed, staying motivated, and persisting in the face of challenges.

Due to the centrality of self-regulated learning to personal readiness for college, researchers, educators, and administrators at the K-12 and higher education levels interested in how to best prepare students for success in college must understand self-

regulated learning and its potential for informing the research on, assessment of, and intervention for college readiness.

## Overview of Self-Regulated Learning

**Definition.** Self-regulated learners are often described as being metacognitively, motivationally, and behaviorally engaged in their own learning (Zimmerman, 1986b). Although definitions of self-regulated learning differ based on the theory from which the researcher operates, this notion of the learner as an active participant in his/her own learning is a core component of most definitions, including Pintrich's (2000) well-accepted definition shared above.

Common features of the majority of definitions include the learner's use of strategies or processes to improve academic achievement, self-monitoring and self-oriented feedback, and an explanation of how and why students engage in self-regulated learning (Zimmerman, 1989a). Learners may use processes and strategies to increase their learning such as metacognitive strategies for planning (e.g. Corno, 1986; Pintrich & DeGroot, 1990; Zimmerman, 1986b); rehearsal, elaboration, and organization strategies for cognitive control (e.g. Garcia & Pintrich, 1994; Pintrich & De Groot, 1990; Weinstein & Mayer, 1986; Zimmerman & Martinez-Pons, 1986); and motivational processes like goal setting, task appraisal, and attempting to make the task more interesting or relevant (Kuhl, 1985; Pintrich & Schunk, 2002; Wolters, 1998; Zimmerman & Schunk, 2008). Self-monitoring is used by students to monitor the effectiveness of the strategies they have chosen to apply to a task and then self-feedback is used to react to the feedback they provide themselves during monitoring in order to alter their strategy use if need be (Corno, 1989; Corno and Mandinach, 1983; Mace, Belfiore, & Shea, 1989; Zimmerman,

1990). In seeking to explain why and how a learner engages in self-regulated learning, different theorists have different views, but most agree that learners put forth time and effort and use various strategies in order to achieve some attractive goal or outcome (Eccles, 1983; Pintrich, 2004; Zimmerman, 1990).

**Theoretical perspectives of self-regulated learning.** While some components of self-regulated learning have been agreed upon and a general definition has been developed, the construct continues to be somewhat loosely defined, lacking a unified model (Pintrich, 2000, 2004; Schunk & Zimmerman, 1994). Zimmerman (1994) notes that, while most people are easily able to identify students who are self-regulated learners as those students who initiate their own learning, appear engaged and interested in their learning, are confident and strategic in their work, and react to self-feedback and continuously work to improve, researchers have not been able to reach a consensus on how to explain the processes at work in self-regulation of learning. Researchers of self-regulated learning operate from a number of different theoretical perspectives and therefore have developed several different models of self-regulated learning. Prominent views and perspectives from which research on self-regulated learning is conducted include a social cognitive perspective, an operant view, a phenomenological view, a volitional view, and a cognitive constructivist view (Zimmerman, 2001; Zimmerman & Schunk, 1989).

***Social cognitive view.*** A perspective from which researchers of self-regulated learning (e.g. Pintrich, 2000; 2004; Wolters, 2010; Winne & Hadwin, 2008; Zimmerman, 2000; 2001) commonly operate is that of the social cognitive perspective, either through this perspective alone or integrated with other perspectives. Bandura's (1986) social

cognitive theory established that humans are not simply reactive organisms, but rather proactive beings whose functioning is the product of a triadic reciprocity between personal attributes, environmental influences, and behavior. Drawing on this conception of a triadic reciprocity, social cognitive theorists argued that self-regulated learning is determined by the interaction of students' personal, environmental, and behavioral processes and that learners proactively and reactively adapt these process to attain their personal goals (Schunk, 1989; Zimmerman, 1989a; Zimmerman, 2000). Adding self-regulation to Bandura's (1986) triadic model of reciprocal determinism, Zimmerman (1989b) proposed, "Self-regulated learning occurs to the degree that a student can use personal (i.e., self-) processes to strategically regulate behavior and the immediate learning environment" (p. 330).

The cyclical process involves a feedback loop in which students draw on feedback from previous performance in order to make adjustments during their current performance on a task. Self-regulation, then, is using the feedback gained from observation and judgment to regulate one's behavior, environment, and self. Behavioral self-regulation is the adjusting of one's actions while performing a task, environmental regulation is the adjusting of one's environmental conditions and outcomes, and covert self-regulation is the monitoring and adjusting of one's cognitive or affective state (Zimmerman, 2000). According to Zimmerman (2000), this self-regulation cyclical process occurs in three phases: forethought (processes that occur prior to performance on a learning task including analyzing the task and determining one's self-motivation beliefs), performance control (processes that occurring during performance on a task such as self-control and self-observation), and self-reflection (processes that occur following

performance including self-judgment and self-reaction).

Social cognitive theorists see self-efficacy as a key variable in personal efforts to self-regulate (Bandura, 1986; Schunk, 1989; Zimmerman, 1989b). Motivation to self-regulate is based on one's perceptions of self-efficacy, or perceived ability to put forth the necessary effort and actions to achieve a selected goal. An example of how the social cognitive process of self-regulation might look is that a student with high self-efficacy beliefs (self-process) may choose more difficult tasks to work on, put forth effort toward completing the task well, and persist through the challenges that arise (behavior processes). When the student's teacher sees the student doing well on the task, the teacher may provide positive feedback to the student (environmental process), which in turn increases the student's belief that she can complete the task and acquire new knowledge. The student can also self-monitor throughout the learning (behavior processes) and change her perception of her ability based on her own self-observations (self-processes). Additionally, the student's high self-efficacy beliefs (self-processes) may encourage the teacher to provide more challenging learning tasks in the future (environmental processes).

The fact that environmental processes, behavioral processes, and self-processes are continuously interacting with one another and reciprocally impacting one another, means that researchers operating from the social cognitive view of self-regulated learning must pay attention to all processes occurring and multiple interactions taking place (Zimmerman, 1989a).

***Operant view.*** Much of the research on self-regulation has stemmed from operant researchers study of self-reinforcement and self-recording (Zimmerman, 1989b). This

research has been extended to academic performance and has become the basis for an operant view of self-regulated learning; however, the operant view is seldom used as part of self-regulated learning models in research today. Mace and colleagues (1989) used the term *self-control* interchangeably with *self-regulation* in their writing and defined the key sub-processes of self-control as people's modification of antecedent and consequential stimuli to regulate their own behavior. In their view, self-controlled behavior is ultimately controlled by the environment. Motivation to self-regulate then, unlike in other theories of self-regulated learning, does not come from a desire to achieve a certain learning goal, but instead is linked to external reinforcing stimuli. Therefore, instead of reinforcers being ends in themselves, self-reinforcers serve as discriminative stimuli that promote and guide further responding.

In self-regulated learning, self-control usually entails foregoing an immediate reward and engaging instead in behavior that leads to a greater reward in the long-term (Mace et al., 1989). Brigham (1982) identified the three characteristics that are essential to self-control and to delaying gratification, the absence of any one of which indicate the absence of self-control: 1) having to choose between alternative actions, 2) the "relative reinforcing value of the consequences for the response alternatives" (p. 29), and 3) whether the alternatives involve immediate or delayed consequences. The student having to decide between immediate and delayed consequences when determining their behavior is what causes the term *self-control* to be utilized.

The key sub-processes in self-control and self-regulated learning are self-monitoring, self-instruction, and self-reinforcement (Mace et al., 1989). For example, a student may grant himself 10-minute video-game breaks for every 30 minutes of

homework in which he engages (self-instruction). He monitors his progress by checking the time regularly and checking to make sure he is continuing to work on his homework (self-monitoring). When the 30 minutes is up, if he has stayed on task doing his homework the entire period, he rewards himself with a video game break (self-reinforcement). This cycle of delaying instant gratification (he could forget about his homework and just play video games) continues until he has met his long-term goal of completing his homework, and so he is able to employ self-control for the purpose of improving his academic performance. Researching self-regulated learning from the operant view requires understanding the external factors at play in a given learning situation.

***Phenomenological view.*** Engaging in learning for the sake of learning and further developing one's self-concept is the ultimate purpose of self-regulated learning from the phenomenological view (McCombs, 1989). A phenomenological view of self-regulated learning is one that presupposes that the self is the key player in one's learning in that the self, through self-phenomena such as perceptions, cognitions, and emotions directs and regulates learning behaviors (McCombs, 1989). The basic role of the self is to motivate the individual to approach, engage in, and persist in learning activities (Wittrock, 1990).

McCombs (1989) explained that understanding the phenomenological view of self-regulated learning requires understanding the self-system structures and processes at work during self-regulated learning. She described the self-system structures as the learners' global self-concept, or perception of themselves as learners, and the learners' perception of their ability to direct their own learning in specific academic subjects. She explained that negative self-perceptions of self or ability would lead to decreased

motivation to learn and likely diminished persistence in the learning task. Self-system processes are those processes that the learners use to develop their self-perceptions, define their self-relevant learning goals, and monitor and direct their affect, motivation, and behavior.

While this perspective may sound somewhat like the social cognitive view in that the learner is setting a goal and, based on their perceptions of their abilities, either putting forth effort toward reaching the goal or not, this perspective differs in that it does not place any emphasis on the role of the environment in shaping those perceptions (McCombs, 1989). Instead, only the self and the self's perception of the environment are important in self-regulated learning; there exists no reciprocity between what is occurring in the environment and the learner. Researchers operating from the phenomenological perspective must focus specifically on the self-system structures and processes that the learner brings to the learning task.

***Volitional View.*** While the concept of volition is implicit in most definitions of self-regulated learning, the definition put forth by volitional theorists it is made explicit. Volitional theorists define self-regulated learning as "an effort put forth by students to deepen and manipulate the associative network in content areas, and to monitor and improve that deepening process" (Corno & Mandinach, 1983, p. 95). In this view, self-monitoring serves a protective or control function in learning (Corno, 1989). An assumption of the volitional perspective is that learning is a function of the person and situation (Rheinberg, Vollmeyer, & Rollett, 2000). Person in this case refers to the characteristics of learners that impact their ability to control their learning such as their motivational traits, motives, interests, self-efficacy beliefs, and goal orientation

(Rheinberg et al., 2000). Situation refers to characteristics and difficulty of the task, social setting, resources available, and the consequences that the learner could encounter. Corno (1994) suggested that volition involves the learner using available resources from the situation to make important moments in academic pursuit count.

Kuhl (1985) differentiated between motivation and volition (two terms regularly interchanged inappropriately) defining motivation as the process by which an impulse or intention is created, and volition as the process by which the intentions or impulses are controlled and acted upon. The focus of volition is protecting one's intention to learn. He added that volitional strategies during self-regulated learning could be called the action strategies.

Corno (1989) suggested two main categories of volitional control strategies. Covert volitional control strategies are those that learners use to control their cognition, emotion, and motivation in order to promote learning. A student ignoring the noises in his classroom and channeling his attention into his assignment is an example of a learner controlling his cognition. Emotional control can be demonstrated, for example, by a student who is engaged in positive self-talk before a test in order to calm herself and increase the likelihood of being successful on the test. A student reminding himself that he needs an "A" in the class to keep his grade-point average at a 4.0 is an example of a student engaging in volitional control of his motivation. Overt volitional control strategies are those that learners use to control their environments, particularly to control the task situation and to control others in the task setting. An example of controlling the task situation is a student asking his teacher for permission to move away from the noisy students in class. A student who asks her teacher for help on a learning task is an example

of a learner attempting to control others in the task setting. Each of these volitional control strategies can be seen in some form in other perspectives or models of self-regulated learning, so, although researchers may not realize it when they choose a particular theory of self-regulated learning from which to conduct their research, most are including a volitional view in their work.

***Cognitive constructivist view.*** Paris and Byrnes (1989) explained that the cognitive constructivist view examines how students construct their own perspectives of academic competence, effort, tasks, and strategies. They suggested that self-competence refers to learners understanding of their own academic abilities. Specifically, learners form beliefs about their ability, agency (their role in their own success and failure) and control (expectations about whether or not they can achieve desired outcomes), and that these beliefs change throughout development based on experiences and changing criteria for success, but become virtually immutable by adolescence.

Students' perceptions of effort, or how hard they should try on learning tasks, also change over time. Paris and Byrnes (1989) asserted that children move from an incremental view of their ability, meaning that they believe their ability is a result of their effort, to an entity view of their ability, meaning that they see their intelligence as fixed and that it cannot be altered by effort. These perceptions of effort shape how a student self-regulates his/her learning. Unfortunately, during development, children may form erroneous perceptions of their ability and effort that can lead to learned helplessness and external blaming.

Paris and Byrnes (1989) suggested that throughout development, children's views of school and academic tasks change. In order to be self-regulated learners, students must

choose appropriate learning goals, and their perceptions of academic tasks impact their choice of goals. If students view academic tasks as simply worksheets to be completed or procedures to follow, their goal is not to understand, but to finish the task. This type of thinking can negatively impact students' learning and can set up the students for making inappropriate goals throughout their education.

Perceptions of the structure of an academic task also impact students' self-regulated learning, particularly the strategies they choose to help guide their learning. Students become accustomed to certain predictable structures in academic tasks, and perceptions of these structures affect how the student approaches the task. For example, if after several reading tests students realize that they need not read the passage in order to answer the questions, this poor practice may be adopted and applied in different settings to multiple reading tasks. Children's perceptions of academic tasks interact with their perceptions of self-competence and effort to affect how they self-regulate their learning.

Finally, Paris and Byrnes (1989) explained that throughout development, students amass learning strategies that they use to regulate their learning. In building theories about which strategies to keep in their arsenal, students gather information about the functions and purposes of various strategies, about how to use different strategies, and about when and why the strategies are effective. Eventually, students construct their own perceptions about which learning strategies to use and for self-regulated learners, the use of those strategies becomes automatic and transfers to a variety of tasks.

Researchers operating from the cognitive constructivist view must be aware of the fact that the theories that learners construct about self-competence, effort, academic tasks, and strategies change throughout development, and the development of positive,

appropriate theories that lead to self-regulated learning and can be promoted or hindered based on cognitive constraints, early experiences, task specificity, and distorted information available for theory construction.

**Research On Self-Regulated Learning Components**

Key components of self-regulated learning apparent in the majority of these theoretical perspectives are directly related to the psychosocial predictors of college success identified by Robbins and colleagues (2004, 2006) and include: strategy use, self-efficacy, motivation and goal orientation, effort and mindset, and persistence and determination. The following section explores representative research findings for each of these key components and their link to academic success at the secondary and postsecondary levels.

**Descriptive research.** The majority of research on self-regulated learning at all educational levels has been descriptive. Descriptive research at the elementary and secondary level, conducted for the most part through self-report inventories, questionnaires, and interviews, has demonstrated a relationship between effective self-regulation of learning and positive educational outcomes such as higher academic achievement, higher self-efficacy, more self-motivation, greater interest in learning, and more appropriate learning goals (e.g. Cleary, 2006; Pintrich & DeGroot, 1990; Schunk & Zimmerman, 1994). The research of self-regulated learning in postsecondary education has been conducted mainly in the last two decades. The findings from most of these descriptive studies mirror findings from descriptive studies in elementary and secondary schools: self-regulated learners perform better in college than do those students who are

poor self-regulated learners (e.g. Elliot & Sheldon, 1997; Ley & Young, 1998; Pintrich & Garcia, 1991; Wolters, 1998).

**Intervention research.** Promising results from descriptive studies at all educational levels, along with the assumption that self-regulated learning can be taught and learned, have led researchers to shift more recently to an emphasis on intervention studies, particularly at the elementary level. In most intervention studies, a specific self-regulated learning strategy is taught to students in a certain subject (academic subjects are emphasized here, though much research has looked at self-regulated learning instruction and sports) and the effect of strategy use is measured by the quality of work produced, the achievement of a goal, or a skill successfully learned (Zimmerman & Schunk, 2008). Intervention studies have repeatedly demonstrated that self-regulated learning strategies and processes can be taught and learned (e.g. Butler, 1998; Harris & Graham, 1999; and Hattie, Biggs, & Purdie, 1996). Intervention studies examining the effectiveness of training for components of self-regulated learning other than strategy use are few, with a limited number of studies investigating self-efficacy training and mindset training.

Although research studies have been conducted at all school levels, none to date have examined directly the relationship between self-regulated learning and college readiness of high school students. While researchers have determined the profiles of students' self-regulated learning abilities and strategy use that are associated with academic achievement at both the high school level (e.g. Cleary, 2006; Pintrich & DeGroot, 1990; and Zimmerman and Martinez-Pons, 1986) and college level (e.g. Ley & Young, 1998, and VanderStoep et al., 1996), researchers have yet to determine the profile of a college-ready high school student (a profile that may differ from that of a high-

achieving high school student based on the fact that high school academic competency is different than college academic competency (Conley, 2007)), nor have studies examined whether explicitly teaching students to be self-regulated learners while in high school ensures that they are personally ready for college. Therefore, findings from descriptive and intervention studies presented here for both secondary and postsecondary students provide our best understanding of the relationship between self-regulated learning and college readiness to date. Findings of representative studies are organized by the key components of self-regulated learning, but note that the components are interrelated and so cannot be cleanly categorized.

**Self-regulated learning strategy use.**

***Definition.*** Strategy use refers to students engaging in and managing their own learning through employing processes and strategies to regulate their motivation, cognition, emotion, behavior, and environment (Corno, 1989; Zimmerman, 1989b, 2000). Examples of strategies employed by self-regulated learners include: goal setting, planning, self-instruction, self-consequating, self-monitoring, self-evaluating, help-seeking, environmental structuring, seeking information, organizing, rehearsing, memorizing, and participating (Corno, 1989; Zimmerman, 1989b, 2000). These self-regulated learning strategies parallel those identified by Conley (2012) as key learning skills and techniques, one of four facets of college readiness.

***Research findings from secondary education.*** Descriptive research has demonstrated that students who report using more self-regulated learning strategies demonstrate higher academic achievement than those who report less strategy use (e.g. Cleary, 2006, Pintrich and DeGroot, 1990; Zimmerman and Martinez-Pons, 1986). For

example, Zimmerman and Martinez-Pons (1986) found that in 13 of 14 categories of self-regulated learning strategies assessed, high achieving tenth grade students reported significantly greater strategy use than did the low achieving tenth graders ($\chi^2(3) = 81.49$, $p < .001$). When attempting to classify the tenth grade students into the high- and low-achieving groups based on their responses to questions about their self-regulated learning strategy use, 91% were classified into the appropriate group.

Cleary (2006) found similar results when comparing low-achieving ninth and tenth graders with high-achieving ninth and tenth graders. Students with average grades of B and higher reported greater use of self-regulated learning strategies ($F(1, 106) = 7.12$, $p < .01$) and engaged in fewer maladaptive behaviors ($F(1, 106) = 10.70$, $p < .01$) than did students earning grades of D or lower. Pintrich and DeGroot (1990) found that in response to items on a questionnaire about strategy use, intrinsic motivation, and self-efficacy, seventh grade students who reported the greatest levels of self-regulated strategy use also reported the highest levels of intrinsic motivation, self-efficacy, and achievement. Wolters and Pintrich (1998) found that the use of self-regulatory strategies reported by junior high students could be used to explain their semester grades in the core subjects of math, English, and social studies.

The use of strategies is one of the few components of self-regulated learning that has some intervention research to support it, particularly at the elementary level. Intervention studies have repeatedly demonstrated that self-regulated learning strategies and processes can be taught and learned (e.g. Butler, 1998; Harris & Graham, 1999; and Hattie et al., 1996). Results from Hattie and colleagues' (1996) meta-analysis on self-regulated learning strategy use indicated that students of all ages, elementary through

adult, can be trained in using self-regulated learning strategies and that such training helps students develop an arsenal of strategies from which to choose in different academic tasks and learning contexts.

There exists a dearth of self-regulated intervention studies at the secondary and postsecondary level. The few intervention studies that have been implemented at the secondary level typically focus on reading, writing, math, or science. Harris and Graham (1999) used their Self-Regulated Strategy Development (SRSD) program (an intervention in which the instructor explains, models, and prompts students to use specific strategies in completing an academic task), in a writing study with fifth and sixth grade students with learning disabilities and found that students in the treatment group improved their writing performance enough that their papers were indistinguishable from their regular-education peers, and their writing scores were significantly higher than the students in the control group not receiving the self-regulated learning strategy intervention. Harris and Graham (1999) explained that the same intervention program was used in over 20 other studies to help students improve performance in writing, reading, and math with elementary and secondary students, and in each study results led to the conclusion that the self-regulated strategy development program is effective in improving educational outcomes for students. They also acknowledged that short-term maintenance has been demonstrated, but long-term maintenance has not been shown without students receiving intervention boosters.

In another example from the K-12 intervention research on self-regulated learning, Cleary, Platten, and Nelson (2008) examined the effectiveness of the Self-Regulation Empowerment Program (SREP), a program designed to help secondary

students become self-regulated learners (Cleary & Zimmerman, 2004), in increasing ninth grade biology students' test scores, use of self-regulated learning strategies, and motivational beliefs. The researchers found that students who received the SREP intervention scored as well or better on their biology test than the students who did not receive the intervention and demonstrated an increase in their management of their behavior (reliability change index (RCI) = 2.52, $p < .01$), seeking of information (RCI = 2.26 $p < .05$), self-efficacy for learning (RCI = 2.26 $p < .05$), and self-efficacy for outcomes (RCI =4.00, $p < .01$), although their interest and enjoyment of the biology content did not increase.

***Research findings from postsecondary education.*** In their study of self-regulated learning by college students' major, VanderStoep and colleagues (1996) found that high achievers and low achievers in the social sciences and natural sciences could be differentiated by their self-reported knowledge, motivation, and self-regulation. Ley and Young (1998) examined the difference in the use of self-regulated learning strategies between postsecondary students required to take developmental courses and regular admission students. Results indicated that developmental and regular admission students differed significantly in their use of self-regulated learning strategies ($\chi^2(15, N = 59) = 28.6, p < .05$) with developmental students reporting using fewer strategies than those students not needing to take developmental courses. Kitsantas and colleagues (2008) examined college students' prior academic ability, self-regulatory processes, and motivational beliefs and their ability to predict academic performance (as determined by GPA) over the first two years of college. Results indicated that the strongest predictors of academic performance were SAT scores ($\beta = .23$, $t$ [189] = 3.65, $p < .001$), high school

GPA ($\beta$ = .29, $t$ [189] = 4.48, $p$ < .001), and time management ($\beta$ = .22, $t$ [189] = 3.55, $p$ < .001), while self-efficacy ($\beta$ = .19, $t$ [189] = 2.03, $p$ < .05) was useful in predicting academic success in the second semester of college.

Finally, in his study of college students' use of self-regulatory strategies, Wolters (1998) presented three problems to students and attempted to determine which strategies they would use to overcome the problems. He found that when faced with different types of problems, students used different strategies to help them overcome each. When faced with an irrelevant task, students were more likely to use extrinsic regulatory strategies (such as choosing an extrinsic reward for task completion) than information processing strategies (such as planning, elaborating, or organizing; $t$(114) = 3.87, $p$ < .001) or intrinsic regulatory strategies (such as asking how the material connects to them or how learning the material will help them reach their goals; $t$(114) - 3.87, $p$ < .001). When faced with a difficult task they were more likely to use information-processing strategies than an extrinsic regulation strategy ($t$(l14) = 13.93, $p$ < .001) or an intrinsic regulation strategy ($t$(114) =16.43, $p$ < .001). When faced with a boring task, students were more likely to use volitional strategies (such as blocking out distractions and self-talk, "just do it") than intrinsic regulation ($t$(114) =3.74, $p$ < .001) or an information-processing strategy ($t$(l, *4)* = 5.27, $p$ < .001). Moreover, results from regression analyses indicated that intrinsic regulation, extrinsic regulation, and gender together explained approximately 10% of the variance in students' self-reported learning (mastery) goal orientation ($F$(3, 111) = 4.11, $p$ < .01) with intrinsic regulation found to be a significant individual predictor of students' self-reported learning goal orientation ($\beta$ =.21, $p$ < .05) and not of performance goal orientation. In a second set of regression

analyses, intrinsic and extrinsic regulation along with performance and learning goals and gender explained a significant portion of the variance in students' use of strategies such as strategies for rehearsal ($F(5, 109) = 3.11$, $p < .05$), organization ($F(5, 109) = 3.92$, $p < .05$), elaboration ($F(5, 109) = 17.84$, $p < .001$), critical thinking ($F(5, 109) = 4.52$, $p < .001$), and metacognition ($F(5,109) = 7.71$, $p < .001$), and in students' grade in their introductory psychology course ($F(5, 109) = 4.41$, $p < .05$).

Intervention studies conducted at the postsecondary level have focused on general strategy instruction, often through a required student success course in which students are taught to be effective college students. One such study that assessed general strategy instruction was conducted by Butler (1998) in which she examined the effectiveness of the Strategic Content Learning (SCL) instructional model with postsecondary students with learning disabilities. Individualized SCL tutoring for students resulted in improvements in students' metacognitive knowledge about self-regulated learning processes and strategies ($d = .83$, $p < .01$), increased self-efficacy ($d = .99$, $p < .01$), and the adoption of strategic approaches to tasks ($d = .90$, $p < .01$). Butler also found that students were able to transfer the strategies they learned to different contexts and tasks. Similarly, civil engineering students who received training in self-regulated learning strategies demonstrated improvements in their intrinsic motivation to study ($t(20) = -1.91$, $p < .05$), self-efficacy ($t(20) = -3.17$, $p < .01$), effort($t(20) = -2.91$, $p < .01$), and in their ability to remain attentive ($t(20) = -3.21$, $p < .01$), handle distractions ($t(20) = -3.50$, $p < .01$), and avoid procrastination ($t(20) = 3.49$, $p < .01$; Schmitz and Wiese, 2006).

Intervention studies with postsecondary students have also looked at direct instruction of strategies for learning a specific subject, such as Azevedo and Cromley's

(2004) study of the effectiveness of self-regulated learning strategy training in helping undergraduate students learn hypermedia. They found that students in the self-regulated-strategy-instruction group were better able to understand the concept being taught than were students in the control condition ($t(130) = -3.86$, $p < .05$, $\eta 2 = 0.68$.). In a separate study, Azevedo, Cromley, and Siebert (2004) examined the impact of three scaffolding interventions on facilitating students' understanding of a complex topic. Students in the adaptive scaffolding condition were better able to regulate their learning throughout the process and learned significantly more ($F$ [2,48] = 5.62; $p < .05$) than the students in the no-scaffolding or fixed-scaffolding conditions.

**Motivation/Goal Orientation.**

***Definition.*** Motivation/goal orientation refers to students' motivation to learn, to do well in school, and to pursue future goals (e.g. Covington, 2000; Deci & Ryan, 1985; Eccles & Wigfield, 2002; Zimmerman & Schunk, 2008). Motivation runs throughout self-regulated learning, for example in informing the tasks in which students choose to engage, the goals they set for themselves, the effort they put into completing a task, the strategies they choose for completing a task, the level of mastery they display in completing a task, and their satisfaction with their performance (e.g. Eccles & Wigfield, 2002; Schunk, 1984; Zimmerman & Kitsantas, 1999; Zimmerman & Schunk, 2008). Zimmerman (2008) identified the key sources of motivation in self-regulated learning that researchers focus on in order to understand the motives and processes that students draw on to activate and sustain their learning as: goal orientation, self-efficacy, and attributions or mindset. Each of these will be addressed as individual components of self-regulated learning, with this section focusing in on goal orientation.

Learners' goal orientations, as defined by achievement goal theorists, refer to the different ways that that learners approach, engage in, and respond to learning tasks (Ames, 1992). Researchers differentiate between two main types of goal orientations: mastery and performance goals (referred to alternatively as learning and ability or task-involved and ego-involved goals) (e.g. Ames & Archer, 1988, Dweck & Leggett, 1988, Maehr & Nicholls, 1980). Mastery goals are those that orient the learner "toward developing new skills, trying to understand their work, improving their level of competence, or achieving a sense of mastery based on self-referenced standards" (Ames, 1992, p. 262). Conversely, performance goals are those that orient the learner toward trying to prove their ability through doing better than others, surpassing expectations, or achieving success with little effort (Ames, 1992).

Research has demonstrated consistently that students who approach learning with a mastery goal orientation engage in more self-regulated learning behaviors (e.g. Ames 1992, Dweck & Leggett 1988, Pintrich & De Groot 1990, Pintrich & Schrauben 1992), report higher levels of effort and persistence (e.g. Grant & Dweck, 2003; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Wolters, 2004), and exhibit greater persistence at difficult tasks (Elliott & Dweck, 1988; Stipek & Kowalski, 1989) than do students who approach learning from a performance goal orientation. The research in this area for learners of all ages is vast and well-developed (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010). A few example studies will be provided here.

***Research findings from secondary education.*** In a study from Pokay and Blumenfeld (1990) examining the relationship between motivation (including self-concept, expectancies, and value placed on the subject matter) and use of learning

strategies and the effect both have on academic performance for high school geometry students, researchers found that early in the semester, prior algebra grade ($\beta$ = .15), sex ($\beta$ = -.25), and all motivation variables including self-concept ($\beta$ = -.40), value ($\beta$ = .36), and expectancies ($\beta$= .20) predicted the use of general cognitive strategies (accounting for 20% of the variance). Later in the semester, geometry self-concept ($\beta$ = .37), algebra achievement ($\beta$ = .26), geometry grade on the first test ($\beta$ = .22), and metacognitive strategy use ($\beta$ = .14) were significant predictors of grades and accounted for 51% of the variance.

Miller and colleagues (1996) conducted studies with high school mathematics students to measure the learning goals that students had for doing academic work and the relationship between the goals and perceived ability, self-regulation, strategy use, future consequences of doing school work, and the amount of effort and persistence the students demonstrated. Students' perceptions of ability (self-efficacy for math) were correlated most strongly with their learning goal ratings ( $r$ = .56, $p$ < .001). Learning goals were also significantly related to future consequences ($r$ = .21, $p$ < .001), self-regulated learning ($r$ = .62, p < .001), deep strategy use ($r$ = .54, $p$ < .001), shallow strategy use ($r$ = .25, $p$ < .001) effort, ($r$ = .35, $p$ < .001), persistence ($r$ = .47, $p$ < .001), and achievement (end of semester math grade; $r$ = .41, $p$ < .001) subscales. Additionally, a series of regression analyses examined the contribution of learning goals to outcomes and revealed that learning goals significantly predicted self-regulated learning ($\beta$ = .39), deep strategy use ($\beta$ = .50), effort ($\beta$ = .35), and persistence ($\beta$ = .27).

Pajares, Britner, and Valiante (2000) conducted two studies with middle school students to examine the relationship between achievement goals and motivation

constructs (subject-specific self-concept, subject-specific self-efficacy, and self-efficacy for self-regulated learning) in writing and science. In both studies, mastery, task-oriented goals were found to be related positively with subject-specific self-efficacy (writing, $r$ = .26, $p < .0001$; science, $r = .21$, $p < .001$), self-concept (writing, $r = .55$, $p < .0001$; science, $r = .29$, $p < .0001$), and self-efficacy for self-regulated learning ($r = .50$, $p < .0001$; $r = .21$, $p < .001$).

Greene, Miller, Crowson, Duke, Akey (2004) utilized path analysis to investigate the impact of high school students' perceptions of classroom structures (tasks, autonomy support, and mastery evaluation) on their self-efficacy, relevance of class work, and their achievement goals in a particular classroom setting, as well as to investigate the impact of self-efficacy, instrumentality, and goals on students' cognitive engagement and achievement. Researchers found that students' achievement, measured by their percentage grade, was significantly and positively predicted by self-efficacy ($\beta$ =.38, $t$ = 5.29) and strategy use ($\beta$ =.15, $t$ = 2.08), whereas self-efficacy was predicted by autonomy support ($\beta$ = .22, $t$ = 2.16) and mastery evaluation ($\beta$ = .29, $t$ = 2.53). The predictors were found to account for 22% of the variance in both achievement and self-efficacy. Additionally, self-efficacy predicted mastery goals ($\beta$ = .24, $t$ = 4.08), as did perceived relevance of the task ($\beta$ = .44, $t$ = 7.49), and their interest in the task ($\beta$ = .34, $t$ = 4.00).

***Research findings from postsecondary education.*** Findings at the postsecondary level mirror those at the secondary level, with mastery goal orientation consistently found to be related to self-regulated learning and academic achievement (e.g. Bernacki, Byrnes, & Cromley, 2012; Elliot & Sheldon, 1997; Harackiewicz et al., 2002; Miller &

Brickman, 2004; Pintrich and Garcia, 1991). A unique finding that performance goals can also be beneficial to student success at the college level can be seen in several studies (e.g. Harackiewicz, et al., 2002; Wolters, 1998) perhaps because performance goals give students a self-imposed short-term goal similar to those they were accustomed to having provided for them in secondary school or because the college classroom can be more competitive (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997).

In a study attempting to determine what students identify as the factors that helped them to be successful in community college, the Student Intention Survey was administered to 915 community college students (Polinsky, 2002). Of those who said they achieved their goals, 94.7% noted self-determination and motivation as the most essential factors in their success. In looking at several of his studies conducted with college students, Pintrich (1999) found significant positive relationships between students' reported mastery goal orientation and self-regulation, reported as a range of regression coefficients and zero-order correlations (.20 to .40), achievement (.0.3 to .23), and strategy use such as elaboration (.11 to .39), rehearsal (.06 to .27), and organization (.32 to .39).

Schraw, Horn, Thorndike-Christ, and Brunin (1995) investigated whether college students′ goal orientations affected their achievement, strategy use, and metacognition. ANCOVAs indicated that once ACT scores were used as a covariate in all analyses to remove the effect of prior achievement, learning (mastery) goal orientation demonstrated a significant main effect for course achievement ($F(1,396) = 7.76$), strategy use ($F(1,396) = 5.18$), and metacognitive knowledge ($F(1,396) = 6.35$), whereas no significant main effects were found for performance goal orientation. These findings suggested that

differences in college students' achievement and strategy use were a function of their learning orientation.

Zusho, Pintrich, and Coppola (2003) examined college student goal orientation, level of motivation, and use of self-regulatory strategies over time, as well as their relationship with course grade in chemistry. They found that over time, throughout the course, declines were evident in students' levels of self-efficacy ($F(2,443) = 15.10$, $p < 0.001$), perceptions of task value ($F(2, 443) = 91.40$, $p < 0.001$), reported use of performance goals ($F(1, 440) = 11.662$, $p < 0.001$), use of rehearsal strategies ($F(1,452) = 77.51$, $p < 0.001$), and use of elaborative strategies ($F(1, 451) = 180.77$, $p < 0.001$), while increases were seen in students' use of organizational strategies ($F(1, 449) = 251.92$, $p < 0.001$) and metacognitive strategies ($F(1,405) = 18.01$, $p < 0.001$). At both measurement points in the semester, significant correlations were found between mastery goals and adaptive motivational beliefs such as self-efficacy ($r = .33, .40$, $p < .001$), task value ($r = .48, .59$, $p < .001$), and final course grade ($r = .16, .18$, $p < .001$), whereas no significant correlations were found between performance goals and self-efficacy, task value, or final grade. Also, mastery goals were significantly correlated with use of self-regulated learning strategies such as rehearsal ($r = .70, .21$, $p < .001$), elaboration ($r = .16, .59$, $p < .001$), organization ($r = .28, .46$, $p < .001$), and metacognition ($r = .42, .44$, $p < .001$). Performance goals were significantly correlated with use of self-regulated learning strategies such as rehearsal (at the 2nd check $r = .48$, $p < .001$), elaboration ($r = .52, .18$, $p < .001$), and organization ($r = .52, .54$, $p < .001$), but not with metacognition.

Harackiewicz and colleagues (2002) investigated the role of achievement goals (both mastery and performance), ability, and prior achievement in predicting academic

achievement at the college level. Through regression analysis they tested a nine-term model including goals, ability, high school performance, achievement motivation, interest, enjoyment, final grade, and semester GPA. They found a main effect of mastery goals for interest in psychology $F(1, 461) = 61.14$, $p < .01$ $\beta = .35$) and enjoyment of the class lectures $F(1, 461) = 13.73$, $p < .01$, $\beta = .16$), indicating that students who reported approaching psychology with mastery goals reported higher levels of interest in psychology and that they enjoyed the class lectures more than students who did not endorse mastery goals. For final course grade, significant main effects were found for performance-approach goals, $F(1, 461) = 16.07$, $p < .01$ ($\beta = .16$), and work avoidance goals, $F(1, 461) = 13.85$, $p < .01$ ($\beta = -.15$), but not for mastery goals. Results indicated that students who adopted performance-approach goals obtained higher grades in their psychology course, and students who adopted work avoidance goals earned lower grades. Interestingly, for semester GPA, a main effect was found for performance-approach goals, $F(1, 461) = 14.46$, $p < .01$ $\beta = .15$) and for mastery goals, $F(1, 461) = 4.85$, $p < .05$, $\beta = -.09$), showing that students who adopted performance-approach goals were more likely than those who adopted mastery goals to have higher semester GPAs. The researchers explained this finding by suggesting that "the negative effect [for mastery goals] may reflect a suppression effect, given that the zero-order correlation of mastery goals with semester GPA was .01" (p. 568).

Research has also begun to explore the importance of long-term, future-oriented goals for student success. Miller, DeBacker, and Greene (1999) defined future goals as, "the self-relevant, self-defining goals that govern important aspects' of people's lives," (p. 251) and Miller and Brickman (2004) noted that these goals can include goals for

future education, careers, relationships, or making a contribution to society. These future goals are self-determined (Ryan & Deci, 2000) and future-oriented in the sense that the students' performance on a task does not lead independently to attainment of the future goal. Because these future goals are so far off, individuals must set proximal goals to reach them, and Miller and Brickman (2004) suggested that these proximal goals then serve as an impetus to engage in self-regulated behavior. This means that once students identify future goals for themselves that are personally relevant, they set proximal goals to reach those future goals (and some of these are set for them through the assigning of tasks which students judge for value and relation to their future goals), which results in students engaging in self-regulatory behaviors in order to achieve those proximal goals and ultimately their future goals. When a task is determined to be unrelated to students' future goals, there is less incentive to engage in completing the task.

Based on studies they have conducted in the past (e.g. Brickman & Miller, 1998, 2001; Miller, et al., 1996, 1999; Greene et al, 1996), Miller and Brickman (2004) concluded that students who perceive their schoolwork as important to achieving their future goals are more likely to value the work and engage in self-regulated learning in order to move closer to reaching their proximal goals and ultimately their future goals. Their theoretical model of future-oriented motivation and self-regulation was tested through path analysis with college students (Tabachnick, Miller, & Relyea, 2008). They found that students' perception of their school tasks as relevant and valuable was significantly, positively predicted by students' proximal goal of graduating from college (standardized coefficient =.28, $t = 6.25$) and by their intrinsic future goals (standardized coefficient =.35, $t = 7.73$). Perceived task value and relevance and intrinsic future goals

predicted the use of self-regulation strategies (standardized coefficient = .43, $t$ =10.19 and standardized coefficient= .32, $t$ = 7.61 respectively). Intrinsic future goals predicted students holding a proximal goal of graduating from college (standardized coefficient= .39, $t$ = 8.10). In other words, as hypothesized by Miller and Brickman (2004), future goals were found to predict the creation of a proximal goal (college graduation), which in turn predicted the perceived utility and value of college work, which in turn predicted the use of self-regulated learning strategies.

**Self-efficacy.**

***Definition.*** Self-efficacy is another source of motivation for students that serves to activate and sustain their self-regulated learning (Zimmerman, 2008). Bandura (1997) defined self-efficacy as, "a judgment of one's ability to organize and execute given types of performances" (p. 21). Applied to education, student self-efficacy refers to students' beliefs about their ability to achieve their academic goals (Bandura, 1997; Pajares, 1996; Zimmerman, 2000). Evidence suggests that the stronger a student's self-efficacy beliefs, the more likely the student is to participate in his learning, put forth effort, and persist in the face of challenges (Bandura, 1997; Schunk, 1991). Students' self-efficacy develops in reaction to information gathered through observing social models, past performance, self-evaluation, comparison with others, and appraisal by others (Schunk, 1991; Usher & Pajares, 2008). Self-efficacy is important to self-regulated learning because it serves as a determinant of whether a student chooses to engage in a learning task or not, affects performance during engagement of the task, and is changed based on self-feedback gathered during the task and self-evaluative feedback upon completion of the task (Schunk, 1989).

Note that the term self-efficacy overlaps with the term "expectancy" as used by Eccles and Wigfield (1995, 2002) in their expectancy-value theory of achievement motivation. They define students' expectancies as the outcomes, whether successes or failures, that the students anticipate achieving through their actions (Wigfield & Eccles, 2000). Both terms are used interchangeably in educational research, inappropriately according to Bandura (1997) and Pajares (1996a). Nevertheless, findings from studies examining both the effect of students' self-efficacy and expectancies are pertinent to understanding the role of students' outcome expectations on their self-regulated learning and academic achievement and so findings from both are presented.

***Research findings from secondary education.*** The literature on self-efficacy and its relationship to academic achievement in both secondary school and college is well developed (e.g. Chemers, Hu, & Garcia, 2001; Lent, Brown, & Larkin, 1984; Zimmerman, Bandura, & Martinez-Pons, 1992). Descriptive research at the secondary level has confirmed consistently the relationship between self-efficacy and self-regulated learning and with academic achievement (e.g. Pajares, 1996; Pintrich & DeGroot, 1990; Schunk, 1991; Zimmerman et al., 1992). In looking at several studies conducted with middle school students, Pintrich (1999) reported significant positive relationships between students' reported use of self-regulated learning strategies and their self-efficacy (regression coefficients or zero-order correlations ranged from .29 to .67) and between their self-efficacy and academic performance (regression coefficients or zero-order correlations ranged from .19 to .38). In one such study, Pintrich and DeGroot (1990) examined seventh graders' self-efficacy, motivation, cognitive strategy use, effort management, and academic performance using the Motivated Strategies for Learning

Questionnaire (Pintrich et al., 1991, 1993) and a review of classroom artifacts. They found that self-efficacy was significantly, moderately correlated with cognitive strategy use ($r$ =.33) and self-regulation ($r$ =.44). Results from regression analysis indicated that self-efficacy (partial $r$ = .18, $p$< .02) and self-regulation (partial $r$ = .22, $p$ < .005) were significant predictors of academic performance as measured by average grade on schoolwork artifacts.

Zimmerman and colleagues (1992) utilized path analysis to study the relationship between academic self-efficacy, self-efficacy for self-regulated learning, and academic achievement. They found that academic self-efficacy affected academic achievement directly ($\beta$ = .21) and indirectly ($\beta$ =.36) by raising students' grade goals. Results indicated that when students had higher belief in their ability to perform well academically, they performed better academically, and additionally, they set higher academic goals for themselves, which in turn led to higher academic performance.

Pajares (1996b) utilized path analysis to examine the role of self-efficacy in general education and gifted middle school students' solving of math problems. Math self-efficacy correlated significantly with academic performance for both general education and gifted students ($r$ = .60, $r$ = .56, $p$ < .05) and self-efficacy for self-regulated learning correlated significantly with performance for both general education and gifted students ($r$ =.24, $r$ = .35; $p$ < .05). Gifted middle school students reported higher math self-efficacy and self-efficacy for self-regulated learning than did regular education students. Additionally, math self-efficacy demonstrated a direct effect on math performance for regular education students ($\beta$ =.39) and for gifted students ($\beta$ = .46)

when controlling for the effects of math anxiety, cognitive ability, mathematics grades, self-efficacy for self-regulatory learning, and sex.

Particularly salient for understanding students' personal readiness for college is understanding students' expectancies regarding their educational attainment. Student aspirations or expectations for educational attainment refer to the highest level of education students anticipate reaching. In a national sample of high school students, 92.6% reported that they planned to attend some form of postsecondary institution after high school (Adelman, 2006). Studies examining student educational attainment expectations more closely typically analyze group differences between students from groups that are typically represented in college (white or Asian-American, middle to upper class students with at least one parent who attended college) versus those underrepresented in college (minority students and those who will be the first in their family to attend college if they choose to do so; Holland & Farmer-Hinton, 2009; Tym, McMillon, Barone, & Webster, 2004).

Data gathered about the cohort of 2004 high school seniors who were part of the Education Longitudinal Study of 2002 indicated that most students who would be first-generation college students expected to obtain some college (27.2%), attend a 4-year graduate college (29.8%), or (22%) attend graduate or professional school (Ingels, Planty, & Bozick, 2005). Students who would be non-first-in-family college students tended to have higher expectations for their educational attainment with 38.5% of students expecting to attend a 4-year college and 40.1% expecting to attend graduate or professional school. In comparison to potential first generation student, only 12.6% of potential non-first generation students expected to obtain only some college.

Additionally, research has demonstrated that the earlier the high expectations for educational attainment are formed, the better. Regardless of parents' level of education, students who have higher educational aspirations by eighth grade are more likely to attend college (Bui, 2005).

***Research findings from postsecondary education.*** Findings for self-efficacy at the postsecondary level are comparable to those at the secondary level, with researchers demonstrating that a students' self-efficacy is related to his/her use of self-regulated learning strategies, choice in tasks, choice in college major, performance in college, adjustment to college, and persistence to degree completion (e.g. Greene & Miller, 1996; Lent, Brown, & Larkin, 1986; Pajares & Miller, 1994; Pintrich, 1999; Zimmerman & Bandura, 1994). Pintrich (1999) found positive relationships between college students' reported use of self-regulated learning strategies and their self-efficacy (regression coefficients and zero-order correlations ranged from .12 to .58) and between their self-efficacy and academic performance (regression coefficients or zero-order correlations ranged from .27 to.45).

Tuckman and Sexton (1990) examined the relationship between junior and senior college students' self-efficacy and a self-regulated learning task involving writing test items, and determined that students with higher self-efficacy engaged in significantly more writing than did students with lower self-efficacy ($F = 43.97$, $df = 2,111$ $p < .001$), demonstrating a relationship between self-efficacy and actual performance. Interestingly, they also found that students with high self-efficacy actually underestimated their performance and wrote an average of 38 items per week (compared to their average estimation of 30 items per week) whereas the low self-efficacy group overestimated their

performance, writing an average of only 4 items per week, below their average estimation of five items per week. Tuckman and Sexton (1990) attributed this finding to students who believed they could do more (those with high self-efficacy) putting in more effort and doing more than they thought they could and those who expected little putting in less effort and achieving less than expected.

Much of the research on self-efficacy at the college level has focused on the fields of mathematics and science and the link between mathematics self-efficacy and performance (e.g. Hackett, 1985; Hackett & Betz, 1989; Lent, Lopez, & Bieschke, 1991, 1993; Pajares & Miller, 1994). Hackett and Betz (1989) defined *mathematics self-efficacy* as "a situational or problem-specific assessment of an individual's confidence in her or his ability to successfully perform or accomplish a particular task or problem" (p. 262). Researchers in this area have generally found that college students' mathematics self-efficacy is more predictive of their mathematics interest, choice of math-related courses and majors, and mathematics performance than their prior mathematics achievement (e.g. Hackett, 1985; Hackett & Betz, 1989; Lent, Lopez, & Bieschke, 1991, 1993; Pajares & Miller, 1994). For example, Hackett and Betz (1989), in their study of undergraduates found that self-efficacy for mathematics performance was correlated moderately with actual mathematics performance ($r$ =. 44, $p$ < .01), and that mathematics self-efficacy predicted choice of a mathematics-related major above and beyond mathematics performance and achievement ($\beta$ =.24). In another example, similar to the Pajares' (1996) study with middle schoolers, Pajares and Miller (1994) utilized path analysis to study the role of math self-efficacy and self-efficacy for self-regulated learning in college students' mathematical problem solving. Math self-efficacy ($\beta$ =.55)

was more predictive of problem solving than was math self-concept, perceived usefulness of mathematics, prior experience with mathematics, or gender. Self-efficacy beliefs also mediated the effect of prior math experiences on math problem solving.

In studies of college students who pursue science and engineering courses, high self-efficacy has been demonstrated to influence the academic persistence necessary to maintain high academic achievement (Lent et al., 1984, 1986). For example, Lent, Brown, and Larkin (1984) examined the relation of self-efficacy beliefs to college students' persistence and success in science and engineering college majors and found that students' who reported high self-efficacy for meeting the educational requirements of their majors achieved higher grades (Hotelling's $T^2(3, 20) = 11.93$, $p < .05$) and persisted longer ($\chi^2(1, N = 24) = 4.04$, $p < .05$) in those majors over the following year than those with low self-efficacy.

In their meta-analysis of 36 studies, Multon, Lent, and Brown (1991) also examined the relationship between self-efficacy beliefs and academic performance and persistence (defined as time-on-task, amount of time spent on a performance measure, and number of academic semesters completed) for students in elementary, secondary, and college. Effect size estimates for performance ($r_u = .38$, $z = 28.22$, $p < .001$) and for persistence ($r_u = .34$, $z = 11.75$, $p < .001$) indicated that across studies, self-efficacy beliefs were moderately related to performance and persistence. Additionally, self-efficacy beliefs were found to account for approximately 14% of the variance in students' academic performance and approximately 12% of the variance in academic persistence.

In regard to expectations for educational attainment, for first-year college enrollees the discrepancy between first generation and non-first generation students in

expectations for educational attainment apparent at the high school level has been found repeatedly, with first generation students expecting lower levels of educational attainment than non-first generation students (e.g. Hahs-vaughn, 2004; Lohfink & Paulsen, 2005; Terenzini et al., 1996). Understanding this discrepancy in expectations is significant because expectations for educational attainment are consistently related to actual educational attainment, particularly for first generation college students.

In a study examining the predictors of first-year GPA for students, expectancy beliefs were the most significant predictor for first generation students ($R^2$ change = .34, $p$ <.001 for expectancy and .16, $p$ < .001 for ACT), but not for non-first generation students ($R^2$ change = .10, $p$ < .001 for expectancy and .16, $p$ < .001 for ACT) (Naumann, Bandolos, & Gutkin, 2003). In their study of first-year students enrolled at four-year colleges, Lohfink and Paulsen (2005) found that first generation students who expected to complete a bachelor's degree or higher were 7.3% more likely to persist than those who expected to complete a bachelor's degree or less. In their study examining the differences in self-efficacy for first generation and non-first generation college students, Ramos-Sanchez and Nichols (2007) found that, regardless of parent education level, students' level of self-efficacy at the beginning of the year predicted later college adjustment ($F$(2, 188) = 10.62, $p$ < .001; $R^2$ = 10 (adjusted $R^2$ = .09), with higher self-efficacy being related to better college adjustment.

**Effort/mindset.**

***Definition.*** A third source of motivation for self-regulating one's learning comes from a learner's attributions of success and failure to either their effort or their ability. Effort/mindset refers to students' mindset (whether intelligence and ability are viewed as

fixed or malleable with effort), how they view failure and success, and the effort they put into schoolwork. Research has demonstrated that when students attribute previous academic successes and failures to their own level of effort, they are more likely to put forth effort again in the future (e.g. Ames & Archer, 1988; Dweck & Leggett, 1988; Weiner, 1986).

This component of motivation and self-regulated learning is highly associated with goal orientation because students who operate from a growth mindset, or one in which they view their ability as changeable through effort, and attribute success to effort and hard work are more likely to set mastery goals for themselves whereas students who operate from a fixed mindset, or the belief that they cannot change their ability and that their performance is determined by their ability, are more likely to set performance goals (e.g. Ames & Archer, 1988; Blackwell, Trzesniewski, & Dweck, 2007; Dweck & Leggett, 1988). Effort and mindset are also strongly related to self-efficacy, with students' with higher self-efficacy more likely to put forth effort to achieve their goal (e.g. Pintrich, 1999; Pintrich & DeGroot, 1990; Tuckman and Sexton; 1990). Therefore, much of the research on effort and mindset also overlaps with goal orientation and self-efficacy and some sample findings have already been presented.

***Research findings from secondary education.*** Most research on mindset, or theories of intelligence, occur at the elementary or college levels; however, there are some studies at the secondary level. Blackwell and colleagues (2007) followed four cohorts of seventh grade students through to eighth grade and examined the relationship between their mindset, or beliefs about their ability to change their intelligence, and their achievement as measured by course grades. They found significant positive correlations

between a growth mindset and effort beliefs ($r = 5.54$, $p < .01$), learning goals ($r = 5.34$, $p < .01$), low helpless attributions (how much they believed ability caused their failure; $r = 5.44$, $p < .01$), and positive strategies (reported use of effort-based strategies; $r = 5.45$, $p < .01$). Seventh and eighth graders' mindsets were found to be significant predictors of mathematics achievement ($r$'s ranged from .12 to .20, $p < .01$). Additionally, mindset at the beginning of seventh grade predicted math achievement at the end of eighth grade ($\beta = .17$, $t = 3.40$, $p < .05$), and when prior math achievement was controlled for ($\beta = .43$, $t = 8.48$, $p < .05$), with students with growth mindsets and mastery goal orientations performing better in math than those with fixed mindsets.

Blackwell and colleagues (2007) also conducted an intervention study to determine if they could teach seventh grade students to approach work from a growth mindset and in turn perform better academically. Results indicated that the students in the control group saw a drop in their grades from the beginning of seventh grade to the end ($b = -.20$, $t = -2.61$, $p < .05$), as is typical for junior high students, but students in the experimental condition saw no such drop and a significant effect of the intervention was found ($b = .53$, $t = 2.93$, $p < .05$).

Good, Aronson, and Inzlicht (2003) also conducted an intervention study with junior high school students in an effort to encourage students to see their intelligence as malleable and measure the impact of the intervention on standardized test achievement. A control group and three treatment groups were created, with one treatment group receiving only messages about the malleability of intelligence, the second receiving messages only about the fact that all students face struggles but most overcome them, and the third receiving both messages. Results indicated that a growth mindset could be

taught and was worthwhile to teach. The researchers found that all three treatment conditions increased both male and female students' math standardized test scores as compared to the control condition, and the results were particularly strong for females. Females achieved significantly higher math scores if they were in the intelligence as malleable condition ($t(26) = 3.34$, $p < .001$, $d = 1.13$), the overcome challenges condition ($t(25) = 4.29$, $p < .001$, $d = 1.50$), and the combined condition ($t(26) = 4.14$, $p < .001$, $d = 1.30$) than if they were in the control condition. Males achieved significantly higher math scores than the control group only in the intelligence is malleable condition ($t(40) = 1.95$, $p < .054$, $d = 0.64$).

***Research findings from postsecondary education.*** Van Etten, Pressley, McInerney, and Liem (2008) conducted an ethnographic interview study with college seniors in an effort to learn more about their academic motivations. In regard to their beliefs about effort, the students acknowledged that ability played a role in academic success in college but they also reported believing that most students can be successful in college through effort and effective strategy use and that such a belief helped keep them motivated. The characteristics that were identified as positively affecting motivation by the most students included: having high expectations and/or goals, being able to pay for college, health and wellness, feeling successful, and feeling recognized for their success. In regard to the effect of instructor feedback on their motivation, students reported that positive specific feedback was most motivating and negative specific feedback was the next most motivating, while positive general feedback was not helpful and negative general feedback was least motivating and actually often had the opposite effect and caused students to exert less effort or give up.

Hong, Chiu, Dweck, Lin, and Wan (1999) examined the role of growth mindset in predicting college students' effort versus ability attributions as well as their performance on an intelligence test. No significant main effects or interaction effects were found for performance on the standardized test based on theory of intelligence held by the students. Despite the task being described as an intelligence test, a significant main effect was found in students' effort attributions ($F$(l, 76) = 5.02, $p < .05$), with students with growth mindsets attributing more weight to effort ($M$ = 27.3%) than did students with fixed mindsets *(*$M$ = 17.8%).

In a somewhat similar study, Grant and Dweck (2003) examined the goal orientation, attributions, and achievement of students in a college organic chemistry course. They found that learning or mastery goals were significantly negatively correlated with loss of intrinsic motivation ($r$ = -.39, p < .001) and withdrawal of time and effort (r = -.40, $p < .001$) while ability or performance goals were significantly positively correlated with each ($r$ = .40, $p < .001$ and .32, $p < .01$ respectively). They also found that learning goals ($\beta$ =.56, $p < .001$) were predictive of effort-based attributions for failure while ability goals were predictive of ability-based attributions ($\beta$ =.22, $p < .05$). Finally, learning goals were found to positively predict final course grade ($\beta$ = .20), $t$(120) = 2.42, $p < .05$ while ability goals did not significantly predict grades.

Robins and Pals (2002) investigated the stability of mindset from high school to college and across all years of college, as well as individual differences during college. In two separate cohorts, they found no significant differences in students' mindset from the beginning of college to their second, third, or fourth year in college. The researchers also computed correlation coefficients for mindset scores between each of the three

assessments times and found all were significant ($p$ <. 05) and positive: .63 for Year 2 to Year 3, .67 for Year 3 to Year 4, and .57 for Year 2 to Year 4.

Aronson, Fried, and Good (2002) conducted an intervention study to test whether or not teaching a growth mindset to students, particularly African American students, would help them resist stereotype threats (student awareness of negative stereotypes about the intelligence of African American versus White students) and perform better in college than their peers in the control group. Results demonstrated that students (both African American and White) in the group who learned about the malleability of intelligence reported viewing intelligence as more malleable ($t(73) = 2.07$, $p < .05$), enjoying the educational process more ($t(72) = 2.05$, $p$ <.05.), and valuing academics more ($t(72) = 2.22$, $p < .05$), and earned higher grades (controlling for SAT, $F(2, 72) = 4.93$, $p < .01$) than did their peers in the two control conditions.

**Persistence/determination.**

***Definition.*** Persistence can be defined as a student's ability to maintain effort and continue engaging in goal-directed behavior despite obstacles (e.g. Duckworth and Seligman, 2005; Harackiewicz et al., 1997; Kahn & Nauta, 2001; Robbins et al., 2004, 2006). Persistence is intricately linked to effort and mindset and to goal orientation because it refers to continued effort and is influenced by a student's belief that effort will play a role in whether or not he/she will be able to achieve his/her goal. Students who believe that effort and hard work have the potential to lead to positive outcomes and who set mastery goals for themselves are more likely to persist in their behavior toward achieving a goal (e.g. Elliott & Dweck 1988, Grant & Dweck 2003, Miller et al. 1996, Wolters, 2004). Self-efficacy plays into a students' persistence by providing motivation

for students to persist, with students with high self-efficacy more likely to persist on tasks, despite challenges because they believe they are capable of achieving a given goal (e.g. Greene & Miller, 1996; Perrakis, 2008**;** Pintrich, 1999; Zimmerman & Bandura, 1994).

Despite these overlaps in terms, persistence is distinguished from effort, self-efficacy, and strategy use, and goal orientation in the work of Robbins and colleagues (2004, 2006) and identified both as "goal striving" and "determination." In Conley's key learning skills and techniques, persistence was also identified as its own component of academic behavior. Therefore, persistence was distinguished in this review as an interrelated but separate aspect of self-regulated learning. Due to interrelatedness of persistence with the other components of self-regulated learning, multiple research findings on persistence have already been presented in this review, but a few more representative examples of findings will be shared. Note than in research, persistence is studied through various terms in addition to persistence including academic buoyancy, academic tenacity, determination, grit, perseverance, and self-discipline and so various terms are seen in the research findings below.

***Research findings from secondary education.*** As mentioned, research has consistently demonstrated that at both the secondary and postsecondary levels, students with a growth mindset and students with high self-efficacy tend to persist in putting forth effort toward a goal despite challenges (e.g. Elliott & Dweck 1988, Grant & Dweck 2003, Greene & Miller, 1996; Pintrich, 1999; and Wolters, 2004).

Duckworth and Seligman (2005) investigated the self-discipline of eighth graders and its relation to final grades, school attendance, admission to a competitive high school,

and standardized achievement test performance, and in a replication study additionally investigated the relationship between self-discipline, IQ, and study habits. Self-discipline was operationalized as a student's ability to delay gratification, inhibit behavior, follow rules, and control impulsive reactions. This relates to the notion of persistence in that students who persist must often delay gratification and ignore or control their instinct to quit when faced with challenges in order to achieve their learning goal. In both studies researchers found that self-discipline was significantly positively correlated with first semester grades ($r$ =.52, p < .001 and r = .66, $p$ <. 001), final grades ($r$ = .55, $p$ < .001 and $r$ = .67, $p$ < .001), achievement test performance ($r$ = .29, $p$ <. 01 and $r$ = .43, $p$ < .001), and selection to a competitive high school ($r$ = .42, $p$ < .001 and $r$ = .56, $p$ < .001), and in study 2 self-discipline was found to be significantly correlated with homework hours ($r$ = .35, $p$ < .001). Also, results from a regression analysis with self-discipline and IQ indicated that self-discipline accounted for more than twice as much variance in final GPA ($\beta$ = .65, p < .001) as IQ did ($\beta$ =.25, p < .001).

Martin & Marsh (2008) examined high school students' academic buoyancy, defined as "students' ability to successfully deal with academic setbacks and challenges that are typical of the ordinary course of school life (such as poor grades, competing deadlines, exam pressure, or difficult schoolwork)" (p. 54), and its relation to their self-efficacy, control, academic engagement, anxiety, and teacher-student relationship. Results from assessments administered at two points during the school year indicated a significant relationship between academic buoyancy and anxiety (-.53; -.48) uncertain control (-.36, -.38), engagement (.18, .21), self-efficacy (.16, .21), and teacher–student relationships (.16, .21). Post-test results showed that anxiety ($\beta$ = -.46), self-efficacy ($\beta$ =

.14), academic engagement ($\beta = .16$), and teacher-student relationships ($\beta = .08$) explained variance in academic buoyancy over and above that explained by academic buoyancy in the pretest.

***Research findings from postsecondary education.*** In their study investigating predictors of college student persistence from the first year of college to the next, Kahn and Nauta (2001) focused on the variables from Social Cognitive Career Theory, including self-efficacy, outcome expectations, and goals. Students were first assessed before beginning college and then again during their second semester. Results from first semester measures indicated significant positive relationships between sophomore persistence and high school achievement ($r = .16$, $p < .01$), pre-college self-efficacy ($r = .12$, $p < .05$), and first-semester GPA ($r = .43$, $p < .001$), and the odds ratio of 4.02 for first-semester GPA indicated that, even when controlling for past performance and social cognitive factors, students were four times more likely to persist to the second year of school for every one point increase in first semester GPA. Results from second semester measures indicated significant positive relationships between sophomore persistence and second semester self-efficacy ($r = .19$, $p < .01$), second semester outcome expectations ($r = .25$, $p < .001$), second semester performance goals ($r = .24$, $p < .001$), and second semester GPA ($r = .31$, $p < .001$). The best predictors of sophomore persistence when considering first and second semester measures were second semester performance goals ($\psi = 1.99$) and second semester GPA ($\psi = 3.25$).

Gore (2006) studied the extent to which self-efficacy beliefs predict college outcomes, including GPA and persistence or retention to the next semester and to the next school year. Using hierarchical linear regression, Gore found that the ACT

composite score was a significant predictor of GPA across the first three semesters of college, accounting for between 6% and 7% of the variance, and that end-of-the-semester college self-efficacy was a significant predictor accounting for an additional 10% of the variance in first- and second-semester GPAs and an additional 4% of the variance in third-semester GPA. A second study conducted by Gore (2006) using hierarchical logistic regression indicated that in regard to persistence from one semester to the next, the addition of academic self efficacy to a model with ACT composite increased the ability to predict persistence from semester one to two ($G_{diff}$ = 5.83, $df$ = 1, $p$ < .05) and semester two to three ($G_{diff}$ = 4.74, $df$ = 1, $p$ < .05)

Perrakis (2008) studied the factors that predict and promote academic success for community college students (measured by course completion and GPA). Through regression analysis she found that race, age, high school GPA, calculus completion, reasons for enrollment, and dedication to persistence were found to be significant predictors for both genders in the sample. An additional significant predictor for men only was the feeling of belonging on campus, and additional significant predictors for women only were marital status and the intent to succeed academically.

**Personal readiness and self-regulated learning summary.**

***Personal Readiness.*** Results from Robbins and colleagues' (2004, 2006) studies on psychosocial factors as predictors of college success suggested that aspects of self-regulated learning account for differences in first-year college performance and in student retention, and so the core components of self-regulated learning and the research conducted with secondary and postsecondary samples were examined to better understand how these components may affect college readiness. The core components of

self-regulated learning strategy use, goal orientation, self-efficacy, effort and mindset, and persistence and determination directly aligned with Conley's (2012) key learning skills and techniques, one of four major aspects of college readiness. Research has demonstrated that each of these components is related to positive outcomes at both the secondary and postsecondary education levels. Researchers have not yet explored these components in relation to college-ready high school students, however, and so research must be undertaken to do so.

A starting point for this research on a key portion of college readiness, personal readiness, involves defining the construct. Drawing on the literature review on psychosocial predictors of college success and components of self-regulated learning, the term *personal readiness* was defined as the dimension of college readiness pertaining to students' self-regulated learning ability including their self-efficacy and their ability to engage in academic behaviors such as planning, setting learning and future goals, managing their time, using study skills, putting forth effort, maintaining belief in their ability to succeed, staying motivated, and persisting in the face of challenges.

The second step in conducting research on the personal readiness for college of high school students requires the use of existing measures or the development of new measures that specifically measure personal readiness for college. A brief review of such measures follows.

## Assessing Students' Personal Readiness For College

**Existing measures of personal readiness for college.** As mentioned previously, tools that measure students' personal readiness for college while still in high school are lacking. However, in recent years, two tools have emerged as promising for the study of

personal readiness: the academic behaviors dimension of the College & Career Ready School Diagnostic (CCRSD; Conley, McGaughey, Kirtner, van der Valk, & Martinez-Wenzl, 2010), and ENGAGE Grades 10-12 (ACT, 2012), an adaptation of ACT's postsecondary Student Readiness Inventory for middle and high school students.

***Academic behaviors dimension of the CCRSD.*** The academic behaviors dimension of the CCRSD (Conley et al., 2010) contains 37 items on a four-point importance scale (ranging from not at all important to very important with an additional don't know option) measuring the key learning skills and techniques that Conley (2007, 2011) identified as necessary for college readiness. Lombardi, Seburn, and Conley (2011) examined the initial psychometric properties of the academic behaviors dimension through a cross-validation study with ninth through twelfth graders. Salient factors were identified through an exploratory factor analysis (EFA) with a randomly selected 40% of the sample and included: Goal-driven Behaviors ($\alpha = .87$, $\overline{X} = 3.40$, $SD = 0.71$; defined as the perceived importance of setting goals and the necessary steps in accomplishing those goals), Persistence ($\alpha = .90$, $\overline{X} = 3.43$, $SD = 0.72$; defined as help-seeking and time management behaviors), Study Skills ($\alpha = .86$, $\overline{X} = 3.12$, $SD = 0.81$; defined as group work with peers, and test- and note-taking strategies), and Self-Monitoring ($\alpha = .83$, $\overline{X} = 3.01$, $SD = 0.90$; defined as self-awareness of effective strategies, resources, and ways to improve). A confirmatory factor analysis was conducted with the remaining 60% of the sample resulting in an acceptable model fit ($\chi^2(271) = 1164.2$, $p < .001$, RMSEA = .06, and CFI = .89).

The CCRSD was developed to serve as a diagnostic tool for the school and its practices rather than for individual students. Based on findings from their initial

validation study, Lombardi and colleagues (2011) contended that the academic behaviors dimension of the CCRSD is a tool that has the potential to inform school personnel of how their students are performing on academic behaviors such as goal-driven behaviors, study skills, persistence, and self-monitoring and how these academic behaviors may be integrated into the school curriculum. While promising in measuring personal readiness for college, this instrument fails to measure student self-efficacy, which Conley (2011) in addition to other researchers has suggested is a key part of academic behavior.

***ENGAGE.*** Unlike the CCRSD, the ENGAGE is intended to evaluate individual students' psychosocial attributes and inform individual intervention (ACT, 2012). ENGAGE, previously named the Student Readiness Inventory, was developed for college students (Le, Casillas, Robbins, and Langley, 2005; Robbins, et al 2004, 2006) and items were adapted to the high school level for the Grades 10-12 version. The high school ENGAGE shares 92% of its 108 items with the college version. The 108 items form ten scales (ACT, 2012): Academic Discipline (measures students efforts and perception of themselves as hardworking; $\alpha = .87$), Academic Self-confidence, (measures students' self-efficacy for schoolwork; $\alpha = .84$), Commitment to College (measures students' commitment to attending and completing college; $\alpha = .89$), Communication Skills (measures interpersonal communication and social skills; $\alpha = .85$), General Determination (measures commitment to fulfilling obligations; $\alpha = .88$), Goal Striving (measures the strength of efforts to achieve goals; $\alpha = .87$), Social Activity (measures level of comfort with interacting with others; $\alpha = .86$), Social Connection (measures involvement with the school community; $\alpha = .83$), Steadiness (measures emotional regulation; $\alpha = .87$), and Study Skills (measures beliefs in ability to solve problems and

complete schoolwork; $\alpha = .88$).

Based on factor analysis conducted previously with college students (Le et al., 2005), these 10 scales were hypothesized to form 3 higher-order factors, Motivation and Skills, Social Engagement, and Self-regulation; a hypothesis that was confirmed in an initial validation study of the ENGAGE grades 10-12 (ACT, 2012). Based on model fit indices including comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR), the researchers deemed the model an acceptable fit for ENGAGE grades 10-12 (fit index values were not presented; ACT, 2012).

Interestingly, although the model fit was deemed acceptable and many of the scales of the ENGAGE align with the definition of personal readiness presented here within and the core components of self-regulated learning, their assignment to the three higher-order factors is not well aligned with theory. First, the factor of Motivation and Skills (defined as "personal characteristics that help students to succeed academically by focusing and maintaining energies on goal-directed activities," ACT, 2012, p. 45) includes both characteristics and skills as the name implies. These skills (Communication Skills, Study Skills, and Academic Discipline) are aligned theoretically with the factor Self-Regulation (defined as the "cognitive and affective processes used to monitor, regulate and control behavior related to learning," ACT, 2012, p. 45) because they are indeed examples of processes related to the self-regulation of learning. This alignment is represented by the factor correlation of .86 between Motivation and Skills and Self-Regulation. Additionally, according to the model, only two scales load on to the factor Self-Regulation, Academic Self-Confidence and Steadiness, which are not processes as

the definition suggests, but attitudes about ability. According to theory, Academic Self-Confidence (self-efficacy) fits more appropriately with Motivation because self-efficacy is a source of motivation for learning and goal directed behavior (e.g. Zimmerman & Schunk, 2008). The ENGAGE for grades 10-12 is a promising tool for measuring students' personal and social readiness for college, but theory suggests the need for testing a new model for the ENGAGE grades 10-12 and research should continue to be conducted to gather further validity data for the ENGAGE grades 10-12.

***Summary of measures for personal readiness.*** In sum, in initial validation studies of both the academic behaviors domain of the CCRSD and the ENGAGE grades 10-12, both measures have demonstrated that they have the potential to measure personal readiness for college. However, neither instrument has been studied for its predictive validity, meaning that their ability to predict success in college has not been established. Predictive validity is perhaps the most important form of validity for these instruments to truly be called measurements of college readiness and so future research must seek to gather such evidence.

**Measures for self-regulated learning.** While few measures of personal readiness for college are currently available and remain in the initial stages of validation, numerous measures for self-regulated learning and the components of self-regulated learning exist. Instruments that measure self-regulated learning strategy use and study skills include instruments such as Revised Study Processes Questionnaire – Two Factor Model (Revised-SPQ-2F; Biggs, Kember, & Leung, 2001), Approaches to Learning and Studying Inventory (ALSI; Entwisle & McCune, 2004), and the Learning and Study Strategies Inventory (LASSI; Weinstein, Zimmerman, & Palmer, 1988). These measures

focus almost solely on strategy use and fail to measure other aspects of self-regulated learning. Instruments such as the Motivation and Engagement Scale- High School (MES; Martin, 2007) and the Patterns of Adaptive Learning (PALS; Midgley et al., 2000) have been demonstrated to be psychometrically sound measures for measuring achievement motivation for school including goal orientation and self-efficacy but do not measure strategy use. Instruments measuring students' beliefs about intelligence and effort and about their persistence include short scales created for research or taken from larger scales such as the Theory of Intelligence scale (Dweck 1999), Effort Beliefs scale (Blackwell, 2002 as cited in Blackwell, et al., 2007), and the Effort and Persistence subscale from the Cognitive Engagement subscales of the Attitudes Toward Mathematics Survey (Miller, el al., 1996). Instruments measuring students' self efficacy in relation to academics also tend to be scales created for particular studies such as the Verbal Efficacy and Mathematics Efficacy scales (Zimmerman & Martinez-Pons, 1990), Academic Self-Efficacy Scale (Chemers et al, 2001), the Mathematics Self-Efficacy Scale (Betz & Hackett, 1983) and subscales that pertain to academics drawn from the Children's Multidimensional Self-Efficacy Scales (Bandura, 1989).

The most comprehensive tools available for assessing self-regulated learning are the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1991, 1993), and the Self-Regulation Strategy Inventory - Self-Report (SRSI-SR; Cleary, 2006) which both measure the various components of self-regulated learning. The SRSI-SR remains in the initial phase of instrument validation, with the only published validation study conducted with 142 students from one high school. On the other hand, the MSLQ, which was developed based on the social-cognitive view of

learning for the purpose of assessing the strategies that students use to regulate their learning, has been well researched (e.g. Pintrich et al., 1991,1993) and used in various studies (e.g. Hadwin, Winne, Stockley, Nesbit, & Woszcyna, 2001; Jacobson & Harris, 2005; Lynch, 2006).

Despite the research supporting the use of the MSLQ, Pintrich (2004) suggested that the MSLQ is not as comprehensive as it should be, particularly for assessing the self-regulated learning of college students, because it fails to assess strategies to control motivation or affect; students' attempts to monitor, control, and regulate their motivation; and students' perceptions of the task and context. Pintrich (2004) proposed a conceptual framework for assessing self-regulated learning in college students that integrates motivational, affective, and social contextual factors with cognitive and educational factors and suggested that either a new instrument be developed for assessing self-regulated learning following his framework needs to be developed or the pieces missing from the MSLQ may be added.

***Summary of measures for self-regulated learning.*** While multiple instruments and scales have been developed to measure self-regulated learning in general and its components separately, only two have been identified that are comprehensive in that they measure strategy use, self-efficacy, goal orientation, effort, and persistence: the MSLQ (Pintrich et al., 1991) and the SRSI-SR (Cleary, 2006), both of which require more research. Furthermore, no assessment of self-regulated learning designed specifically for evaluating college readiness exists, and so research must be conducted to determine if instruments such as the MSLQ or SRSI-SR can serve to predict college success. If a new measure is developed, Pintrich's (2004) framework, as well as his call for a use-inspired

model that can inform intervention, may serve as a guide for the development of an instrument to measure self-regulated learning for college readiness.

**Considerations For Future Assessment**

Future research focused on developing an instrument to measure personal readiness for college (which, based on research, is hypothesized to be virtually synonymous with students' ability to self-regulate their own learning) should take into account the three suggestions that Winne and his colleagues (Winne & Hadwin, 1998;Winne & Perry, 2000) have identified as important to consider when developing an instrument to measure self-regulated learning.

First, Winne and Perry (2000) suggested that when developing a measure of self-regulated learning, clearly defining the construct is one of the most important aspects of the process. They proposed that when researchers develop an instrument, they are operationally defining a theory of self-regulated learning. Ensuring that the construct is clearly defined and that the items on the instrument created measure that construct is important to providing construct validity evidence.

They also suggested that asking students to stop and reflect on their use of self-regulated learning is similar to an intervention in itself in that some of the same types of validity that Shadish, Cook, and Campbell (2002) describe must be considered when creating the instrument to make certain that valid interpretations can be drawn from it. For example, Winne and Perry (2000) suggested that researchers need to consider internal validity and try to eliminate the possibility of confounding between the measurement intervention, other factors, and the response. The students' responses on a self-report instrument could be attributed to their belief that their teacher will see their

responses if the researchers do not make clear that individual results will be kept confidential. In developing their instrument, researchers need to prevent such possible confounding.

Finally, in line with Pintrich's (2004) use-inspired basic research model, Winne and Hadwin (1998) argued that any instrument developed must offer utility; it must serve a greater purpose than measuring self-regulated learning for the sake of measuring self-regulated learning or measuring personal readiness for the sake of measuring personal readiness. Like the MSLQ, ENGAGE, and CCRSD, the instrument should provide information to researchers, students, and educators that leads them to improve their motivation to use and their actual use of self-regulated learning strategies and processes for the purpose of ultimately improving learning and academic achievement, and in the case of a survey measuring personal readiness for college, for the purpose of ultimately improving personal readiness for college and the likelihood of succeeding in college.

**Summary**

A great divide exists between the competency expectations for high school and postsecondary education and too few high school students are graduating from high school prepared for success in college courses. Researchers attempting to determine why this great divide exists and what can be done to bridge the divide have shifted their focus from examining only students' academic readiness for college to a more comprehensive focus on the multiple dimensions of readiness including students' psychosocial readiness. Unlike high school students, college students are expected to be independent learners, and so an aspect of psychosocial readiness is receiving special attention in the research on what makes college students successful independent learners. The psychosocial

predictors of college readiness identified by researchers are virtually synonymous with self-regulated learning and its components.

While researchers have consistently demonstrated the positive relationship between self-regulated learning and academic achievement at both the secondary and postsecondary level, no research has demonstrated the relationship between self-regulated learning and what it takes to be a college-ready high school student. A current need in the research is for a line of research focused directly on self-regulated learning as it pertains to college readiness. Such research will require a measurement tool that can serve the purpose of measuring self-regulated learning for college readiness and designing and testing interventions that promote self-regulated learning. Few such tools currently exist, and so more research should be conducted for the current tools or new, user-friendly tools should be created. Research that seeks to develop new tools or improve upon current tools in the area of personal readiness will have the potential to add to the literature on college readiness and help to bridge the divide between high school graduation and college success.

**Research Questions**

The purpose of this study was to fill a gap identified through review of the literature by developing Personal Readiness Evaluation for Postsecondary (PREP) and establishing validity evidence for the inferences drawn from the PREP, a tool designed to measure personal readiness for college of high school students early enough in the students' journey to college that the information can be used to inform interventions that can in turn increase the students' readiness for success in postsecondary education. Chapter 3 presents the methods used in addressing the overarching research question of

this study: to what extent do evidence and theory support the inferences drawn from the Personal Readiness Evaluation for Postsecondary (PREP) for ninth-twelfth graders? Inferences to be validated included 1) the PREP measures critical aspects of students' personal readiness for college such as their use of self-regulated learning strategies, their self-efficacy, and their effort and persistence; and 2) the PREP can be used to identify students in need of additional support in developing aspects of personal readiness for college. More specific research questions included:

**Phase I. Instrument Development**

1. What is the evidence of content validity?

**Phase II. Pilot Study and Instrument Refinement**

2. Can the intended factor structure of the PREP be confirmed? What is the fit of the model?
3. Does the PREP demonstrate internal consistency?

**Phase III. Testing of the Refined Instrument**

4. Can the intended factor structure of the PREP be confirmed? What is the fit of the model?
5. What is the evidence of convergent validity? Are the three factors interrelated?
6. What is the evidence of discriminant validity?
    a. Is there adequate discrimination between the three factors?
    b. Is the PREP distinct from measures of college readiness such as the PLAN, ACT, and grade point average?
7. Does the PREP demonstrate internal consistency?

8. Is the PREP able to distinguish between groups based on grade point average?
9. Can the PREP be used to identify groups of students in need of intervention to promote self-efficacy and expectations, effort and persistence, and self-regulated learning?

# Chapter 3

# Methods

## Research Questions

The overarching research question for this study is: to what extent are the inferences drawn from the Personal Readiness Evaluation for Postsecondary valid for ninth-twelfth graders? Inferences to be validated included 1) the PREP measures critical aspects of students' personal readiness for college such as their use of self-regulated learning strategies, their self-efficacy, and their effort and persistence; and 2) the PREP can be used to identify students in need of additional support in developing aspects of personal readiness for college. Validity evidence was gathered for this study in three phases. The first phase was the scale development phase, the second was the pilot and instrument refinement phase, and the third was the testing of the refined instrument. In these phases, validity evidence gathered included evidence based on theory, content, internal structure, and relations to other variables. (AERA, APA, & NCME, 1999).

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    b. Is the PREP distinct from measures of college readiness such as the PLAN, ACT, and grade point average?
7. Does the PREP demonstrate internal consistency?
8. Is the PREP able to distinguish between groups based on grade point average?
9. Can the PREP be used to identify groups of students in need of intervention to promote self-efficacy and expectations, effort and persistence, and self-regulated learning?

**Phase I: Instrument Development**

The Personal Readiness Evaluation for Postsecondary (PREP) was developed using the guidelines for scale development laid out by DeVellis (2003) who proposed the following steps: "Step 1: Determine clearly what it is you want to measure" (p. 60). "Step 2: Generate an item pool" (p. 63). "Step 3: Determine the format for measurement" (p. 70). "Step 4: Have the initial item pool reviewed by experts" (p. 85). "Step 5: Consider inclusion of validation items" (p. 87). "Step 6: Administer items to a development sample" (p. 88). "Step 7: Evaluate the items" (p. 90). "Step 8: Optimize scale length" (p. 96). In addition to serving as scale development steps, these steps also serve as a general sequence for gathering evidence of content validity, defined as "the degree to which

elements of an assessment instrument are relevant to and representative of the targeted construct for a particular assessment purpose" (Haynes, Richard, & Kubany, 1995, p. 239). Therefore, the procedures undertaken in scale development were viewed as procedures for addressing research question 1, what is the evidence of content validity.

**Scale construction.** The first step in developing the PREP was defining the construct to be measured, which began with a thorough review of the literature relevant to personal readiness for college. This literature review revealed five major indicators of personal readiness for college. Through a closer examination of the five indicators of personal readiness for college (key components of self-regulated learning), each was defined (see scale blueprint, Appendix A).

Based on this extensive review of the indicators of personal readiness, step 2 was conducted and a pool of items was written for each of the indicators. Step 3 included developing an initial scale with items selected from the five item pools that were perceived to sufficiently represent the identified indicators of personal readiness for college. Items were placed on either a 4-point scale of agreement or a 4-point frequency scale. Middle or neutral points were avoided due to the tendency for individuals to select the neutral point over other points (DeVellis, 2003).

In accordance with step 4, items on the initial scale were reviewed by three graduate students in educational psychology and by a panel of experts including researchers in educational psychology (n=2) and counselors at the junior high and high school levels (n=6) for representation of the defined construct, clarity, readability, style consistency, grammar, neutrality in language. The scale was revised based on feedback. Think alouds (Johnstone, Bottsford-Miller & Thompson, 2006) were conducted with a

seventh grade male and a tenth grade female in which they thought aloud about each item while completing the PREP and then answered follow-up questions after completing the PREP. After one more round of revisions based on student feedback, the addition of validation items such as those from a social desirability scale or from a similar measure was considered and rejected due to the length of the survey and the lack of a similar measure for high school students.

The PREP was then ready to be administered to a development sample. The scale blueprint including indicator, indicator definition, and 80 items organized by indicator was developed (Appendix A). The pilot draft of the instrument (Appendix B) created from the scale blueprint contained 80 items with 24 items aligning with self-regulated learning, 19 with effort/mindset, 18 with motivation, 10 with persistence/ determination, and 9 with self-efficacy. Responses for 40 items were on a four-point agreement scale of Strongly Disagree, Disagree, Agree, Strongly Agree, and for the other 40 items were on a four-point frequency scale of Never, Rarely, Occasionally, And Regularly.

**Phase II: Pilot Study and Instrument Refinement**

**Participants.** The 80-item PREP was piloted with a purposive convenience sample of 451 seventh - twelfth grade students from three Midwestern public schools: one urban high school, one suburban high school, and one suburban junior high school. The majority of participants were seventh, eighth, and tenth graders and the sample was racially diverse (34% White, 31% Black, 20% Hispanic, 12% Asian, and 3% American Indian).

**Procedures.** Three schools were invited to participate in this study and each agreed. The administrator at each school selected the grades to which the PREP would be

administered. Schools obtained passive parental consent through a letter sent home to all parents or guardians two weeks prior to administration of the PREP (Appendix E). The PREP was administered to students in their advisory or homeroom classes by their teacher. Teachers were given a set of standardized procedures for administration (Appendix G), including the process for obtaining student assent (Appendix F).

Following administration of the PREP, two classes of students within the pilot study provided feedback on the instrument regarding clarity of items, their understanding of items, their thoughts as they read the items, how they interpreted the items, and suggestions for improvement of items and the instrument as a whole. Initial item analysis analyzing response patterns was also conducted.

**Analyses.** The purpose of the pilot study was to refine and revise the instrument, establish the factor structure of the instrument, and provide further evidence of content validity. To that end, the following analyses were utilized.

***Confirmatory Factor Analysis***. Confirmatory factor analysis (CFA) was conducted using LISREL8.8 (Jöreskog & Sörbom, 2006) to test the fit of the five-factor structure hypothesized based on theory (research question 2). Listwise deletion of missing data was used to determine covariance matrices, resulting in a sample size of 380. The estimation method used was Maximum Likelihood and all analyses were conducted on covariance matrices. Model fit was determined using the chi-square test, the Root Mean Square of Error Approximation (RMSEA), and the Comparative Fit Index (CFI). In assessing model fit using these indices, model fit is considered good or close if the chi-square value is nonsignificant (Brown, 2006), if the CFI is approaching one or is greater than or equal to 0.95 (Hu & Bentler, 1999), and if the RMSEA is less than or

equal to 0.05 (Browne & Cudek, 1993) or below the cutoff of .06 (Hu & Bentler, 1999).

***Exploratory Factor Analysis.*** In order to revise the PREP and ensure that the minimum number of items needed to measure personal readiness for college were retained (step 8: optimize scale length), exploratory factor analyses (EFA) were conducted in conjunction with informed researcher decision-making based on theory (Henson & Roberts, 2006). EFA was conducted in SPSS using principal axis factoring with promax rotation (due to interrelatedness of factors). In determining the number of factors to retain, parallel analysis was employed (Horn, 1965; Turner, 1998) in addition to using the eigenvalue >1 rule (Kaiser, 1960) and examining the scree plot (Cattell, 1966). Next, EFA was conducted using principal axis factoring with promax rotation and forcing of the items onto the identified number of factors. Factors and the items loading on each factor were closely examined to check for theoretical fit.

***Reliability analysis.*** Reliability analysis was conducted within SPSS to test the internal consistency of the scales of the PREP (research question 3) and to aid in instrument refinement. Through an iterative process, items that loaded less than .40 (Netemeyer et al., 2003), cross-loaded at .32 or higher (Tabachnick, & Fidell, 2001), were identified as increasing the coefficient alpha if removed (Netemeyer, et al., 2003), and those with poor item-total correlation (Netemeyer et al., 2003) were removed and the process began again with EFA and then reliability analyses.

## Phase III: Testing of the Refined Instrument

### Participants.

***Sample 1.*** The target population of the Personal Readiness Evaluation for Postsecondary (PREP) is Minnesota high school students attending public schools. The

sampling frame for this study included 236,329 ninth-twelfth grade students from 377 traditional public schools with a twelfth grade, including senior highs (grades 9-12 or 10-12; 178), combined junior and senior high schools (196), and K-12 schools (3). In order to secure coverage of the state, a multi-stage cluster sampling method was utilized. First, 12 schools were randomly selected from each of nine regions (established as regional educational service cooperatives) for a total of 108 schools. School administrators and counselors at each of the randomly selected schools were contacted by email, mail, and phone to request participation. Of the 108 randomly selected schools, 12 schools agreed to participate (a response rate of 11.1%). Next, schools selected one or more classes in which to administer the PREP or elected to survey all of their students. A total of 1,665 students participated in the study.

*Participating Schools.* The 12 schools electing to participate represented eight out of the nine regions in the state. Eight of the schools served grades 7-12, 1 served 6-12, and 3 served 9-12. Populations of the schools ranged from 43 students to 1,320 with an average of 390 students and a median of 230 students. Ten of the schools were considered rural schools while 2 were suburban, one in a first ring suburb and one in a second ring suburb. Chi-squared tests were conducted to examine differences between participating and nonparticipating schools. Results from the between-school chi-squared tests indicated no statistical differences for school type (buildings with grades 6-12, 7-12, 8-12, 9-12, 10-12; $\chi^2(4, n = 108) = 1.82, p < .77$); student population ($\chi^2(98, n = 108) = 97.88, p < .49$); gender (male $\chi^2(100, n = 108) = 97.88, p < .54$, female $\chi^2(98, n = 108) = 97.88, p < .49$); or race (Total minority population $\chi^2(69, n = 108) = 75.94, p < .27$), American Indian students $\chi^2(27, n = 108) = 25.31, p < .56$, Asian students $\chi^2(31, n = 108)$

= 31.40, $p < .45$, Hispanic students $\chi^2(44, n = 108) = 53.16, p < .162$, Black students $\chi^2(31, n = 108) = 22.12, p < .88$, and White students $\chi^2(102, n = 108) = 102.94, p < .46$).

*Participating Students*. A total of 1,665 students from the 12 schools participated in the study. Nineteen of the 1,665 students were eliminated from the sample due to incomplete or suspect data yielding a sample size of 1,643. Demographic information was self-reported by students. Students ranged in grade from 9 to 12, with 21.2% in ninth grade, 26.4% in tenth, 31.4% in eleventh, 19.4% in twelfth, and 1.7% unreported. Males made up 50.5% of the sample and females made up 48.0% with 1.5% not reporting gender (compared to 51.4% male and 48.6 female in participating school population). Approximately 23% reported that they would be the first in their family to go to college, while 75% reported that someone in their family had gone to college. 83.6% of students reported that English is the primary language spoken in their home and 14.4% reported that English is not the primary language in their home. In regard to race, 66.8% of students identified themselves as White and 29.9% identified themselves as a race other than White (compared to 22.9% in the participating school population), with 10.5% identifying themselves as Hispanic, 8.9% as Black, 6.6% as Asian, 1.9% as American Indian, and 2.0% as Multiracial, and 3.4% did not report their race. Students also reported on their grade point average, with 22.9% reporting an A- to A average, 25.9% B to A-, 17.4% B- to B, 14.9% C to B-, 7.2% C to B-, 4.8% D to C-, and 3.6% D or below.

A comparison between the study sample demographics reported by students, the demographics of the students in the randomly selected school population, and the demographics of the 377 traditional public schools with a twelfth grade (obtained from the Minnesota Department of Education (MDE, 2010)) can be seen in Table 1.

Information provided for the 377 traditional public schools with a twelfth grade were provided for all students in the schools (which, in some cases, include K-eighth grade students).

Data disaggregated by grade were not available, and so the information provided in the table includes demographic information for 236,329 ninth-twelfth graders and 20,033 non-ninth-twelfth grade students in the Minnesota traditional public school population, 56,948 ninth-twelfth graders and 6,354 non-ninth - twelfth graders in the randomly selected schools population, and 4,683 ninth-twelfth graders and 1,031 non-ninth - twelfth graders in the participating school population. Data indicate that the population of the participating schools was slightly more diverse racially than that of the state school population and considerably more diverse than the randomly selected schools, while the study sample was more racially diverse than the participating schools.

Table 1

*Demographic Information Comparison for Sample 1*

| Demographic | Minnesota Traditional Public School with a 12th grade (n=256,362) | Randomly Selected Schools (n=63,302) | Participating School Population (n=5,714) | Study Sample (self-reported; n=1,643) |
|---|---|---|---|---|
| Race | | | | |
| American Indian | 1.9% | 2.1% | 1.1% | 1.9% |
| Asian | 5.6% | 2.9% | 4.5% | 6.6% |
| Black | 7.3% | 4.8% | 8.5% | 8.9% |
| Hispanic | 4.9% | 4.0% | 8.8% | 10.5% |
| White | 80.3% | 86.2% | 77.1% | 66.8% |
| Multiracial | Not | Not Available | Not Available | 2.0% |
| Not reported | Available | - | - | 3.3% |
| | - | | | |
| Total Minority | 19.7% | 13.8% | 22.9% | 29.9% |
| Gender | | | | |
| Male | 51.2% | 51.4% | 51.4% | 50.5% |
| Female | 48.8% | 48.6% | 48.6% | 48.0 |
| Not reported | - | - | - | 1.8% |

***Samples 2 and 3.*** The second and third samples were purposive convenience samples. The PREP was administered to all tenth-twelfth grade students in two Midwestern suburban high schools participating in Ramp-Up to Readiness™, a school-wide guidance program developed through the College Readiness Consortium at the University of Minnesota and designed to increase the number and diversity of students who graduate from Minnesota high schools with the knowledge, skills, and habits necessary for success in a high-quality college program. A total of 1,498 students participated.

Two separate samples were drawn from this larger sample of 1,498: the first sample (hereafter referred to as sample 2 in this study) was made up of 497 students with a PLAN score on record from the fall of 2010 and the second sample (hereafter referred

to as the sample 3 in this study) included 385 students with an ACT score on record from the fall of 2010. All students in sample 2 were tenth graders, the grade in which the PLAN test is taken, and all students in sample 3 were either eleventh or 12 graders (the ACT is typically taken in the junior and senior years). In both samples about half of the students were male and half female, and the sample racial makeup was similar to that of the school population. Demographic information for the complete sample and the PLAN and ACT subsamples can be found in Table 2.

Table 2

*Demographic Information Comparison for Samples 2 and 3*

| Demographic | Total school population (n=2,888) | Total sample (n=1,498) | Sample 2 (n=497) | Sample 3 (n=385) |
|---|---|---|---|---|
| Grade | | | | |
| 9 | 12.0% | - | - | - |
| 10 | 34.4% | 42.0% | 100.0% | 0.0% |
| 11 | 29.1% | 36.6% | 0.0% | 55.8% |
| 12 | 24.5% | 21.1% | 0.0% | 44.2% |
| Not reported | - | 1.2% | - | - |
| Gender | | | | |
| Male | 51.8% | 51.3% | 49.7% | 48.6% |
| Female | 48.2% | 47.6% | 50.1% | 51.4% |
| Not reported | - | 1.1% | 0.2% | 0.0% |
| Language in Home | | | | |
| English | - | 88.9% | 89.7% | 90.6% |
| Language other than English | - | 8.5% | 8.9% | 7.8% |
| Not Reported | 100% | 2.6% | 1.4% | 1.6% |
| Race | | | | |
| American Indian | 0.8% | 2.5% | 2.0% | 1.8% |
| Asian | 5.5% | 5.2% | 4.8% | 6.2% |
| Black | 12.0% | 5.6% | 5.4% | 6.2% |
| Hispanic | 10.3% | 7.6% | 7.6% | 6.5% |
| White | 71.4% | 77.3% | 76.9% | 78.0% |
| Multiracial | - | 1.8% | 1.8% | 0.3% |
| Not reported | - | 2.8% | 1.4% | 1.0% |

**Data Collection Procedures.**

***Sample 1.*** An Excel spreadsheet of all public secondary school data, including school name, regional educational service cooperative number, district, city, school type, school population, student demographics, school administrator, school address, and school phone number was obtained from the Minnesota Department of Education (MDE, 2010). The school data were examined and all charter schools, alternative learning centers, distance learning programs, and secondary schools without a twelfth grade were eliminated, leaving 377 traditional public schools with a twelfth grade. The revised Excel spreadsheet was converted to an SPSS data file. The data were sorted by regional educational service cooperative number and 12 schools were randomly selected from each of the 9 regions for a total of 108 schools.

Administrators from each school were contacted first by email and mail (see Appendix C) and invited to participate. Those who did not respond were sent a follow-up email reiterating the message in the first communication. Additionally, counselors (who are typically responsible for college and career readiness in their schools) at each school were contacted by email and invited to participate using an email mirroring that of the administrator letter. Schools who did not respond to the emails or mail were contacted by phone and invited to participate. Twelve schools responded that they were interested in participating in the study. These schools were sent follow-up emails with directions for participation, an agreement letter to be signed, and a request for information such as the name and contact information for who would coordinate the PREP study at their school, the number of students they wished to survey, their method for selecting students, the date they would send the parent consent forms, the date they would administer the PREP,

and how they would administer the PREP. Parent consent forms (Appendix E), student assent forms (Appendix F), copies of the PREP scantron form (Appendix D), administration instructions (Appendix G), and a self-addressed envelope with postage included were sent to the designated study coordinators at each school.

Participating schools were directed to select one or more general education classes required of all students (such as a health, physical education, or advisory class in which the class represents the population of the school rather than a select group such as might be found in an Advanced Placement class or special education resource class) in which to administer the survey, with a recommended minimum of 30 students being surveyed in each school. After selecting the students they intended to survey, schools obtained passive parental consent through a letter sent home to all parents or guardians two weeks prior to administration of the PREP (Appendix E). Classroom teachers administered the PREP in the selected classes. Teachers were given a set of standardized procedures for administration (Appendix G), including the process for obtaining student assent (Appendix F).

The number of students participating at each school ranged from 28 students (the entire ninth grade at one school) to 753 students (in which all advisories in the school were administered the PREP). All surveys were administered in April-May of 2011 by paper/pencil scantron form. Upon completion of the PREP at each school, PREP scantrons and assent forms were sent back to the researcher or picked up directly from the school by the researcher. The 1,665 surveys were then scanned into an SPSS data file.

***Samples 2 and 3***. All schools participating in Ramp-Up to Readiness including 3 traditional high schools, 2 charter high schools, 1 area learning center, and 5

middle/junior high schools administered the PREP to their students in the spring of 2011. The sample used in this study was drawn from two of the traditional high schools participating in Ramp-Up to Readiness, one serving grades 10-12 and the other serving grades 9-12. This study falls under the purview of evaluation for Ramp-Up to Readiness which was approved by the Institutional Review Board of the University of Minnesota and required no parent consent or student assent. However, for the two schools in this sample, parents were alerted to the study and were given the option to have their child opt out of the study by a letter sent home two weeks prior to the PREP administration at one school and by an announcement on the school web page prior to the administration at the other. Additionally, students were read the student assent form (Appendix F) used in the pilot study and given the option not to participate if they chose.

Both schools administered the PREP in the first week of May to all students in grade 10-12 advisories. Classroom teachers who were given the same set of standardized procedures for administration as in the pilot study (Appendix G) administered the PREP by paper/pencil scantron form. Out of the total population of tenth-twelfth graders (2541), 1,498 students opted to participate in the study. Scantron forms were collected from each school and scanned into an Excel spreadsheet. The scores for the PLAN (administered to tenth graders the in fall of 2010 at both schools) and ACT (administered to eleventh and twelfth grade students in the fall of 2010 at both schools) were provided by the schools through Naviance, a college and career technology platform used in conjunction with Ramp-Up to Readiness, and were matched to students based on student ID and added to the spreadsheet. After matching, data were de-identified and all PREP data with no corresponding PLAN or ACT scores were removed from the spreadsheet. The Excel

spreadsheet was converted to an SPSS data file. Frequency reports were created for each school and sent to the administrator along with a thank you note for participation.

**Analyses.** The purpose of this study was to establish validity evidence for the PREP and address the overarching questions: To what extent are the inferences drawn from the Personal Readiness Evaluation for Postsecondary valid for ninth-twelfth graders? To that effect, the analyses discussed below were conducted.

***Data screening.*** Prior to addressing any of the research questions, data were examined for questionable response patterns and missing data.

***Confirmatory Factor Analysis***. First, in attempting to establish construct validity evidence for the PREP and test whether the PREP is measuring the construct it is intending to measure (research question 4), confirmatory factor analysis (CFA) was utilized with all three samples. Cronbach and Meehl (1955) suggested that a valuable method for establishing construct validity evidence was factor analysis. Confirmatory factor analysis remains a necessary analysis in scale development for this reason (e.g. Brown, 2006; DeVellis, 2003). Confirmatory factor analysis was used to address the first research question regarding whether the established factor structure could be confirmed. Additionally, Brown (2006) suggested that the benefit of CFA over other methods for establishing construct validity is that the estimates of convergent and discriminant validity take into account measurement error whereas other traditional methods such as ordinary least squares methods do not.

The sample size recommended for CFA should be based on a minimum subject to item ratio of 5:1 (Gorsuch, 1983; Hatcher, 1994) or more conservatively, a ratio of 10 subjects to each parameter being estimated (Schreiber, Nora, Stage, Barlow, & King,

2006). In this study, 36 items are included in the analysis and 36 parameters are being estimated, requiring a minimum sample size of 180 and a more conservative sample size of 360. The sizes of the samples being subjected to CFA in this study range from 383 to 1643 with each sample size meeting the recommended sample size ratios.

The CFA was conducted in LISREL8.8 (Jöreskog & Sörbom, 2006) using full information maximum likelihood (FIML) estimation in order to account for missing data while estimating model parameters. Each item was allowed to load on only one factor (items 1-11 on Self-Efficacy and Expectations, items 12-23 on Effort and Persistence, and items 24-36 on Self-Regulated Learning), all measurement error was assumed to be uncorrelated, factor variances were set to 1.0, and model parameters were freely estimated. In LISREL, the Expectation Maximization algorithm is used to estimate covariances and means from raw data that then serve as starting values for the FIML procedures in which the variance-covariance matrix is analyzed (Jöreskog & Sörbom, 2006). Full information maximum likelihood is generally viewed as the optimal strategy for handling missing data (e.g. Allison, 2001; Duncan, Duncan, & Li, 1998; du Toit & du Toit, 2001) because it uses all of the available data to produce parameter estimates, standard errors, and test statistics that are unbiased with less data lost. FIML assumes multivariate normality and data missing at random or missing completely at random. Findings also suggest that FIML works well with some non-normality (Savalei & Bentler, 2005). In each of the samples, data were approaching normality and were considered missing at random and so FIML was deemed the most appropriate method for handling missing data.

Model fit was determined using the root mean square error of approximation (RMSEA). The Chi-square test tends to reject models based on large samples and so was not reported (Marsh, Balla, McDonald, 1994). Other fit indices commonly reported such as the comparative-fit index and Tucker-Lewis index are not reported here because they are not computed in LISREL8.8. Criteria used for judging model fit based on fit indices was the same as was used in the pilot study for the PREP (Browne & Cudek, 1993). Statistical significance of the unstandardized parameter estimates, calculated by dividing the estimate by its standard error, was determined by examining the Wald statistic provided along with the parameter estimates and standard errors in the LISREL output and ensuring that the value is above 1.96, the critical value at an alpha level of .05 (Brown, 2006). Modification indices for the parameter estimates and for the error variances were examined to determine ways to improve model fit (Brown, 2006) and the model was respecified as deemed necessary and appropriate.

***Reliability analysis.*** Following CFA, reliability analysis was conducted for each sample within SPSS to test the internal consistency of the three scales of the PREP (research question 4). Establishing internal consistency of each scale is another necessary step in scale development and in establishing construct validity (e.g. DeVellis, 2003). According to Cronbach and Meehl (1955), investigating the internal structure of an instrument, specifically its item-test correlations and reliability, helps to provide evidence of validity. In this study, coefficient alpha was used to determine the average correlation of items within the PREP (Cronbach, 1951). Additionally, item-total correlations, and the coefficient alpha if the item was deleted were examined to further investigate how the items on each scale are related to one another and contributing to the scale.

***Correlation analysis.*** Correlations between the three factor sum of item scores were examined to establish convergent and discriminant validity (research questions 5 and 6) for all three samples. Correlation analyses were conducted with samples 2 and 3 in order to gather further evidence of discriminant validity for the PREP and to address the second part of research question 6: is the PREP distinct from other measures and predictors of college readiness such as the PLAN and ACT and grade point average (GPA). It is hypothesized that the PREP has a weak correlation to other measures of college readiness such as the PLAN and ACT tests and GPA because each measures a distinct aspect of college readiness, with the PREP measuring personal readiness for college and the PLAN, ACT, and GPA measure academic readiness.

Correlation analysis was conducted in SPSS to test this hypothesis and determine the relationship between sum scores for each scale (Self-Efficacy and Expectations, Effort and Persistence, and Self-Regulated Learning) and PLAN composite scores in sample 2, ACT composite scores in sample 3, and self-reported GPA in samples 1, 2, and 3. For each sample, missing values were imputed prior to the analysis using the expectation maximization (EM) algorithm in SPSS, which is an iterative process for obtaining maximum likelihood estimates (Dempster, Laird, & Rubin, 1977). EM is a method preferred to traditional approaches to missing data because it allows cases to be retained that would otherwise be excluded from analysis and it produces nearly unbiased estimates of means, variances, and covariances (Howell, 2008). Non-refined factor scores were produced by summing the raw scores for all items loading on a factor (Comrey & Lee, 1992). Responses of strongly disagree and never were scored as 1, disagree and rarely as 2, agree and sometimes as 3, and strongly agree and often as 4. Sum of item

scores were chosen over other methods for obtaining factor scores due to the fact that this instrument is intended to be used by students and teachers who will score the instrument themselves using sum of item scores.

***Pearson's chi-squared test.*** It was hypothesized that the PREP, a measure of personal readiness for college, would distinguish between groups based on grade point average (specifically low achievers and high achievers), which is one of the top predictors of college readiness. Pearson's chi-squared tests were used to test these hypotheses with sample 1. First, groups were set by placing all students into groups based on their self-reported grade point average. It should be noted that self-reported GPA was used in place of actual GPA, which a recent meta-analysis indicated was acceptable due to their finding of an average correlation of .82 between self-reported high school GPA and actual high school GPA across 37 studies (Kuncel, Credé & Thomas 2005). Those students who reported their GPA to fall within the F to C- range were placed in one group and labeled low achievers while students who reported their GPA to fall in the A range were placed in another and labeled high achievers. Students who reported earning GPAs falling within the C to B range were considered average achievers and excluded from the analysis. Descriptive statistics were examined for each group.

Next, each summed scale score was recoded into a dichotomous variable of low and high, with a low scale score being a summed score of less than 33 for the Self-efficacy & Expectations and Self-Regulated Learning scales and scores less than 36 for the Effort and Persistence scale and a high score being 33 or 36 and above respectively. Then, Pearson's chi-squared test was conducted through the cross-tabulation function in SPSS between the two groups and the outcome variable of high and low summed scale

scores. These scale score cut points (33 and 36) were established in conjunction with high school counselors who deemed these scores as the minimum score needed to be "on-track" for personal readiness for college.

***Frequency analysis.*** Frequency analysis was conducted in order to examine the frequency distribution of responses as well as to determine whether the PREP helps to identify groups of students in need of intervention (research question 9) to promote self-efficacy and expectations, effort and persistence, and self-regulated learning, the percentage of students obtaining particular scores on each scale of the PREP was computed using frequency analysis in SPSS. Simple frequency analysis was used because it is an analysis that can easily be conducted by school practitioners using Excel, SPSS, or Naviance. Based on Adelman's (2006) finding that 92.6% of a national sample of high school students reported that they planned to attend some type of postsecondary institution after high school, it was hypothesized that about 7% of students would have scores lower than 33 on the Self-Efficacy & Expectations scale and could be identified for interventions targeting their self-efficacy and expectations for the future. It was also hypothesized that, in alignment with the response to intervention framework (Jimerson, Burns, & VanDerHeyden, 2007), the PREP could serve to identify approximately 15-20% of students in a high school requiring intervention in effort, persistence, and self-regulated learning by identifying 15-20% of students with scale scores below 36 on the Effort & Persistence scale and 15-20% of students with scale scores below 33 on the Self-Regulated Learning scale.

# Chapter 4

## Results

The overarching research question addressed in this study was: To what extent are the inferences drawn from the Personal Readiness Evaluation for Postsecondary valid for ninth-twelfth graders? In this study, validity evidence gathered included evidence based on content, internal structure, and relations to other variables (AERA, APA, & NCME, 1999). Results demonstrating evidence gathered are provided for each study organized by specific research question.

### Phase I: Instrument Development

**What is the evidence of content validity?** Validity evidence based on test content (traditionally referred to as content validity evidence) is gathered through analysis of the relationship between an instrument's content (including themes, wording, format of items, and guidelines for administration and scoring) and the construct it is intended to measure (AERA, APA, & NCME, 1999, p. 11). In this study, content validity was established during the instrument development process in accordance with DeVellis' steps for scale development.

First, the construct was defined based on a thorough literature review on personal readiness for college. Second, items were generated to map on to the identified indicators of personal readiness. A panel of experts reviewed the pool of items and aided in selecting items that they judged to be representative of the construct being measured. Step 3 included developing an initial scale with these selected items. The items were then reviewed again by a panel of experts (step 4) for representation of the defined construct, clarity, readability, style consistency, grammar, neutrality in language and revised based

on feedback as well as by students in the target population for understanding of the items. The items included on the scale blueprint (Appendix A) and the instrument administered in the pilot study (Appendix B) represent the items resulting from expert and student review.

**Phase II: Pilot Study and Instrument Refinement**

**What is the evidence of content validity (continued)?** Following administration of the instrument, student feedback as well as initial item analysis (step 7) led to the elimination of 18 items from further analysis due to lack of clarity in the items, negative wording which placed too much demand on the participants, and redundancy (items eliminated following the pilot are indicated with an * in Appendix B). Furthermore, student feedback resulted in minor changes in the wording of items, the allowing of students to identify more than one race on the current demographic items, reordering of current items so that they were grouped with like items rather than randomly placed on the instrument, and reinforcement of the need to shorten the instrument to be more acceptable to students (See Appendix D for the reworded, re-ordered items).

**Research question 2**: **Can the established factor structure of the PREP be confirmed? What is the fit of the model?** Confirmatory factor analysis (CFA) was conducted with the remaining 62 items using LISREL8.8 (Jöreskog & Sörbom, 2006) to test the fit of the five-factor structure hypothesized based on theory. The fit for this model was: $\chi^2$ (1,819, $n$ = 360) = 4,332.15, $p < .001$), CFI = .96, and RMSEA= .07 (90% CI (0.071, 0.075) indicating a borderline model fit. Modification indices were then used to revise the model and test its fit multiple times, however the five-factor model fit was not

improved. This was not altogether surprising due to the overlap of the constructs underlying this instrument within theory and research.

In an effort to identify a better fitting model and to further revise the PREP to ensure that the minimum number of items needed to measure personal readiness for college were retained (step 8: optimize scale length), exploratory factor analyses (EFA) were conducted in conjunction with informed researcher decision-making based on theory (Henson & Roberts, 2006). Parallel analysis, use of the eigenvalue >1 rule (Kaiser, 1960), and examination of the scree plot (Cattell, 1966) all indicated that three factors should be retained.

Next, EFA was conducted using principal axis factoring with promax rotation and forcing of the 62 items onto three factors. Factors and the items loading on each factor were closely examined to check for theoretical fit. Items previously hypothesized to load on the effort factor and those hypothesized to load on the persistence factor hung together, which made theoretical sense with persistence being defined as the continuance of putting forth effort despite challenges, competing interests, or boredom and both often discussed in tandem in research (e.g. Bandura, 1977; Pintrich & De Groot, 1990; and Schunk, 1991). Additionally, the items hypothesized to load on the motivation factor were found to load on each of the three factors. This, too, made theoretical sense due to the fact that motivation is intricately linked to self-regulated learning, effort, persistence, and self-efficacy (e.g. Bandura, 1977; Pintrich, 1990; Schunk, 1991; and Zimmerman, 1990). The new factors identified through the EFA were called Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning (all three are aspects of

self-regulated learning, with the third factor representing self-regulated learning strategy use but shortened to Self-Regulated Learning; see Table 4 for definitions).

In examining factor loadings, multiple cross-loadings and some low factor loadings below the .40 expected (Netemeyer, Bearden, & Sharma, 2003) were identified. Additionally, results from reliability analyses demonstrated some poor item-total correlations. Both of these findings, as well as the need to shorten the instrument to be more acceptable to students, pointed to the need to further refine the instrument.

Through an iterative process, items that loaded less than .40 (Netemeyer et al., 2003), cross-loaded at .32 or higher (Tabachnick, & Fidell, 2001), were identified as increasing the coefficient alpha if removed (Netemeyer, et al., 2003), and those with poor item-total correlation (Netemeyer et al., 2003) were removed and the process began again with EFA and then reliability analyses. The iterative item reduction process continued until no items met the above criteria for removal. It is important to note that at each stage of the process, items meeting the researcher's criteria for elimination were closely examined before being eliminated to ensure they did not represent an aspect of the defined construct distinct from other items nor warrant further analysis. After the iterative process was concluded, 33 items were retained (items eliminated following the pilot are indicated with an * in Appendix B). The pattern matrix for the 33 items resulting from EFA along with coefficient alphas can be seen in Table 3. CFA fit indices for the 33-item, 3-factor model were: $\chi^2$ (492, $n$ = 360)=996.14, $p$ = .000), CFI = .98, and RMSEA = .05 (90% CI (0.047, 0.056), indicating a better fitting model than the five factor, 62-item model.

Table 3

*Factor Loadings for the 33-item Personal Readiness for Postsecondary (PREP) (N = 380)*

| Item | Item Text | Factors | | |
|---|---|---|---|---|
| | | I | II | III |
| ***A. Self-Efficacy and Expectations (Factor I)*** | | | | |
| 26 | I plan to earn a college degree. | ***.84*** | -.10 | .07 |
| 27 | I will get into college. | ***.82*** | -.05 | .04 |
| 32 | I will finish college even if there are obstacles in my way. | ***.80*** | -.03 | .02 |
| 34 | If I work hard, I will succeed in college. | ***.80*** | -.07 | -.04 |
| 20 | Getting a college degree will help me achieve my future goals. | ***.74*** | -.05 | .02 |
| 31 | Working hard in school now will help me in my future. | ***.64*** | .12 | -.11 |
| 30 | I can do my schoolwork well if I try hard. | ***.64*** | .02 | -.05 |
| 1 | I plan to get more education after I graduate from high school. | ***.56*** | .07 | .01 |
| 16 | I can imagine myself as a successful college student. | ***.56*** | .06 | .06 |
| 39 | I am hopeful about my future. | ***.51*** | .07 | .04 |
| 13 | I will achieve my academic goals. | ***.48*** | .25 | -.00 |
| ***B. Effort and Persistence (Factor II)*** | | | | |
| 41 | Even when my schoolwork is boring, I keep working until I finish it. | -.032 | ***.75*** | -.07 |
| 65 | I turn in my schoolwork on time. | -.120 | ***.74*** | -.03 |
| 64 | I make sure I understand an assignment when I work on it. | .011 | ***.69*** | .04 |
| 69 | I follow through on commitments that I make. | -.043 | ***.67*** | .01 |
| 74 | I make sure I finish what I start. | .032 | ***.67*** | .02 |
| 55 | When I work on an assignment, I focus on getting it done correctly. | .063 | ***.67*** | -.03 |
| 47 | I work hard to achieve the goals I set for myself. | .199 | ***.62*** | -.10 |
| 68 | When I come to a hard question in my schoolwork, I try to answer it. | .005 | ***.62*** | .07 |
| 49 | I try to do my best in my classes. | .109 | ***.55*** | -.00 |
| 63 | I use feedback from my teachers to improve my assignments. | .046 | ***.51*** | .21 |
| 46 | If I fail at something, I try again. | .143 | ***.51*** | .08 |
| ***C. Self-Regulated Learning (Factor III)*** | | | | |
| 70 | When I do an assignment, I try to connect it to my life somehow. | .020 | -.19 | ***.74*** |
| 80 | I try to connect class reading to something interesting. | .085 | -.13 | ***.68*** |
| 62 | While I study I ask myself questions to make sure I understand what I'm studying. | .031 | .03 | ***.67*** |
| 59 | I plan things out before I begin my schoolwork. | .031 | .03 | ***.59*** |
| 53 | While reading for class, I stop once in a while to review what I've read. | -.041 | .02 | ***.56*** |
| 79 | I use a planner/assignment book to keep track of my assignments. | .011 | -.02 | ***.54*** |
| 78 | I make an outline before I write a paper, even if it is not required. | .035 | -.06 | ***.53*** |
| 66 | After I solve a problem, I evaluate the solution I came up with. | -.138 | .27 | ***.51*** |
| 58 | When I get stuck on a question, I talk through it with someone. | .005 | .12 | ***.51*** |

| | | | | |
|---|---|---|---|---|
| 75 | I check over my completed schoolwork to make sure it's correct. | -.074 | .22 | ***.51*** |
| 60 | I combine information from class and from the book when I study for a test. | -.040 | .23 | ***.50*** |
| Percent of variance explained | | 32.96 | 10.85 | 5.30 |
| Coefficient α | | .91 | .90 | .86 |

*Note.* Based on a principal axis factoring with promax rotation

In ensuring representation of the construct, the retained 33 items and the 47 eliminated items were examined and the most current literature was reviewed, which led to the addition of 3 items to the instrument. "I put my schoolwork before other activities" replaced the eliminated items, "I give up watching TV to do my schoolwork" and "I give up hanging out with friends to do my schoolwork" and is hypothesized to load on the effort and persistence factor. Setting goals is an important aspect of self-regulated learning (e.g. Dweck, 1986; Pintrich, 1990; and Zimmerman, 2000) and while items on the PREP such as "I work hard to achieve the goals I set for myself" assume that students set goals for themselves, no items measure whether or not they do and so the item "I set academic goals for myself" was added and anticipated to load on the self-regulated learning factor. Additionally, a help-seeking item, "I ask for help with my schoolwork when I need it" was added to the PREP.

Finally, items on mindset or students' belief about the malleability of their intelligence (Dweck, 2006) performed poorly in the pilot with students commenting that they did not understand the items, with some skipping the items all together, and with the items loading poorly on each of the factors. These items were eliminated from the three scales and rather one (What do you believe about your intelligence/ability?) was added to the demographic information questions in order to identify students' mindset as a student characteristic.

The final draft of the PREP had 36 items on 3 scales –11 on Self-efficacy and Expectations, 12 on Effort and Persistence, and 13 on Self-Regulated Learning (see Table 4 for definitions), with the first 11 items on a Strongly Disagree, Disagree, Agree, Strongly Agree scale and the remaining 25 on a frequency scale of Never, Rarely, Sometimes, Often, along with seven demographic items.

Table 4

*Hypothesized Factors and Their Definitions*

| Hypothesized Factor | Definition | Theoretical and Empirical Support |
|---|---|---|
| Self-Efficacy & Expectations | The student's beliefs about his/her academic competence and expectancies for success or failure in high school and in college. | e.g. Bandura, 1997; Covington, 2000; Deci & Ryan, 1985; Eccles & Wigfield, 2002; Maehr & Midgley, 1991; Meece, Anderman, & Anderman, 2006; Robbins et al., 2004, 2006; Zimmerman & Schunk, 2009 |
| Effort & Persistence | The student's beliefs about effort and the student's ability to maintain effort and continue engaging in goal-directed behavior despite obstacles | e.g. Blackwell, Trzesniewski, & Dweck, 2007; Duckworth and Seligman, 2005; Dweck, 2006; Eccles & Wigfield, 2002; Harackiewicz, et al., 1997, 2002; Kahn & Nauta, 2001; Perrakis, 2008; Robbins, 2004, 2006; Weiner, 1986; Wolters, 2004 |
| Self-Regulated Learning | The student's use of strategies to manage his/her own learning, including planning, using study skills, self-monitoring, self-evaluating, and seeking help when needed. | e.g. Corno, 1989; Hattie, Biggs, & Purdie, 1996; Karabenick & Knapp, 1991; Ley and Young, 1998; Pintrich & DeGroot, 1990; Robbins, 2004, 2006; Schunk 1994, 1996; Wolters and Pintrich, 1998; Zimmerman, 1989b |

Think alouds were conducted for a final time with the same seventh and tenth grade students to gather their feedback on the revised instrument and newly added items. Feedback provided was positive and suggested that students found the length of the survey and items acceptable, with the exception of one which was modified slightly.

A scantron form of the PREP was developed for administration in Phase II (Appendix B).

**Research question 3: Does the PREP demonstrate internal consistency?**

Reliability analysis was conducted for the retained 33 items, which fell evenly across 3 scales: Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning. Resulting coefficient alphas ranged from .86 to .90 (Table 3), indicating very good to excellent internal consistency.

## Phase III: Testing of the Refined Instrument

### Data Screening.

***Sample 1.*** Data were first examined in SPSS for missing data and response patterns. Three students were eliminated due to questionable response patterns in which the same response was marked for the entire instrument. Nineteen students were eliminated from the sample due to incomplete data, with more four or more of the items on their survey left incomplete. For the remaining participants, of 59,148 expected responses in the data set (1,643 participants * 36 items), 112 responses (.19%) were missing. This rate of missing data was considered extremely small, with missing data rates of less than 1% considered trivial and not likely to impact interpretation (Acuna, & Rodriguez, 2004). Despite the small amount of missing data, patterns of missing data were examined. More missing values were observed toward the end of the instrument (e.g. items 1-5 were missing a total of 5 values while items 31-36 were missing a total of 30 values), likely due to participant fatigue or inattention.

Little's MCAR test, the chi-square statistic used to test whether or not the missing values were missing completely at random, was conducted in SPSS. Results ($\chi^2$(1,527, *n*

= 1,643) = 1,808.55, $p < .001$) indicated that the missing values were not missing completely at random. Further examination of missing values through crosstabulation in SPSS in which missing values were compared against grade, gender, race, home language, GPA, and school, indicated that only for schools was there a significant difference in missing data ($\chi^2$ (33, $n$ = 1,643) = 57.09 $p < .01$) and Cramer's Phi =.11, p < .01. Percentages demonstrated that the school with the smallest sample (n = 28) had the lowest percentage of students with complete data (82.1%) compared to the next lowest at 90.7%, and had 2 students missing 1 response, 2 students missing 2 responses, and 1 student missing 3 responses. There is no direct test to determine if the missing data were missing at random (MAR); however, due to only two discernible patterns identified for missing values: missingness toward the end of the instrument and more missingness for a small school, missingness appeared to depend on other observed data (school) and not unobserved data, and so can be considered MAR (Schafer & Graham 202). Even if the missing values were determined to be not MAR, there are so few missing values that the parameter estimates were likely to remain unbiased. Missing values were imputed using the Expectation Maximization (EM) algorithm for correlation, reliability, and chi-square analyses and full information maximum likelihood for CFA.

Frequency analysis was conducted to examine the frequency distribution for each item of the PREP. Participants in the sample responded to the majority of items on the Self-Efficacy & Expectations and Effort & Persistence PREP in a positive manner, and so the frequency distribution tended to skew negatively for the items on these scales. For the items on the Self-regulated Learning scale, participants' responses were more normally

distributed. Frequency data for each item is presented in Table 5. Overall, data were considered to be reasonably normally distributed.

Table 5

*Frequency Data for Sample 1 (n=1,643)*

| Item | SD (%) | D (%) | A (%) | SA (%) | *n* and % missing |
|---|---|---|---|---|---|
| 1. I will achieve my academic goals. | 1.5 | 2.9 | 51.6 | 43.9 | 1 (0.1%) |
| 2. I can do my schoolwork well if I try hard. | 1.3 | 1.2 | 36.6 | 61.0 | 2 (0.1%) |
| 3. Working hard in school now will help me in my future. | 1.7 | 2.3 | 33.4 | 62.5 | 2 (0.1%) |
| 4. I plan to get more education after I graduate from high school. | 1.5 | 2.6 | 25.6 | 70.4 | 0 (0.0%) |
| 5. I plan to earn a college degree. | 1.5 | 2.9 | 28.4 | 67.2 | 0 (0.0%) |
| 6. I can imagine myself as a successful college student. | 1.6 | 5.3 | 46.6 | 46.4 | 2 (0.1%) |
| 7. I will get into college. | 1.7 | 4.0 | 36.6 | 57.6 | 2 (0.1%) |
| 8. If I work hard, I will succeed in college. | 1.5 | 1.6 | 34.1 | 62.7 | 2 (0.1%) |
| 9. I will finish college even if there are obstacles in my way. | 1.8 | 3.0 | 41.1 | 54.0 | 2 (0.1%) |
| 10. Getting a college degree will help me achieve my future goals. | 1.8 | 2.4 | 28.8 | 66.6 | 6 (0.4%) |
| 11. I am hopeful about my future. | 1.7 | 3.0 | 35.0 | 60.2 | 2 (0.1%) |
| 12. I try to do my best in my classes. | 0.6 | 4.1 | 40.8 | 54.4 | 2 (0.1%) |
| 13. I put my schoolwork before other activities. | 2.5 | 21.6 | 57.9 | 18.0 | 1 (0.1%) |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | 1.8 | 17.3 | 49.5 | 31.1 | 4 (0.2%) |
| 15. I turn in my schoolwork on time. | 0.5 | 8.6 | 37.9 | 52.8 | 1 (0.1%) |
| 16. When I work on an assignment, I focus on getting it done correctly. | 0.7 | 4.9 | 40.5 | 54.0 | 0 (0.0%) |
| 17. I make sure I understand an assignment when I work on it. | 0.5 | 5.9 | 39.9 | 53.4 | 5 (0.3%) |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | 1.2 | 8.0 | 41.1 | 49.7 | 0 (0.0%) |
| 19. I use feedback from my teachers to improve my assignments. | 2.0 | 12.1 | 39.8 | 45.9 | 3 (0.2%) |
| 20. I follow through on commitments that I make. | 0.5 | 4.1 | 38.6 | 56.6 | 2 (0.1%) |
| 21. I make sure I finish what I start. | 0.5 | 4.6 | 37.8 | 57.0 | 2 (0.1%) |
| 22. I work hard to achieve the goals I set for myself. | 0.7 | 4.8 | 34.4 | 59.6 | 6 (0.4%) |
| 23. If I fail at something, I try again. | 1.2 | 6.0 | 40.5 | 52.0 | 6 (0.4%) |
| 24. I set academic goals for myself. | 3.5 | 14.3 | 39.1 | 43.0 | 1 (0.1%) |
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | 32.0 | 23.7 | 21.7 | 22.1 | 7 (0.4%) |
| 26. I plan things out before I begin my schoolwork. | 11.8 | 26.2 | 40.7 | 20.9 | 6 (0.4%) |
| 27. I make an outline before I write a paper, even if it is not required. | 17.4 | 31.7 | 33.2 | 17.6 | 1 (0.1%) |
| 28. While I study I ask myself questions to make sure | 9.0 | 22.7 | 43.7 | 24.4 | 3 (0.2%) |

| | | | | | |
|---|---|---|---|---|---|
| I understand what I'm studying. | | | | | |
| 29. When I do an assignment, I try to connect it to my life somehow. | 21.4 | 31.3 | 31.6 | 15.5 | 4(0.2%) |
| 30. I try to connect class reading to something interesting. | 12.0 | 26.5 | 40.6 | 20.9 | 4 (0.2%) |
| 31. While reading for class, I stop once in a while to review what I've read. | 13.3 | 27.8 | 40.5 | 18.3 | 3 (0.2%) |
| 32. I combine information from class and from the book when I study for a test. | 5.8 | 15.6 | 41.1 | 36.9 | 8 (0.5%) |
| 33. When I get stuck on a question, I talk through it with someone. | 7.1 | 18.0 | 44.0 | 30.6 | 5 (0.3%) |
| 34. I ask for help with my schoolwork when I need it. | 2.9 | 12.4 | 39.3 | 45.3 | 3 (0.2%) |
| 35. After I solve a problem, I make sure the solution worked. | 4.0 | 17.0 | 47.4 | 31.1 | 7 (0.4%) |
| 36. I check over my completed schoolwork to make sure it's correct. | 7.5 | 21.5 | 45.3 | 25.3 | 7 (0.4%) |

*Note.* SD = Strongly Disagree, D = Disagree, A =Agree, SA = Strongly Agree

***Samples 2 and 3.*** Data were first examined for questionable response patterns and missing data. No questionable response patterns were detected in either subsample. In both the PLAN and ACT samples, two students were deleted from the sample due to more than half of their data being incomplete leaving 495 participants in the PLAN sample and 383 in the ACT sample. In the PLAN subsample, 53 (.30%) of the 17820 expected responses (495 participants * 36 items) were missing. Of the 13788 expected responses (383 participants * 36 items) in the ACT sample, 31 missing values (0.22%) were observed. As in sample 1, more values were missing at the end of the data sets than at the beginning, indicating possible participant fatigue or inattentiveness. No other discernible patterns in the missing data were observed and missing values were judged to be missing at random (MAR).

Frequency analysis was conducted to examine the frequency distribution for each item of the PREP in samples 2 and 3. As in sample 1, the frequency distribution for the majority of items on the Self-Efficacy & Expectations and Effort & Persistence tended to skew negatively for the items on these scales, while responses to the items on the Self-

regulated Learning scale were more normally distributed. Frequency data for sample 2 is presented in Table 6 and frequency data for sample 3 is presented in Table 7. Overall, data were considered to be reasonably normally distributed.

Table 6

*Frequency Data for Sample 2 (n = 495)*

| Item | SD | D | A | SA | *n* and % missing |
|---|---|---|---|---|---|
| 1. I will achieve my academic goals. | 1.0 | 1.2 | 50.9 | 46.5 | 2 (0.4%) |
| 2. I can do my schoolwork well if I try hard. | 1.0 | 0.6 | 38.0 | 60.0 | 2 (0.4%) |
| 3. Working hard in school now will help me in my future. | 0.8 | 0.8 | 33.1 | 65.3 | 0 (0.0%) |
| 4. I plan to get more education after I graduate from high school. | 1.0 | 2.2 | 27.3 | 69.5 | 0 (0.0%) |
| 5. I plan to earn a college degree. | 0.8 | 2.2 | 31.1 | 65.9 | 0 (0.0%) |
| 6. I can imagine myself as a successful college student. | 0.8 | 3.8 | 48.3 | 46.9 | 1 (0.2%) |
| 7. I will get into college. | 0.8 | 3.6 | 39.6 | 55.6 | 2 (0.4%) |
| 8. If I work hard, I will succeed in college. | 1.0 | 0.8 | 37.0 | 61.0 | 1 (0.2%) |
| 9. I will finish college even if there are obstacles in my way. | 0.6 | 3.6 | 44.8 | 50.7 | 1 (0.2%) |
| 10. Getting a college degree will help me achieve my future goals. | 0.8 | 1.2 | 30.7 | 67.3 | 0 (0.0%) |
| 11. I am hopeful about my future. | 0.6 | 3.6 | 33.5 | 62.0 | 1 (0.2%) |
| 12. I try to do my best in my classes. | 0.2 | 2.0 | 34.7 | 63.0 | 0 (0.0%) |
| 13. I put my schoolwork before other activities. | 2.0 | 13.3 | 59.6 | 24.8 | 1 (0.2%) |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | 0.2 | 12.5 | 43.8 | 43.0 | 2 (0.4%) |
| 15. I turn in my schoolwork on time. | 0.2 | 4.4 | 31.1 | 64.0 | 1 (0.2%) |
| 16. When I work on an assignment, I focus on getting it done correctly. | 0.2 | 2.8 | 38.4 | 58.6 | 0 (0.0%) |
| 17. I make sure I understand an assignment when I work on it. | 0.0 | 4.8 | 38.2 | 57.0 | 0 (0.0%) |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | 0.2 | 5.3 | 37.6 | 57.0 | 0 (0.0%) |
| 19. I use feedback from my teachers to improve my assignments. | 1.4 | 8.9 | 38.6 | 51.1 | 0 (0.0%) |
| 20. I follow through on commitments that I make. | 0.2 | 4.4 | 38.8 | 56.0 | 3 (0.6%) |
| 21. I make sure I finish what I start. | 0.0 | 3.0 | 40.2 | 56.6 | 1 (0.2%) |
| 22. I work hard to achieve the goals I set for myself. | 0.0 | 4.4 | 34.9 | 60.6 | 0 (0.0%) |
| 23. If I fail at something, I try again. | 0.4 | 5.5 | 41.4 | 52.1 | 3 (0.6%) |
| 24. I set academic goals for myself. | 1.4 | 10.3 | 34.5 | 52.9 | 4 (0.8%) |

| | | | | | |
|---|---|---|---|---|---|
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | 26.9 | 19.6 | 22.0 | 31.1 | 2 (0.4%) |
| 26. I plan things out before I begin my schoolwork. | 8.1 | 21.6 | 35.8 | 34.5 | 0 (0.0%) |
| 27. I make an outline before I write a paper, even if it is not required. | 14.5 | 27.9 | 34.9 | 22.0 | 3 (0.6%) |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | 6.3 | 21.6 | 43.8 | 27.9 | 2 (0.4%) |
| 29. When I do an assignment, I try to connect it to my life somehow. | 17.0 | 28.7 | 35.2 | 18.6 | 3 (0.6%) |
| 30. I try to connect class reading to something interesting. | 9.7 | 22.2 | 42.2 | 25.1 | 4 (0.8%) |
| 31. While reading for class, I stop once in a while to review what I've read. | 9.7 | 23.6 | 41.8 | 24.0 | 4 (0.8%) |
| 32. I combine information from class and from the book when I study for a test. | 3.2 | 16.2 | 43.6 | 36.6 | 2 (0.4%) |
| 33. When I get stuck on a question, I talk through it with someone. | 5.5 | 17.0 | 41.8 | 35.6 | 1 (0.2%) |
| 34. I ask for help with my schoolwork when I need it. | 1.6 | 10.5 | 42.0 | 45.7 | 1 (0.2%) |
| 35. After I solve a problem, I make sure the solution worked. | 2.4 | 13.7 | 48.1 | 34.9 | 4 (0.8%) |
| 36. I check over my completed schoolwork to make sure it's correct. | 5.3 | 20.4 | 45.5 | 28.5 | 2 (0.4%) |

*Note.* SD = Strongly Disagree, D = Disagree, A =Agree, SA = Strongly Agree

Table 7

*Frequency Data for Sample 3 (n = 383)*

| Item | SD | D | A | SA | *n* and % missing |
|---|---|---|---|---|---|
| 1. I will achieve my academic goals. | 1.8 | 0.5 | 39.2 | 58.5 | 0 (0.0%) |
| 2. I can do my schoolwork well if I try hard. | 0.0 | 1.6 | 30.8 | 67.6 | 0 (0.0%) |
| 3. Working hard in school now will help me in my future. | 2.1 | 2.1 | 25.3 | 70.5 | 0 (0.0%) |
| 4. I plan to get more education after I graduate from high school. | 1.6 | 0.3 | 19.1 | 79.1 | 0 (0.0%) |
| 5. I plan to earn a college degree. | 1.6 | 0.8 | 20.1 | 77.3 | 1 (0.3%) |
| 6. I can imagine myself as a successful college student. | 1.6 | 1.0 | 35.5 | 61.6 | 1 (0.3%) |
| 7. I will get into college. | 1.6 | 0.5 | 27.7 | 70.0 | 1 (0.3%) |
| 8. If I work hard, I will succeed in college. | 1.6 | 0.5 | 29.0 | 68.4 | 2 (0.5%) |
| 9. I will finish college even if there are obstacles in my way. | 1.6 | 0.8 | 33.4 | 64.0 | 1 (0.3%) |
| 10. Getting a college degree will help me achieve my future goals. | 2.1 | 1.0 | 21.7 | 74.9 | 1 (0.3%) |
| 11. I am hopeful about my future. | 1.6 | 0.8 | 35.2 | 62.1 | 1 (0.3%) |
| 12. I try to do my best in my classes. | 0.8 | 1.0 | 31.1 | 67.1 | 0 (0.0%) |
| 13. I put my schoolwork before other activities. | 1.3 | 9.7 | 55.4 | 33.7 | 0 (0.0%) |

| | | | | | |
|---|---|---|---|---|---|
| 14. Even when my schoolwork is boring, I keep working until I finish it. | 0.3 | 6.0 | 47.3 | 46.2 | 1 (0.3%) |
| 15. I turn in my schoolwork on time. | 0.0 | 1.6 | 26.4 | 71.5 | 2 (0.5%) |
| 16. When I work on an assignment, I focus on getting it done correctly. | 0.0 | 2.6 | 34.5 | 62.9 | 0 (0.0%) |
| 17. I make sure I understand an assignment when I work on it. | 0.3 | 2.3 | 33.9 | 63.4 | 0 (0.0%) |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | 0.8 | 2.1 | 36.6 | 60.1 | 2 (0.5%) |
| 19. I use feedback from my teachers to improve my assignments. | 0.8 | 6.8 | 34.7 | 57.7 | 0 (0.0%) |
| 20. I follow through on commitments that I make. | 0.0 | 0.5 | 30.0 | 68.9 | 2 (0.5%) |
| 21. I make sure I finish what I start. | 0.0 | 2.3 | 31.3 | 66.1 | 1 (0.3%) |
| 22. I work hard to achieve the goals I set for myself. | 0.0 | 2.3 | 30.0 | 67.1 | 2 (0.5%) |
| 23. If I fail at something, I try again. | 0.0 | 2.6 | 39.7 | 57.4 | 1 (0.3%) |
| 24. I set academic goals for myself. | 2.1 | 8.1 | 37.9 | 51.7 | 1 (0.3%) |
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | 21.7 | 14.6 | 24.5 | 38.9 | 1 (0.3%) |
| 26. I plan things out before I begin my schoolwork. | 7.3 | 15.4 | 40.5 | 36.8 | 0 (0.0%) |
| 27. I make an outline before I write a paper, even if it is not required. | 13.3 | 22.5 | 36.3 | 27.9 | 0 (0.0%) |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | 5.7 | 20.1 | 37.9 | 35.2 | 4 (1.0%) |
| 29. When I do an assignment, I try to connect it to my life somehow. | 14.4 | 27.7 | 28.2 | 29.8 | 0 (0.0%) |
| 30. I try to connect class reading to something interesting. | 7.0 | 19.8 | 40.5 | 32.6 | 0 (0.0%) |
| 31. While reading for class, I stop once in a while to review what I've read. | 6.5 | 19.1 | 41.8 | 32.6 | 0 (0.0%) |
| 32. I combine information from class and from the book when I study for a test. | 1.8 | 10.2 | 40.5 | 46.7 | 3 (0.8%) |
| 33. When I get stuck on a question, I talk through it with someone. | 3.1 | 12.5 | 41.0 | 43.3 | 0 (0.0%) |
| 34. I ask for help with my schoolwork when I need it. | 1.0 | 6.5 | 39.9 | 52.2 | 1 (0.3%) |
| 35. After I solve a problem, I make sure the solution worked. | 2.3 | 9.9 | 45.7 | 41.8 | 1 (0.3%) |
| 36. I check over my completed schoolwork to make sure it's correct. | 5.0 | 15.1 | 43.9 | 35.5 | 2 (0.5%) |

*Note.* SD = Strongly Disagree, D = Disagree, A =Agree, SA = Strongly Agree

Correlation analysis assumes a normal distribution and so normality was examined for each factor, for each factor sum score by factor, and for the PLAN and the ACT scores following imputation of missing values using the EM algorithm. Using Kline's (2005) recommendation for examining the absolute value of the skewness and

kurtosis statistics, the only score of concern was for the Self-Efficacy & Expectations factor in the ACT sample, which had a kurtosis value greater than 10 indicating some non-normality, but not approaching the value of 20 that Kline (2005) suggested demonstrates a significant problem. Descriptive statistics are presented in Table 8.

Table 8

*Descriptive Statistics for the Summed Factor Scores, PLAN, and ACT*

| Scores | n | Mean | SD | Skewness (skew se) | Kurtosis (kurt se) |
|---|---|---|---|---|---|
| Sample 1 | | | | | |
| PLAN | 495 | 17.64 | 3.53 | .34(.11) | -.19(.22) |
| Self-Efficacy & Expectations | 495 | 39.09 | 5.15 | -1.49(.11) | 4.51(.22) |
| Effort & Persistence | 495 | 41.63 | 5.07 | -.83(.11) | .30(.22) |
| Self-Regulated Learning | 495 | 31.69 | 7.36 | -.31(.11) | -.47(.23) |
| Sample 2 | | | | | |
| ACT | 383 | 22.46 | 4.66 | -.05(.13) | -.72(.25) |
| Self-Efficacy & Expectations | 383 | 40.10 | 5.47 | -2.64(.13) | 10.50(.25) |
| Effort & Persistence | 383 | 42.75 | 4.62 | -.84(.13) | -.14(.25) |
| Self-Regulated Learning | 383 | 33.38 | 7.41 | -.38(.13) | -.31(.25) |

**Research question 4**: **Can the established factor structure of the PREP be confirmed? What is the fit of the model?** Results from the confirmatory factor analysis conducted with sample 1 ($n$ = 1,643) demonstrated a RMSEA = .060 (90% CI (0.059, 0.062). The RMSEA indicated a reasonable fit (Browne & Cudeck, 1992; Hu & Bentler, 1999). Factor loadings ranged from .37 to .64 and each were deemed statistically significant (Wald statistic greater than 1.96 for $\alpha$ = .05). Unstandardized parameter estimates for sample 1 are presented in Table 9.

Table 9

*Parameter Estimates for Sample 1 (n=1,643)*

| **Factor**<br>Item | Factor Loading | se | Wald Statistic | Error Variance | se |
|---|---|---|---|---|---|
| **Self-Efficacy & Expectations** | | | | | |
| 1. I will achieve my academic goals. | .40 | .01 | 28.88 | .22 | .01 |
| 2. I can do my schoolwork well if I try hard. | .36 | .01 | 27.12 | .21 | .01 |
| 3. Working hard in school now will help me in my future. | .40 | .01 | 28.55 | .23 | .01 |
| 4. I plan to get more education after I graduate from high school. | .50 | .01 | 40.48 | .12 | .01 |
| 5. I plan to earn a college degree. | .52 | .01 | 41.78 | .11 | .01 |
| 6. I can imagine myself as a successful college student. | .53 | .01 | 37.97 | .17 | .01 |
| 7. I will get into college. | .55 | .01 | 40.89 | .13 | .01 |
| 8. If I work hard, I will succeed in college. | .50 | .01 | 40.45 | .12 | .01 |
| 9. I will finish college even if there are obstacles in my way. | .53 | .01 | 40.33 | .13 | .01 |
| 10. Getting a college degree will help me achieve my future goals. | .50 | .01 | 38.31 | .14 | .01 |
| 11. I am hopeful about my future. | .45 | .01 | 31.77 | .21 | .01 |
| **Effort & Persistence** | | | | | |
| 12. I try to do my best in my classes. | .41 | .01 | 29.78 | .20 | .01 |
| 13. I put my schoolwork before other activities. | .48 | .01 | 30.48 | .26 | .01 |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | .52 | .01 | 31.91 | .27 | .01 |
| 15. I turn in my schoolwork on time. | .40 | .02 | 25.19 | .29 | .01 |
| 16. When I work on an assignment, I focus on getting it done correctly. | .42 | .01 | 29.72 | .21 | .01 |
| 17. I make sure I understand an assignment when I work on it. | .41 | .01 | 28.01 | .23 | .01 |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | .41 | .02 | 25.56 | .30 | .01 |
| 19. I use feedback from my teachers to improve my assignments. | .46 | .02 | 26.30 | .36 | .01 |
| 20. I follow through on commitments that I make. | .33 | .01 | 22.89 | .25 | .01 |
| 21. I make sure I finish what I start. | .40 | .01 | 28.36 | .22 | .01 |
| 22. I work hard to achieve the goals I set for myself. | .40 | .01 | 28.00 | .23 | .01 |
| 23. If I fail at something, I try again. | .37 | .02 | 23.46 | .30 | .01 |
| **Self-Regulated Learning** | | | | | |
| 24. I set academic goals for myself. | .50 | .02 | 26.62 | .41 | .02 |
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | .60 | .03 | 21.99 | .95 | .03 |
| 26. I plan things out before I begin my schoolwork. | .62 | .02 | 29.27 | .48 | .02 |

| | | | | | |
|---|---|---|---|---|---|
| 27. I make an outline before I write a paper, even if it is not required. | .58 | .02 | 25.58 | .61 | .02 |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | .64 | .02 | 31.98 | .40 | .02 |
| 29. When I do an assignment, I try to connect it to my life somehow. | .63 | .02 | 27.65 | .59 | .02 |
| 30. I try to connect class reading to something interesting. | .61 | .02 | 29.12 | .49 | .02 |
| 31. While reading for class, I stop once in a while to review what I've read. | .62 | .02 | 29.40 | .48 | .02 |
| 32. I combine information from class and from the book when I study for a test. | .59 | .02 | 30.36 | .40 | .02 |
| 33. When I get stuck on a question, I talk through it with someone. | .54 | .02 | 26.80 | .48 | .02 |
| 34. I ask for help with my schoolwork when I need it. | .46 | .02 | 24.81 | .41 | .02 |
| 35. After I solve a problem, I make sure the solution worked. | .55 | .02 | 30.35 | .34 | .01 |
| 36. I check over my completed schoolwork to make sure it's correct. | .59 | .02 | 30.29 | .41 | .02 |

***Localized areas of strain.*** Next, localized areas of strain or ill fit were assessed using standardized residuals and modification indices (Brown, 2006). First, standardized residuals for each pair of indicators were examined. Positive standardized residuals indicate that the model underestimates the relationship between two indicators while negative standardized residuals indicate overestimation of the relationship (Brown, 2006). Standardized residuals with an absolute value of 1.96 or greater indicate areas of strain (Harrington, 2009). However, standardized residuals are sensitive to sample size and tend to be larger with larger samples, and thus some researchers recommend a larger cutoff such as 2.58 (Byrne, 1989) or looking for residuals with outlying values rather than depending on a cutoff (Brown, 2006), which was the method of examination used with this sample of 1,643.

In this sample, the smallest standardized residual was -5.59, the largest was 8.31, and the median was -0.01. Over 100 indicator pairs had standardized residuals with

absolute values of 3.00 or greater, and another 100 had standardized residuals with absolute values of 2.00 or greater, indicating a number of localized areas of strain. In particular, standardized residuals with absolute values above 3 were noted for 23 indicator pairs that included item 24, 16 pairs that included item 34, 14 pairs that included item 29, 10 pairs that included item 27 and 9 pairs that included item 30.

Modification indices were assessed next to gather more information about the relationships within the model. Modification indices computed for the observed variables indicate the approximate change expected in the model chi-square if each parameter was allowed to be freely estimated rather than constrained to a particular latent variable. Modification indices are conceptualized as chi-square statistics with 1 degree of freedom and so are interpreted similarly, with 3.84 representing the critical value of chi-square at an alpha level less than .05 (Brown, 2006). Modification indices are also sensitive to sample size, and so expected parameter change (EPC) values were examined as well (Brown, 2006). Table 10 presents the modification indices and EPC values for the observed variables. Modification indices and EPC values for item 24 (modification indices = 111.33 and 188.17 and EPC = 0.2 and 0.4) demonstrated ill fit and indicated that item 24 cross-loaded highly on the Effort & Persistence factor as well as cross-loaded on the Self-Efficacy & Expectations factor. Other items of concern indicated through examination of modification indices in conjunction with EPC values included 27, 29, 30, 31, and 34.

Table 10

*Modification Indices and Expected Parameter Change Values for Observed Variables*

| | Self-Efficacy & Expectations | | Effort & Persistence | | Self-Regulated Learning | |
|---|---|---|---|---|---|---|
| | MI | EPC | MI | EPC | MI | EPC |
| 1. I will achieve my academic goals. | -- | -- | 50.60 | 0.11 | 21.28 | 0.06 |
| 2. I can do my schoolwork well if I try hard. | -- | -- | 1.44 | 0.02 | 0.43 | -0.01 |
| 3. Working hard in school now will help me in my future. | -- | -- | 15.09 | 0.06 | 12.48 | 0.05 |
| 4. I plan to get more education after I graduate from high school. | -- | -- | 25.29 | -0.06 | 34.78 | -0.06 |
| 5. I plan to earn a college degree. | -- | -- | 22.89 | -0.05 | 12.18 | -0.04 |
| 6. I can imagine myself as a successful college student. | -- | -- | 19.69 | 0.06 | 21.46 | -0.06 |
| 7. I will get into college. | -- | -- | 0.79 | 0.01 | 0.18 | -0.01 |
| 8. If I work hard, I will succeed in college. | -- | -- | 10.47 | -0.04 | 2.90 | -0.02 |
| 9. I will finish college even if there are obstacles in my way. | -- | -- | 0.07 | -0.00 | 0.65 | 0.01 |
| 10. Getting a college degree will help me achieve my future goals. | -- | -- | 1.31 | -0.01 | 0.54 | 0.01 |
| 11. I am hopeful about my future. | -- | -- | 12.22 | 0.05 | 4.88 | 0.03 |
| 12. I try to do my best in my classes. | 3.21 | 0.03 | -- | -- | 1.49 | -0.03 |
| 13. I put my schoolwork before other activities. | 1.66 | -0.02 | -- | -- | 40.13 | 0.15 |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | 8.92 | -0.05 | -- | -- | 4.31 | 0.05 |
| 15. I turn in my schoolwork on time. | 0.75 | -0.02 | -- | -- | 32.30 | -0.14 |
| 16. When I work on an assignment, I focus on getting it done correctly. | 1.29 | -0.02 | -- | -- | 2.07 | -0.03 |
| 17. I make sure I understand an assignment when I work on it. | 2.34 | -0.02 | -- | -- | 1.36 | 0.03 |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | 0.02 | -0.00 | -- | -- | 0.55 | 0.02 |
| 19. I use feedback from my teachers to improve my assignments. | 5.92 | 0.05 | -- | -- | 50.17 | 0.19 |
| 20. I follow through on commitments that I make. | 3.52 | 0.03 | -- | -- | 30.52 | -0.13 |
| 21. I make sure I finish what I start. | 0.80 | -0.01 | -- | -- | 24.17 | -0.11 |
| 22. I work hard to achieve the goals I set for myself. | 7.69 | 0.04 | -- | -- | 6.56 | -0.6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 23. If I fail at something, I try again. | 1.76 | 0.02 | -- | -- | 6.34 | 0.06 |
| 24. I set academic goals for myself. | 111.33 | 0.20 | 188.17 | 0.40 | -- | -- |
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | 5.85 | -0.07 | 4.81 | -0.10 | -- | -- |
| 26. I plan things out before I begin my schoolwork. | 0.01 | 0.00 | 0.09 | 0.01 | -- | -- |
| 27. I make an outline before I write a paper, even if it is not required. | 4.13 | -0.05 | 40.67 | -0.27 | -- | -- |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | 0.13 | -0.01 | 0.10 | -0.01 | -- | -- |
| 29. When I do an assignment, I try to connect it to my life somehow. | 24.57 | -0.11 | 85.52 | -0.32 | -- | -- |
| 30. I try to connect class reading to something interesting. | 15.20 | -0.08 | 34.93 | -0.19 | -- | -- |
| 31. While reading for class, I stop once in a while to review what I've read. | 9.98 | -0.06 | 48.19 | -0.22 | -- | -- |
| 32. I combine information from class and from the book when I study for a test. | 8.84 | 0.06 | 20.98 | 0.14 | -- | -- |
| 33. When I get stuck on a question, I talk through it with someone. | 0.01 | 0.00 | 0.30 | 0.02 | -- | -- |
| 34. I ask for help with my schoolwork when I need it. | 32.31 | 0.11 | 71.00 | 0.24 | -- | -- |
| 35. After I solve a problem, I make sure the solution worked. | 0.50 | 0.01 | 9.79 | 0.09 | -- | -- |
| 36. I check over my completed schoolwork to make sure it's correct. | 4.67 | -0.04 | 0.57 | 0.02 | -- | -- |

*Note. MI = Modification Index, EPC = Expected Parameter Change*

Modification indices were also examined for the indicator error variances. Of note were the modification indices observed between items positioned next to each other on the PREP. Modification indices indicated that the model would likely fit better if the error variances for items 4 and 5, 25 and 26, 29 and 30, 33 and 34, 35 and 36 were allowed to be correlated.

Although the RMSEA = .060 (90% CI (0.059, 0.062) indicated a reasonable fit for the hypothesized model, the modification indices indicated localized areas of ill fit. Closer examination of the areas of strain and ill fit in the model indicated possible misspecification in the model and model respecification was deemed worth pursuing.

Post-hoc respecification moves the researcher from confirmatory factor analysis into exploratory factor analysis because data are being used to make changes to the model (Harrington, 2009). However, no change decisions were made solely based on data or solely for the sake of improving fit indices. Changes to the model were only made when substantive evidence indicated the appropriateness of the respecification. Additionally, as suggested by Brown (2006), decision rules used to make changes were applied consistently.

***Model respecification.*** As indicated by examination of the modification indices, two major sources of ill fit existed for the PREP: cross-loading items (particularly items 24 and 34) and the lack of specified correlated errors. Model respecification began with further examining the modification indices for indicator error variances to determine if a substantive reason or cause could be identified for the shared variance. As mentioned previously, the modification indices for items 4 and 5, 25 and 26, 29 and 30, 33 and 34, 35 and 36 indicated that the model would likely fit better if the error variances for these items were allowed to be correlated. In examining the items, it was clear that two outside reasons could account for the shared variance (other than shared variance due to the latent factor): 1) The items were next to each other on the instrument and so, as students completed the survey there was some carryover effect from one item to the next; and 2) the items were grouped with like items, and each of the items in these pairs are worded similarly. For example, item 4 reads, “I plan to get more education after I graduate from high school” and item 5 reads, “I plan to earn a college degree.” Both items refer to obtaining postsecondary education and start with the words, “I plan.” Despite the fact that the model fit may be improved by allowing the indicator errors, doing so would lead to a

more complex model that could not be easily scored through summing responses on the three scales. Therefore, since the tool is to be used by students and school personnel, indicator variances were not allowed to be correlated in the model respecification.

Model respecification focused instead on whether or not the model fit would be improved by eliminating cross-loading items. The model was respecified and two additional models were tested. In Model B, item 24 was eliminated. In Model C, items 24 and 34 were both eliminated.

*Model B.* The model was respecified with item 24 eliminated. Several substantive reasons affirmed the decision to eliminate item 24 (I set academic goals for myself): a) the item was added post-scale development; b) the item cross-loads highly with the other two factors; c) it is assumed throughout the scale that the student sets goals for him- or herself as seen in item 1 (I will achieve my academic goals) and item 22 (I work had to achieve the goals I set for myself), and so asking students if they set goals for themselves two-thirds of the way into the survey is likely somewhat redundant and confusing; and d) theoretically, goal setting is an important step in the process of self-regulated learning as a student approaches his or her schoolwork, and yet this item lacks specificity and is not tapping into task-specific goal setting which is better measured through item 26, "I plan things out before I begin my schoolwork". The item may be retained in future scales as a student characteristic variable on a dichotomous scale or may be refined to be a more task-specific goal setting item.

The model was refit and demonstrated a RMSEA = .061 (90% CI (0.059, 0.062). All factor loadings were .31 and above and were deemed significant. The standardized residuals were examined and determined to continue to demonstrate areas of strain and ill

fit in the model, with the range of values for the residuals between -5.29 and 7.31. The modification indices and EPC values for the indicators were examined continued to demonstrate areas of ill fit, particularly for item 34 (modification indices = 42.99 and 92.77 and EPC = 0.12 and 0.27).

*Model C.* Model B was respecified with item 34 eliminated, was refit, and resulted in a RMSEA = .059 (90% CI (0.057, 0.061). All factors loaded significantly at 0.33 (unstandardized factor loadings) and above (Table 11). Salient indicators are typically identified as having completely standardized loadings above .30 (Brown, 2006). The completely standardized loadings for this model ranged from .53 to .84, indicating that all were considered salient. Squared multiple correlations ($R^2$) values for each item indicate the proportion of variance in the indicator that is estimated to be "true score" variance. Squared multiple correlations for the indicators in this model ranged from .28 to .71, indicating that between 26% and 69% of the indicators' variance was estimated to be accounted for by the latent variable on which it loaded. Unstandardized and completely standardized factor loadings and standard errors, error variances and standard errors, and squared multiple correlations ($R^2$) are presented in Table 11.

Due to its demonstrated close model fit, improvement in fit over the other models (Table 12), and few identified localized areas of strain, model C was considered the best fitting model.

Table 11

*Parameter Estimates for Model C, Sample 1 (n=1,643)*

| Item | Unstand-ardized | Standa-rdized | se | Error Variance | se | $R^2$ |
|---|---|---|---|---|---|---|
| Self-Efficacy & Expectations | | | | | | |
| 1. I will achieve my academic goals. | .40 | .65 | .01 | .22 | .01 | .42 |
| 2. I can do my schoolwork well if I try hard. | .36 | .62 | .01 | .21 | .01 | .38 |
| 3. Working hard in school now will help me in my future. | .40 | .64 | .01 | .23 | .01 | .41 |
| 4. I plan to get more education after I graduate from high school. | .50 | .83 | .01 | .12 | .01 | .68 |
| 5. I plan to earn a college degree. | .52 | .84 | .01 | .11 | .01 | .71 |
| 6. I can imagine myself as a successful college student. | .52 | .79 | .01 | .17 | .01 | .63 |
| 7. I will get into college. | .55 | .83 | .01 | .13 | .01 | .69 |
| 8. If I work hard, I will succeed in college. | .50 | .83 | .01 | .12 | .01 | .68 |
| 9. I will finish college even if there are obstacles in my way. | .53 | .82 | .01 | .13 | .01 | .68 |
| 10. Getting a college degree will help me achieve my future goals. | .50 | .80 | .01 | .14 | .01 | .63 |
| 11. I am hopeful about my future. | .45 | .70 | .01 | .21 | .01 | .49 |
| Effort & Persistence | | | | | | |
| 12. I try to do my best in my classes. | .41 | .67 | .01 | .20 | .01 | .45 |
| 13. I put my schoolwork before other activities. | .48 | .69 | .02 | .26 | .01 | .47 |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | .53 | .71 | .02 | .27 | .01 | .51 |
| 15. I turn in my schoolwork on time. | .40 | .59 | .02 | .29 | .01 | .35 |
| 16. When I work on an assignment, I focus on getting it done correctly. | .42 | .67 | .01 | .21 | .01 | .45 |
| 17. I make sure I understand an assignment when I work on it. | .41 | .64 | .02 | .23 | .01 | .41 |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | .41 | .60 | .02 | .30 | .01 | .36 |
| 19. I use feedback from my teachers to improve my assignments. | .46 | .61 | .02 | .36 | .01 | .37 |
| 20. I follow through on commitments that I make. | .33 | .55 | .01 | .25 | .01 | .30 |
| 21. I make sure I finish what I start. | .40 | .65 | .01 | .21 | .01 | .42 |
| 22. I work hard to achieve the goals I set for myself. | .40 | .64 | .01 | .23 | .01 | .41 |
| 23. If I fail at something, I try again. | .37 | .56 | .02 | .30 | .01 | .31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Self-Regulated Learning | | | | | | |
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | .61 | .53 | .03 | .94 | .03 | .28 |
| 26. I plan things out before I begin my schoolwork. | .62 | .67 | .02 | .48 | .02 | .44 |
| 27. I make an outline before I write a paper, even if it is not required. | .60 | .61 | .02 | .59 | .02 | .38 |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | .64 | .72 | .02 | .39 | .02 | .51 |
| 29. When I do an assignment, I try to connect it to my life somehow. | .66 | .66 | .02 | .55 | .02 | .44 |
| 30. I try to connect class reading to something interesting. | .63 | .68 | .02 | .47 | .02 | .46 |
| 31. While reading for class, I stop once in a while to review what I've read. | .63 | .68 | .02 | .46 | .02 | .47 |
| 32. I combine information from class and from the book when I study for a test. | .59 | .68 | .02 | .40 | .02 | .46 |
| 33. When I get stuck on a question, I talk through it with someone. | .52 | .60 | .02 | .50 | .02 | .36 |
| 35. After I solve a problem, I make sure the solution worked. | .54 | .67 | .02 | .35 | .01 | .45 |
| 36. I check over my completed schoolwork to make sure it's correct. | .59 | .68 | .02 | .41 | .02 | .46 |

Table 12

*RMSEA for the PREP Three-Factor Models A-C (Sample 1, n =1,643)*

| RMSEA | 90%CI RMSEA |
|---|---|
| .060 | (.059; .062) |
| .061 | (.059; .062) |
| .059 | (.057, .061) |

*Note.* Model A contains all items. In Model B, item 24 was eliminated. In Model C items 24 and 34 were eliminated.
RMSEA = Root-Mean Square Error of Approximation

**Model replication.** Confirmatory factor analyses were conducted in LISREL8.8 with full information maximum likelihood with samples 2 and 3 to test the fit of the newly specified Model C. Factor loadings, which were significant in each sample, are

presented in Table 13. For sample 2, the RMSEA = .064, 90% CI (0.061; 0.068) and for sample 3, the RMSEA = .074, 90% CI (0.070, 0.078) indicate that the fit of the respecified model was borderline to reasonable (Table 14).

Table 13

*Parameter Estimates for Sample 2 (n=495) and Sample 3 (n=383)*

| | Sample 2 | | | Sample 3 | | |
|---|---|---|---|---|---|---|
| | Unstan-dardized | Stand-ardized | SE | Unstan-dardized | Stand-ardized | SE |
| Self-Efficacy & Expectations | | | | | | |
| 1. I will achieve my academic goals. | .41 | .72 | .02 | .46 | .76 | .03 |
| 2. I can do my schoolwork well if I try hard. | .39 | .69 | .02 | .48 | .84 | .02 |
| 3. Working hard in school now will help me in my future. | .41 | .76 | .02 | .48 | .76 | .03 |
| 4. I plan to get more education after I graduate from high school. | .47 | .82 | .02 | .46 | .84 | .02 |
| 5. I plan to earn a college degree. | .47 | .82 | .02 | .48 | .85 | .02 |
| 6. I can imagine myself as a successful college student. | .50 | .82 | .02 | .51 | .85 | .03 |
| 7. I will get into college. | .51 | .84 | .02 | .49 | .86 | .02 |
| 8. If I work hard, I will succeed in college. | .47 | .83 | .02 | .51 | .89 | .02 |
| 9. I will finish college even if there are obstacles in my way. | .50 | .83 | .02 | .52 | .88 | .02 |
| 10. Getting a college degree will help me achieve my future goals. | .43 | .78 | .02 | .52 | .84 | .03 |
| 11. I am hopeful about my future. | .45 | .75 | .02 | .48 | .81 | .03 |
| Effort & Persistence | | | | | | |
| 12. I try to do my best in my classes. | .37 | .68 | .02 | .39 | .71 | .03 |
| 13. I put my schoolwork before other activities. | .41 | .61 | .03 | .42 | .64 | .03 |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | .47 | .68 | .03 | .43 | .71 | .03 |
| 15. I turn in my schoolwork on time. | .35 | .60 | .03 | .25 | .50 | .02 |
| 16. When I work on an assignment, I focus on getting it done correctly. | .39 | .69 | .02 | .40 | .74 | .02 |
| 17. I make sure I understand an assignment when I work on it. | .42 | .70 | .02 | .39 | .71 | .03 |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | .42 | .69 | .03 | .39 | .67 | .03 |
| 19. I use feedback from my teachers | .44 | .62 | .03 | .41 | .63 | .03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| to improve my assignments. | | | | | | |
| 20. I follow through on commitments that I make. | .39 | .66 | .03 | .26 | .52 | .02 |
| 21. I make sure I finish what I start. | .39 | .70 | .02 | .38 | .70 | .02 |
| 22. I work hard to achieve the goals I set for myself. | .41 | .70 | .02 | .37 | .69 | .02 |
| 23. If I fail at something, I try again. | .38 | .62 | .03 | .32 | .59 | .03 |
| Self-Regulated Learning | | | | | | |
| 25. I use a planner/assignment book/agenda to keep track of my assignments | .76 | .64 | .05 | .70 | .58 | .06 |
| 26. I plan things out before I begin my schoolwork. | .68 | .72 | .04 | .69 | .76 | .04 |
| 27. I make an outline before I write a paper, even if it is not required. | .68 | .69 | .04 | .71 | .71 | .05 |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | .69 | .80 | .03 | .73 | .83 | .04 |
| 29. When I do an assignment, I try to connect it to my life somehow. | .69 | .70 | .04 | .76 | .71 | .05 |
| 30. I try to connect class reading to something interesting. | .66 | .72 | .04 | .69 | .74 | .04 |
| 31. While reading for class, I stop once in a while to review what I've read. | .64 | .70 | .04 | .68 | .77 | .04 |
| 32. I combine information from class and from the book when I study for a test. | .59 | .74 | .03 | .51 | .70 | .03 |
| 33. When I get stuck on a question, I talk through it with someone. | .55 | .64 | .04 | .50 | .65 | .04 |
| 35. After I solve a problem, I make sure the solution worked. | .50 | .67 | .03 | .52 | .70 | .03 |
| 36. I check over my completed schoolwork to make sure it's correct. | .56 | .69 | .03 | .60 | .71 | .04 |

*Note.* Values in the standardized column represent completely standardized estimates.

Table 14

*RMSEA for Model C for Samples 1 (n=1643), 2 (n=495), and 3 (n=383)*

| Sample | RMSEA | 90%CI RMSEA |
|---|---|---|
| 1 | .059 | (.057, .061) |
| 2 | .064 | (.061; .068) |
| 3 | .074 | (.070; .078) |

*Note.* RMSEA = Root Mean Square Error of Approximation

**Research question 5: What is the evidence of convergent validity? Are the three factors interrelated?** Evidence of convergent validity is established by demonstration that theoretically overlapping constructs are interrelated. In this study, based on theory, the three constructs measured were hypothesized to be interrelated and therefore the three factors were hypothesized to be correlated and the indicators assigned to each latent variable were hypothesized to load significantly on all three latent variables. Evidence for convergent validity was established in two ways: factor loadings and factor correlations.

First, it was hypothesized that each item would load significantly on one factor. Results from the CFA for each sample indicated this to be the case, with all factor loadings found to be significant (see Tables 11 and 13) and all completely standardized loadings above .30 (indicating the salience of each indicator).

Second, it was hypothesized that each factor would be correlated with the others, with the factors of Effort & Persistence and Self-Regulated Learning having the highest correlation. Results from the CFA conducted with samples 1, 2, and 3 indicated that the correlations between the latent factors of Self-Efficacy & Expectations and Effort & Persistence, Self-Efficacy & Expectations and Self-regulated Learning, and Effort & Persistence and Self-regulated Learning were statistically significant (Wald statistic greater than 1.96 for $\alpha = .05$), indicating that the factors were all interrelated. Table 15 presents the factor correlations and standard errors for each pair of factors in each of the samples. Results from correlation analysis conducted with each sample between the sum of item scale scores for each factor indicated that the observed correlations between the latent factors of Self-Efficacy & Expectations and Effort & Persistence, Self-Efficacy &

Expectations and Self-regulated Learning, and Effort & Persistence and Self-regulated Learning were statistically significant ($p < .001$), indicating that the factors were all interrelated. Table 16 presents the factor correlations for each pair of factors in each of the samples. The strength of the relationship between observed correlations was interpreted using Cohen's (1988) classification system, which regards correlations less than .2 as weak, .2 to .4 as moderately weak, .4 to .6 as moderately strong, .6 to .8 as strong, and greater than .8 as very strong. As evidenced by the estimated correlations of .62 to .63, the correlations between Effort & Persistence and Self-regulated Learning proved to be the highest and were considered strong, while the other relationships ranged from weak to moderately strong.

Table 15

*Factor Correlations (with Standard Errors) Estimated from CFA for Samples 1 (n =1,643), 2 (n =495), and 3 (n =383)*

| | Sample 1 | | | Sample 2 | | | Sample 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | I | II | III | I | II | III |
| Self-Efficacy & Expectations (I) | 1.00 | | | 1.00 | | | 1.00 | | |
| Effort & Persistence (II) | .52 (.02) | 1.00 | | .54 (.04) | 1.00 | | .34 (.05) | 1.00 | |
| Self-Regulated Learning (III) | .37 (.02) | .72 (.02) | 1.00 | .42 (.04) | .70 (.03) | 1.00 | .16 (.05) | .69 (.03) | 1.00 |

Table 16

*Observed Factor Correlations for Samples 1 (n =1,643), 2 (n =495), and 3 (n =383)*

| | Sample 1 | | | Sample 2 | | | Sample 3 | | |
|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | I | II | III | I | II | III |
| Self-Efficacy & Expectations (I) | 1.00 | | | 1.00 | | | 1.00 | | |
| Effort & Persistence (II) | .48 | 1.00 | | .50 | 1.00 | | .32 | 1.00 | |
| Self-Regulated Learning (III) | .33 | .62 | 1.00 | .37 | .63 | 1.00 | .14 | .62 | 1.00 |

**Research question 6: What is the evidence of discriminant validity?**

***A. Is there adequate discrimination between the three factors?*** Evidence for discriminant validity was established in two ways: factor loadings and factor correlations. First, it was hypothesized that items would load on one item only and demonstrate little or no cross-loading. In order to ensure that indicators loaded on one factor only, modification indices and EPC values were examined to detect cross-loading. While modification indices for items 1, 27, 29, 31, 32 were considered high (>25.00), when examined in conjunction with EPC values, none of the items was determined to identify high cross-loading (all EPC values were less than .20).

Additionally, while it was hypothesized and confirmed that each factor correlated with the others, it was also hypothesized that each factor was distinct, measuring separate constructs. A rule of thumb in applied research is that factor correlation coefficients that exceed .80 indicate poor discrimination (Brown, 2006). In this study, factor correlations ranged from .14 to .72 in samples 1, 2, and 3 (see Tables 15 and 16), indicating that although factors were found to be related, they were distinct from one another.

***B. Is the PREP distinct from measures of college readiness such as the PLAN, ACT, and grade point average (GPA)?*** In order to address the second part of the research question, correlation analyses were conducted between summed item scores for each scale and PLAN scores in sample 2, ACT scores in sample 3, and GPA in samples 1, 2, and 3. The strength of the relationship was again interpreted using Cohen's (1988) classification system. Additionally, squared correlations were computed to determine the amount of variance shared by the measures.

Results, presented in Table 17, indicated that the relationships between the PLAN and ACT scores and the PREP scales of Self-Efficacy & Expectations and Effort & Persistence were significant, positive, and weak to moderately weak (Cohen, 1988) as expected. The shared variance between PLAN and ACT scores and the two PREP scales ranged from 10-30%. The relationship between the PLAN and ACT and the PREP scale of Self-Regulated Learning was not significant. In regard to GPA, in each sample, GPA was found to significantly, positively correlate with Self-Efficacy & Expectations and Effort & Persistence. The correlation between GPA and Self-Efficacy & Expectations was considered moderately weak for each sample while the correlation between GPA and Effort & Persistence ranged from moderately weak to moderately strong, with shared variance ranging from 4% to 28%. The relationship between GPA and Self-Regulated Learning was found to be significant, positive, and moderately weak in samples 1 and 2, but was found to be nonsignificant in the sample 3.

Table 17

*Correlations Between PREP Scales and PLAN, ACT, and GPA*

| | Self-Efficacy & Expectations | | Effort & Persistence | | Self-Regulated Learning | |
|---|---|---|---|---|---|---|
| | *r* | $r^2$ | *r* | $r^2$ | *r* | $r^2$ |
| PLAN | .19** | 0.04 | .30** | 0.09 | .06 | 0.00 |
| ACT | .10* | 0.01 | .12* | 0.01 | -.02 | 0.00 |
| GPA (Sample 1, n=1591) | .36** | 0.13 | .47** | 0.22 | .24** | 0.06 |
| GPA (Sample 2, n = 484) | .34** | 0.12 | .53** | 0.28 | .31** | 0.10 |
| GPA (Sample 3, n=382) | .21** | 0.04 | .31** | 0.10 | .08 | 0.01 |

*Note. * p<.05 **p<.01*
Missing values were not imputed for GPA

**Research question 7: Does the PREP demonstrate internal consistency?**

Reliability analysis was conducted for each sample in order to test the internal consistency of each scale. Missing data values were imputed using the EM algorithm

prior to analysis. Item-total correlations, coefficient alpha with item deleted, and the coefficient alpha for each scale are presented in Table 18 for all three samples. DeVellis (2003) suggested the following thresholds for coefficient alpha values research scales: "Below .60, unacceptable; between .60 and .65, undesirable; between .65 and .70, minimally acceptable; between .70 and .80, respectable; between .80 and .90, very good" (p.96). He also suggested that an alpha of .85 is adequate for research with group data and that an alpha in the mid-90s is desirable for instruments used to make high-stakes decisions for individuals.

Results from the reliability analysis show that the coefficient alpha for the Self-Efficacy & Expectations scale was .94 or above for each sample, for Effort & Persistence was .89 or .90 for each, and for Self-Regulated Learning were .89 and above, indicating very good to excellent internal consistency. None of the values for the coefficient alpha when the item is deleted demonstrated that the coefficient alpha would be increased by dropping items.

Table 18

*Results from Reliability Analysis for Sample 1 (n =1,643), Sample 2 (n = 495), and Sample 3 (n =383)*

| | Sample 1 | | Sample 2 | | Sample 3 | |
|---|---|---|---|---|---|---|
| | Item-total correlation | α with item deleted | Item-total correlation | α with item deleted | Item-total correlation | α with item deleted |
| Self-Efficacy & Expectations | | | | | | |
| 1. I will achieve my academic goals. | .64 | .94 | .70 | .94 | .74 | .96 |
| 2. I can do my schoolwork well if I try hard. | .61 | .94 | .68 | .95 | .82 | .96 |
| 3. Working hard in school now will help me in my future. | .63 | .94 | .74 | .94 | .75 | .96 |
| 4. I plan to get more education after I graduate from high school. | .79 | .93 | .80 | .94 | .84 | .96 |
| 5. I plan to earn a college degree. | .80 | .93 | .79 | .94 | .85 | .96 |
| 6. I can imagine myself as a successful | .76 | .93 | .79 | .94 | .83 | .96 |

| | | | | | | |
|---|---|---|---|---|---|---|
| college student. | | | | | | |
| 7. I will get into college. | .79 | .93 | .81 | .94 | .84 | .96 |
| 8. If I work hard, I will succeed in college. | .80 | .93 | .81 | .94 | .86 | .96 |
| 9. I will finish college even if there are obstacles in my way. | .79 | .93 | .80 | .94 | .86 | .96 |
| 10. Getting a college degree will help me achieve my future goals. | .77 | .93 | .76 | .94 | .83 | .96 |
| 11. I am hopeful about my future. | .68 | .93 | .74 | .94 | .79 | .96 |
| Scale α | .94 | | .95 | | .96 | |
| Effort & Persistence | | | | | | |
| 12. I try to do my best in my classes. | .62 | .88 | .65 | .89 | .67 | .89 |
| 13. I put my schoolwork before other activities. | .62 | .88 | .56 | .90 | .58 | .89 |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | .66 | .88 | .65 | .89 | .67 | .89 |
| 15. I turn in my schoolwork on time. | .56 | .88 | .57 | .90 | .49 | .90 |
| 16. When I work on an assignment, I focus on getting it done correctly. | .63 | .88 | .66 | .89 | .70 | .89 |
| 17. I make sure I understand an assignment when I work on it. | .60 | .88 | .67 | .89 | .67 | .89 |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | .56 | .88 | .65 | .89 | .62 | .89 |
| 19. I use feedback from my teachers to improve my assignments. | .56 | .88 | .57 | .90 | .58 | .89 |
| 20. I follow through on commitments that I make. | .53 | .88 | .62 | .89 | .52 | .89 |
| 21. I make sure I finish what I start. | .63 | .88 | .67 | .89 | .69 | .89 |
| 22. I work hard to achieve the goals I set for myself. | .61 | .88 | .67 | .89 | .66 | .89 |
| 23. If I fail at something, I try again. | .52 | .88 | .57 | .90 | .53 | .89 |
| Scale α | .89 | | .90 | | .90 | |
| Self-Regulated Learning | | | | | | |
| 25. I use a planner/assignment book/agenda to keep track of my assignments | .51 | .88 | .62 | .91 | .58 | .92 |
| 26. I plan things out before I begin my schoolwork. | .64 | .88 | .69 | .90 | .75 | .91 |
| 27. I make an outline before I write a paper, even if it is not required. | .59 | .88 | .67 | .90 | .70 | .91 |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | .67 | .88 | .76 | .90 | .79 | .91 |
| 29. When I do an assignment, I try to connect it to my life somehow. | .64 | .88 | .68 | .90 | .70 | .91 |
| 30. I try to connect class reading to something interesting. | .64 | .88 | .70 | .90 | .73 | .91 |
| 31. While reading for class, I stop once in a while to review what I've read. | .65 | .88 | .68 | .90 | .74 | .91 |
| 32. I combine information from class and from | .62 | .88 | .69 | .90 | .65 | .91 |

| | | | | | | |
|---|---|---|---|---|---|---|
| the book when I study for a test. | | | | | | |
| 33. When I get stuck on a question, I talk through it with someone. | .55 | .88 | .61 | .91 | .60 | .92 |
| 35. After I solve a problem, I make sure the solution worked. | .61 | .88 | .63 | .91 | .67 | .91 |
| 36. I check over my completed schoolwork to make sure it's correct. | .62 | .88 | .65 | .90 | .68 | .91 |
| Scale α | .89 | | .91 | | .92 | |

**Research question 8: Is the PREP able to distinguish between groups based on grade point average?** Pearson's chi-square tests were used to test whether the PREP could distinguish between low achievers and high achievers, that is, whether there was a significant difference between the two groups for each of the PREP scales. Results of the cross-tabulation are presented in Table 19. A significant difference was found between low achievers and high achievers for each scale, with students reporting a D or F GPA shown consistently to possess lower scores on Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning than students reporting having an A GPA. Based on the resulting phi coefficients, relationships between level of achievement and scores on the PREP scales ranged from moderately weak to moderately strong.

Table 19

*Crosstabulation of Low Achievers (n=138) and High Achievers (n=377) and Low and High Summed Factor Scores*

| | Self-Efficacy & Expectations | | Effort & Persistence | | Self-Regulated Learning | |
|---|---|---|---|---|---|---|
| Groups | Low | High | Low | High | Low | High |
| Low Achievers | | | | | | |
| n | 49 | 89 | 66 | 72 | 105 | 33 |
| % | 35.5% | 64.5% | 47.8% | 52.2% | 76.1% | 23.9% |
| High Achievers | | | | | | |
| n | 9 | 368 | 10 | 367 | 183 | 194 |
| % | 2.4% | 97.6% | 2.7% | 97.3% | 48.5% | 51.5% |
| $X^2$ | 110.88* | | 163.88* | | 31.10* | |
| Phi ϕ | .46* | | .56* | | .25* | |

*Note. df=1, *p < .001*

**Research question 6. Can the PREP be used to identify groups of students in need of intervention to promote self-efficacy and expectations, effort and persistence, and self-regulated learning?** Frequency analyses were conducted in SPSS for sample 1 with missing values imputed through the EM algorithm. In Table 20, the minimum, maximum, and mean scale scores are presented along with standard deviation, and the percentage of students scoring below and above the 33 point cutoff for the Self-Efficacy & Expectations and Self-Regulated Learning scales and the 36 point cutoff for the Effort & Persistence scale. On the Self-Efficacy & Expectations and Effort & Persistence scales, 8.6% and 16.4% of students did not meet the cutoff score, similar to the hypothesized values of 7% and 15-20%. In the case of Self-Regulated Learning, a much larger percentage, 61.7% of participants, did not meet the cutoff score, indicating that the scale identified many more students for intervention than hypothesized (15-20% was hypothesized).

Table 20

*Scale Scores and Percentage of Students Below and Above Scale Score Cutoffs*

| | minimum | maximum | mean | SD | % Below cutoff | % At or Above cutoff |
|---|---|---|---|---|---|---|
| Self-Efficacy & Expectations | 11.00 | 44.00 | 38.87 | 5.41 | 8.6% | 91.4% |
| Effort & Persistence | 12.00 | 48.00 | 40.57 | 5.30 | 16.4% | 83.6% |
| Self-Regulated Learning | 11.00 | 44.00 | 30.18 | 7.04 | 61.7% | 38.3% |

# Chapter 5

## Discussion

Measuring students' personal readiness for college before they begin their postsecondary education has the potential of informing early intervention and helping students to develop the skills and habits they need to succeed in postsecondary education once they do begin. Despite the clear benefits for measuring personal readiness while students are still in high school, few instruments are currently available for such a purpose, with one measuring personal readiness prior to college enrollment and several more measuring personal readiness once the students are already on campus. The purpose of this study was to fill a gap identified through review of the literature by developing the Personal Readiness Evaluation for Postsecondary (PREP) and establishing validity evidence for the inferences drawn from the PREP, an instrument designed to measure high school students' personal readiness for college, including their self-efficacy and expectations, effort and persistence, and self-regulated learning abilities; and to establish validity evidence so that the PREP might help to increase the number of measurement tools available to schools and be used to inform interventions to increase personal readiness for college.

The overarching research question for this study was: To what extent are the inferences drawn from the Personal Readiness Evaluation for Postsecondary valid for ninth-twelfth graders? An explanation of the results from this study and validity evidence, along with a discussion of merits and limitations, implications, directions for future research, and conclusions follow.

**Phase I and II: Instrument Development and Pilot Study**

**Research question 1: What is the evidence of content validity?** Content validity was well established during the instrument development process. The construct of personal readiness for college was defined and items were deemed to be representative of the construct by experts. Additionally, expert review and student review of items resulted in clear, age-appropriate items on the PREP. Evidence was also gathered to demonstrate that the instrument measures what it intends to measure and so may be used as intended to measure aspects of personal readiness for college (see results for research questions 2-4) and to identify high school students in need of additional support (see results for research question 9), which further reflects validity evidence based on content validity.

**Phase III: Testing the Refined Instrument**

**Research question 2**: **Can the established factor structure of the PREP be confirmed? What is the fit of the model?** The five-factor model for the PREP demonstrated borderline model fit, which was not altogether surprising due to the overlap of the constructs underlying this instrument within theory and research. Exploratory factor analysis suggested that a three factor model would better fit the data. The three factor model aligned with theory and with the construct of personal readiness for college as defined in scale development. The three identified factors were: Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning.

**Research question 3: Does the PREP demonstrate internal consistency?** Reliability analysis conducted for the 33 items retained following instrument refinement

and indicated very good to excellent internal consistency, providing validity evidence based on internal structure.

**Phase III. Testing of the Refined Instrument**

**Research Question 4: Can The Established Factor Structure Of The PREP Be Confirmed? What Is The Fit Of The Model?** The third phase of this study sought to replicate the three-factor model established in Phase II with the 33 items remaining from the initial scale and three added items. Results from a confirmatory factor analysis (CFA) indicated that the model was a reasonable fit according to the Root-Mean Square Error of Approximation (RMSEA), but modification indices and standardized residuals indicated localized areas of ill fit particularly for items 24 and 34, which were two of the items added for trial in this phase.

Due to poor model fit, an iterative process of model respecification was undertaken using modification indices for indicators along with theory to drive the respecification. The final model excluded items 24 and 34, which cross-loaded highly on other factors and were considered redundant. The RMSEA indicated that the respecified model demonstrated a reasonable model fit that was an improvement over the other two models tested (Table 12). The respecified model was then replicated through CFA with sample 2 and sample 3. Model fit indices from both samples confirmed that the model was a reasonable fit (Table 14).

**Research Question 5: What Is The Evidence Of Convergent Validity? Are The Three Factors Interrelated?** Convergent validity was established through: a) significant loading of items on one factor in all three samples and b) in all three samples, factors were significantly correlated and ranged in strength from weak to strong (Tables

15 and 16) as expected based on theory and empirical research (e.g. Zimmerman, 2000; Pintrich et al., 1993).

**Research Question 6: What Is The Evidence Of Discriminant Validity?** Discriminant validity evidence was gathered to demonstrate discrimination between the three constructs measured in the PREP (self-efficacy and expectations, effort and persistence, and self-regulated learning) and between the PREP and measures of academic readiness for college.

**Is there adequate discrimination between the three factors?** Evidence for discrimination between constructs on the PREP was established through: a) factors loading on one factor with little to know cross-loading in samples all three samples and b) factor correlations below the factor .80 threshold (Brown, 2006). All evidence pointed to the ability to discriminate between the three constructs measured in the PREP.

**Is the PREP distinct from measures of college readiness such as the PLAN, ACT, and grade point average?** Evidence of discrimination between the construct of personal readiness for college as measured by the PREP and academic readiness for college as measured by PLAN and ACT scores and GPA was established by conducting correlation analysis between measures for all three samples. Results (Table 17) indicated that the relationships between both the PLAN and ACT scores and the PREP scales of Self-Efficacy and Expectations and Effort & Persistence were significant, positive, and weak to moderately weak (Cohen, 1988) as expected, while the relationship between the PLAN and ACT and the PREP scale of Self-Regulated Learning was not significant.

While a significant correlation between Self-Regulated Learning and the PLAN and ACT was predicted, it makes theoretical sense that they were not statistically related

because while students' performance on the tests are likely related to their how they expect to do, how hard they try, and how much they keep trying despite challenging problems, it is less likely for their performance to be related to some of the self-regulated learning strategies measured in the PREP which are not feasible to employ (i.e. talking over a difficult problem with someone, planning things out before starting) or not related to the test (i.e. using a planner, making an outline for a paper, ask questions while studying).

In regard to correlations with GPA, GPA was found to significantly, positively correlate with Self-Efficacy & Expectations and Effort & Persistence, with moderately weak correlations and a range of moderately weak to moderately strong correlations respectively. GPA was found to significantly, positively correlate with Self-Regulated Learning in samples 1 and 2, but not in sample 3 for which the relationship was deemed nonsignificant, with only 1% of variance shared between the two. This may due to the sample being made up of students who took the ACT, an optional test for juniors and seniors who are planning to go to college (as opposed to the PLAN which is taken by all sophomores), and thus students both reported higher GPA and scored higher on the Self-Regulated Learning scale than did the students in the other two samples. In fact, 87.7% of students in sample 3 reported having a B or A GPA compared to 68.5% of the students in sample 1 and 71.1% in sample 2, and the average score on the Self-Regulated Learning scale for sample 3 was 33.4 ($SD$ = 7.4), while it was 30.2 ($SD$ = 7.0) for sample 1 and 31.7 ($SD$ = 7.4) for sample 2.

**Research Question 7: Does The PREP Demonstrate Internal Consistency?**

Results from reliability analyses for each sample (Table 18) provided evidence of internal

consistency for each scale on the PREP, with alpha coefficients within the very good to excellent range and above the .85 considered adequate for the research (DeVellis, 2003). This means that each scale of the PREP measures the construct it is intended to measure and that each of the items within the scales contributes meaningfully to their respective scale.

**Research Question 8: Is The PREP Able To Distinguish Between Groups Based On Grade Point Average?** Results from chi-square tests conducted with sample 1 (Table 20) indicated that the PREP is able to differentiate between low and high achievers across all three scales. Students who reported a GPA of D or below were shown to score lower on average on each of the PREP scales than students who reported a GPA of A. These findings supported the hypothesis that the PREP would be able to distinguish between groups based on GPA, and provided further support for past findings from research that found that high achieving students could be distinguished from low achieving students by their ability to engage in self-regulated learning (e.g. Zimmerman, 1998; Zimmerman & Martinez-Pons, 1990). This finding also provides evidence that the personal readiness for college habits and skills are associated with academic achievement in high school, and so promoting the development of these habits and skills may lead to improvement in students' academic achievement while still in high school.

**Research Question 9: Can The PREP Be Used To Identify Groups Of Students In Need Of Intervention To Promote Self-Efficacy And Expectations, Effort And Persistence, And Self-Regulated Learning?** It was hypothesized, in alignment with Adelman's (2006) finding that approximately 93% of students planned to obtain postsecondary education, that around 7% of students in this study would have

scores lower than the 33 cutoff established in conjunction with high school counselors on the Self-Efficacy & Expectations scale and could be identified for interventions targeting their self-efficacy and expectations for the future. In sample 1, the hypothesis was supported with 8.6% of students being identified as not meeting the 33-point cutoff score and as likely to benefit from intervention to promote self-efficacy and high expectations for the future. It was also hypothesized that, in alignment with the response to intervention framework (Jimerson et al., 2007), the PREP could serve to identify approximately 15-20% of students with scale scores below the 36-point cutoff on the Effort & Persistence scale and 15-20% of students with scale scores below the 33-point cutoff on the Self-Regulated Learning scale. On the Effort & Persistence scale, 16.4% were identified as not meeting the 33-point cutoff score and as likely to benefit from interventions promoting strategies for putting forth effort and persisting in the face of challenges.

On the other hand, a much larger percentage, 61.7% of participants, did not meet the cutoff score of 36 on the Self-Regulated Learning scale and so were identified as likely to benefit from interventions explicitly teaching self-regulated learning strategies. Even among the high achievers identified in sample 1, 48.5% had not met the cutoff. This large percentage of students who do not sometimes or often use the self-regulated learning strategies associated with academic achievement both in high school and postsecondary education indicates a systems issue— that our K-12 schools are either not teaching self-regulated learning strategies and/or are enabling students and not expecting them to use these self-regulated strategies on their own (for example, grading for completion of assignments rather than accuracy does not promote students checking over

their work). So while the instrument served to identify a large number of students requiring intervention, more than would likely be served in tier 2 interventions, it demonstrated the ability of the PREP to alert schools to a systems issue and the need to promote self-regulated learning at the universal level. Additionally, past studies have not indicated the average percentage of high school students using self-regulated strategies, and so this study adds to the literature by suggesting that low numbers of students (38.3% in this study) actually use the strategies in high school that they will likely be required to use in postsecondary education in order to be successful.

**Summary Of Findings**

This study sought to gather validity evidence to support the inferences drawn from the PREP. Sources of validity evidence included test content, internal structure, and relations to other variables. Evidence of content, construct, factorial, convergent, and discriminant validity combined to establish the validity argument that that the PREP measures what it intends to measures; that the three factors, Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning, are interrelated and yet distinct constructs; that the PREP demonstrates internal consistency within scales; that the PREP is somewhat related to measures of academic readiness for college including the PLAN, ACT, and GPA, but measures a construct, personal readiness for college, distinct from academic readiness; and that the PREP is able to discriminate between high and low achievers based on their GPA.

This evidence of validity lends credibility to the interpretations that those using the PREP can draw, specifically, interpretations regarding whether or not an individual demonstrates self-efficacy, expectations, effort, persistence, and the use of self-regulated

learning strategies at a level above the level anticipated to be consistent with being on-track for personal readiness for college (meaning above the established cutoff scores). The validity evidence also lends credibility to group level interpretations from the PREP data such as making data-driven decisions about the groups of students that would likely benefit from intervention to promote their self-efficacy, expectations, effort, persistence, and self-regulated learning, as well as data-driven decisions about whether or not the skills and habits associated with personal readiness for college need to be taught and fostered at a universal level. It should be noted that the PREP is not intended to be used to make high-stakes decisions for individuals and so should not be used for this purpose.

**Merits And Limitations**

A merit in this study was the rigorous iterative process followed to develop and establish validity evidence for the PREP, beginning with defining the construct, generating the item pool, and developing an initial scale, and then moving into revising the items, piloting the instrument, revising and refining the instrument based on data, establishing a close-fit factor structure for the PREP, replicating that structure, and gathering evidence of construct, convergent, and discriminant validity. The study also benefited from having three large samples (n=1,643, n=495, and n=383), which could be used to establish validity evidence. This was especially beneficial following the respecification of the model because two independent samples were able to confirm that the newly specified model was indeed a reasonable fit. Good coverage of the state was secured in sample 1, with eight out of nine regions represented in the sample. Additionally, the amount of missing data in each of the samples was well below 1% and so was not likely to impact the analyses conducted. To handle missing data, two of the

most widely recommended methods of estimation were used: the Expectation-Maximum was used to impute values for missing data for correlation, reliability, and chi-square analyses, and Full Information Maximum Likelihood was used to estimate parameters and standard errors for CFA.

In addition to its many merits, the study does have its limitations as well. First, the low response rate from schools (11%) was a limitation in this study and necessitated the use of all available data, with some schools representing a much larger proportion of the sample than others. However, schools that chose to participate were not statistically different from those who did not choose to participate and responses on the PREP were found not to be statistically related to school. Most schools that did not participate reported not being able to do so in April or May because it was too close to the end of the school year and they had many testing days in the schedule for those months (state exams, advanced placement tests, ACT, etc.). Efforts should be made to invite schools to participate in such a study earlier in the school year. Also, response was much greater from counselors than from administrators. Counselors are typically the individuals responsible for college and career readiness in their schools and so initial invitations to participate in a similar study should go to both administrators and counselors.

Another limitation of this study was that no data were collected on the students who chose not to participate in the study, so while differences between participants and their school populations could be analyzed (which demonstrated no significant differences), differences between participants and non-participants could not. Differences between participants and nonparticipants may be significant. In the future, this must be addressed up front, with data collected on all possible participants prior to administration

of the PREP and information gathered on those who chose not to participate at the time of the survey administration.

**Implications**

The purpose of the PREP is to measure high school students' personal readiness for college early enough in their educational journey to college that the information can be used to inform interventions that can in turn increase the students' readiness for success in postsecondary. This study has lent credibility to the inferences drawn from the PREP and so it can be used as intended. The intention is that after taking the PREP, students can score it for themselves and get a score for each scale, Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning, and then compare that score to a cutoff score to see whether they are on-track or off-track in their development of personal readiness for college.

Students can use this information to identify gaps and set goals for themselves to close the gaps. Parents can use the information to help them understand personal readiness for college and their child's level of personal readiness so that they can help to support personal readiness at home. Educators can use this information to identify students in need of intervention to increase their personal readiness and then design interventions based on individual student needs. Schools can use the information to identify gaps in their own preparation of students for college. They can use the tiered intervention recommendation of expecting 80% of their students to be demonstrating personal readiness on each of the scales, and if 80% of the students are not, they can design and implement universal level interventions to promote personal readiness, and if 80% are, they can identify groups of students requiring intervention in each of the areas

of personal readiness and design and implement small group interventions to promote personal readiness.

Furthermore, information gathered through administration of the PREP can be used to inform policy. It is clear from students' performance on the PREP, in particular their performance on the Self-Regulated Learning scale, that schools are not expecting or preparing their students to regularly engage in academic behaviors such as planning, setting learning and future goals, managing their time, using study skills, putting forth effort, maintaining belief in their ability to succeed, staying motivated, and persisting in the face of challenges. As states begin to develop college and career readiness standards, which several states are currently are in the process of doing (Conley, Leather, & Wilhoit, 2012), measures such as the PREP can serve to inform those standards, providing evidence for the need to raise expectations and ensure that all schools promote their students' development as independent learners.

**Directions for Future Research**

This study represents a first step in establishing the psychometric properties of the PREP. Further research is needed to determine whether or not the factors and items on the PREP fully represent and measure the construct of personal readiness, to gather additional validity evidence, as well as to continue to refine the instrument as needed.

One of the most important forms of validity evidence yet to be gathered for the PREP is that of predictive validity – does the PREP indeed predict personal readiness for college? A longitudinal study following students who take the PREP early in their high school career through to their second year of college could provide evidence as to

whether the PREP predicts success in college as measured by retention to the second year.

Concurrent validity evidence should be gathered for the PREP by assessing the correlation between the PREP and the newly developed ENGAGE instrument (ACT, 2012) and academic behaviors dimension of the CCRSD (Conley et al, 2010), as well as between the PREP scales and measures of similar constructs such as between the Self-Efficacy & Expectations scale and the Self-Efficacy for Learning and Performance scale from the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & Mckeachie, 1993) between the Effort & Persistence scale and the Persistence subscale from the Cognitive Engagement subscales of the Attitudes Toward Mathematics Survey (Miller, Greene, Montalvo, Ravindran, & Nichols, 1996), and between the Self-Regulated Learning scale and the Self-Regulation Strategy Inventory—Self-Report (Cleary, 2006).

Additionally, because early intervention is so critical in developing and cementing the habits needed to be successful in postsecondary education, gathering validity evidence for the use of the PREP with middle school students should be undertaken.

Finally, if the PREP is to be used to inform instructional practices and interventions, which is the intent of the instrument, it is necessary to gather evidence for the effectiveness of self-efficacy training and explicit teaching of effort-management and self-regulated learning strategies in improving outcomes for students. Once evidence for instructional practices and interventions that work has been collected, a strong evidence-based and data-driven assessment-to-intervention link can be established for the PREP.

## Conclusion

Currently, there is a dearth in instruments to measure personal readiness for college prior to enrollment in college in order to inform early intervention and promote the development of personal readiness. The Personal Readiness Evaluation for Postsecondary (PREP) was developed to fill this void. Validity evidence gathered in this study demonstrated that the PREP can be used with confidence to measure students' Self-Efficacy & Expectations, Effort & Persistence, and Self-Regulated Learning, all indicators of personal readiness for college. Validity evidence also suggests that the PREP can appropriately be used to provide students, parents, and teachers with an indicator of whether the students are on-track or off-track to personal readiness for college as well as identify students in need of intervention for any of the three indicators of personal readiness for college. This tool has the potential to help students improve their personal readiness for college prior to enrollment in college and thus improve their chances of succeeding in college.

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## Appendix A

# Scale Blueprint for the Personal Readiness Evaluation for Postsecondary (PREP)

| College Readiness indicator | Indicator Definition(s) | Research Base | Items |
|---|---|---|---|
| **Effort/ Mindset** | The student's mindset (whether intelligence and ability are viewed as fixed or malleable with effort), how he/she views failure and success, and the effort he/she puts into schoolwork. | Blackwell, Trzesniewski, & Dweck, 2007; Covington, 2000; Dweck & Leggett, 1988, 1999; Dweck, 2006; Eccles & Wigfield, 2002; Robbins et al., 2004, 2006; Weiner, 1986 | 1. I do just enough work to get by in my classes. |
| | | | 2. I try to do my best in my classes. |
| | | | 3. People think of me as a hard-working student. |
| | | | 4. I pretend to work in class. |
| | | | 5. Completing my assignments is more important than completing them well. |
| | | | 6. When I work on an assignment, I only focus on getting it done. |
| | | | 7. When I work on an assignment, I focus on getting it done correctly. |
| | | | 8. I can do even the hardest schoolwork if I try. |
| | | | 9. I can do my schoolwork well if I try hard. |
| | | | 10. If I work hard, I will succeed in college. |
| | | | 11. If I get good grades it is because of luck. |
| | | | 12. I believe natural ability is more important than hard work for succeeding in college. |
| | | | 13. I try to learn from the mistakes I make on my schoolwork. |
| | | | 14. I can change my intelligence. |
| | | | 15. I am I give up watching T.V. to do my schoolwork. |
| | | | 16. I give up hanging out with friends to do my schoolwork. |
| | | | 17. Other activities keep me from doing my homework |
| | | | 18. If I get good grades, it is because I worked hard. |
| **Motivation/ Goal Orientation** | The student's motivation to learn, to do well in school, and to pursue future goals. | Covington, 2000; Deci & Ryan, 1985; Eccles & Wigfield, 2002; Maehr & Midgley, 1991; Meece, Anderman, & Anderman, 2006; Robbins et al., 2004, 2006; Wolters, 2004; Zimmerman & Schunk, 2009 | 19. I need a reward to make me learn. |
| | | | 20. I do my schoolwork in order to get good grades. |
| | | | 21. I try to do better in school than my peers. |
| | | | 22. I work hard in school so that I don't look stupid. |
| | | | 23. I try to avoid looking smarter than my classmates. |
| | | | 24. I enjoy learning because it helps me get better at something. |
| | | | 25. I don't mind making mistakes because I can learn something from them. |
| | | | 26. I prefer to do schoolwork that is easy for me. |
| | | | 27. If something better came along, I would not go to college. |
| | | | 28. I prefer schoolwork that challenges me. |
| | | | 29. Getting a college degree will help me achieve my future goals. |
| | | | 30. I want to go to college so that I can get a good job. |

| | | | |
|---|---|---|---|
| | | | 31. Working hard in school now will help me in my future. |
| | | | 32. Doing well in school now will not help me in my future. |
| | | | 33. Going to school is a waste of time. |
| | | | 34. I apply what I learn in school to what I do outside of school. |
| | | | 35. I make sure I understand what I am taught in school. |
| | | | 36. I plan to earn a college degree. |
| | | | 37. I plan to get more education after I graduate from high school. |
| **Persistence/ Determination** | The student's ability to maintain effort and continue engaging in goal-directed behavior despite obstacles. | Duckworth & Seligman, 2005; Eccles & Wigfield, 2002; Harackiewicz, et al., 1997, 2002; Kahn & Nauta, 2001; Perrakis, 2008; Robbins, 2004, 2006; Wolters, 2004 | 38. When people give me something to do, they know I will do it. |
| | | | 39. I work hard to achieve the goals I set for myself. |
| | | | 40. I do my best to follow through on commitments that I make. |
| | | | 41. I am easily frustrated by difficult tasks. |
| | | | 42. If I fail at something, I try again. |
| | | | 43. When I come to a hard question in my schoolwork, I skip it. |
| | | | 44. When I come to a hard question in my schoolwork, I try to answer it. |
| | | | 45. Even when my schoolwork is boring, I keep working until I finish it. |
| | | | 46. I will finish college even if there are obstacles in my way. |
| | | | 47. I make sure I finish what I start. |
| **Self-regulated learning strategy use** | The student's use of strategies to manage his/her own learning, including planning, using study skills, self-monitoring, self-evaluating, and seeking help when needed. | Corno, 1989; Hattie, Biggs, & Purdie, 1996; Karabenick & Knapp, 1991; Ley and Young, 1998; Pintrich & DeGroot, 1990; Robbins, 2004, 2006; Schunk 1994, 1996; Wolters and Pintrich, 1998; Zimmerman, 1989, 1994; Wolters, 1998 | 48. If I don't understand my schoolwork, I ask my teacher for help. |
| | | | 49. When I get stuck on a question, I like to talk through it with someone. |
| | | | 50. I would rather do poorly on my schoolwork than ask for help. |
| | | | 51. I ask for help to avoid doing the work myself. |
| | | | 52. I check over my completed schoolwork to make sure it's correct. |
| | | | 53. When I do my schoolwork, it's important to understand what I'm doing. |
| | | | 54. I plan things out before I begin my schoolwork. |
| | | | 55. I make an outline before I write a paper, even if it's not required |
| | | | 56. I combine information from class and from the book when I study for a test. |
| | | | 57. While I study, I ask myself questions to make sure I understand what I'm studying. |
| | | | 58. I try to put important ideas into my own words when I study. |
| | | | 59. When I don't understand what I read, I reread the section. |
| | | | 60. While reading for class, I stop once in a while to review what I've read. |
| | | | 61. I try to connect class reading to something interesting. |

| | | | |
|---|---|---|---|
| | | | 62. I try to get rid of distractions when I study. |
| | | | 63. If a school project is large, I break it into manageable chunks. |
| | | | 64. When I face a problem, I try to come up with the best solution before I act. |
| | | | 65. If my solution to a problem fails, I try to figure out why it didn't work. |
| | | | 66. After I solve a problem, I evaluate the solution I came up with. |
| | | | 67. I use feedback from my teachers to improve my assignments. |
| | | | 68. I turn in my schoolwork on time. |
| | | | 69. When I do an assignment, I try to connect it to my life somehow. |
| | | | 70. I make sure I understand an assignment when I work on it. |
| | | | 71. I use a planner/assignment book to keep track of my assignments. |
| **Self-efficacy** | The student's belief about his/her academic competence and expectancies for success or failure. | Bandura, 1997; Chemers, 2001; Eccles & Wigfield, 2002; Kahn & Nauta, 2001; Pajares, 1996; Robbins et al., 2004; Zimmerman & Schunk, 2009 | 72. I have the ability to complete my schoolwork. |
| | | | 73. I can imagine myself as a successful college student. |
| | | | 74. I am capable of succeeding in challenging courses. |
| | | | 75. I can keep up academically with my classmates. |
| | | | 76. I will get into college. |
| | | | 77. I will finish college. |
| | | | 78. I will achieve my academic goals. |
| | | | 79. I am smart enough to go to college. |
| | | | 80. I am hopeful about my future. |

**Appendix B**

# PERSONAL READINESS EVALUATION FOR POSTSECONDARY (PREP)

The purpose of the Personal Readiness Evaluation for Postsecondary is to measure students' personal readiness for college. A report of how all students in your school responded will be shared with your school, but your individual survey responses are confidential and will not be shared with anyone. Please understand that there are no right or wrong answers and that different students will respond differently. Please answer each question honestly.

In this survey, the word ***college*** refers to all educational opportunities available to students after high school including, but not limited to, four-year college, two-year college, community college, and technical school.

**Determine whether you strongly disagree, disagree, agree, or strongly agree with the following statements and mark ☒ the appropriate box.**

| | Strongly disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 1. I plan to get more education after I graduate from high school. | ☐ | ☐ | ☐ | ☐ |
| 2. People think of me as a hard-working student.* | ☐ | ☐ | ☐ | ☐ |
| 3. I have the ability to complete my schoolwork.* | ☐ | ☐ | ☐ | ☐ |
| 4. If I get good grades it is because of luck.* | ☐ | ☐ | ☐ | ☐ |
| 5. I apply what I learn in school to what I do outside of school.* | ☐ | ☐ | ☐ | ☐ |
| 6. I prefer schoolwork that challenges me.* | ☐ | ☐ | ☐ | ☐ |
| 7. I try to learn from the mistakes I make on my schoolwork. * | ☐ | ☐ | ☐ | ☐ |
| 8. I will finish college. | ☐ | ☐ | ☐ | ☐ |
| 9. Completing my assignments is more important than completing them well.* | ☐ | ☐ | ☐ | ☐ |
| 10. I try to do better in school than my peers.* | ☐ | ☐ | ☐ | ☐ |
| 11. If I get good grades, it is because I work hard.* | ☐ | ☐ | ☐ | ☐ |
| 12. I enjoy learning because it helps me get better at something.* | ☐ | ☐ | ☐ | ☐ |

| | Strongly disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 13. I will achieve my academic goals. | ☐ | ☐ | ☐ | ☐ |
| 14. I am smart enough to go to college.* | ☐ | ☐ | ☐ | ☐ |
| 15. I believe natural ability is more important than hard work for succeeding in college.* | ☐ | ☐ | ☐ | ☐ |
| 16. I can imagine myself as a successful college student. | ☐ | ☐ | ☐ | ☐ |
| 17. I need a reward to make me learn.* | ☐ | ☐ | ☐ | ☐ |
| 18. Going to school is a waste of time to me.* | ☐ | ☐ | ☐ | ☐ |
| 19. I do my schoolwork in order to get good grades.* | ☐ | ☐ | ☐ | ☐ |
| 20. Getting a college degree will help me achieve my future goals. | ☐ | ☐ | ☐ | ☐ |
| 21. I don't mind making mistakes because I can learn something from them.* | ☐ | ☐ | ☐ | ☐ |
| 22. I make sure I understand what I am taught in school. | ☐ | ☐ | ☐ | ☐ |
| 23. I can change my intelligence.* | ☐ | ☐ | ☐ | ☐ |
| 24. I prefer to do schoolwork that is easy for me.* | ☐ | ☐ | ☐ | ☐ |
| 25. When people give me something to do, they know I will do it.* | ☐ | ☐ | ☐ | ☐ |
| 26. I plan to earn a college degree. | ☐ | ☐ | ☐ | ☐ |
| 27. I will get into college. | ☐ | ☐ | ☐ | ☐ |
| 28. I can do even the hardest schoolwork if I try. | ☐ | ☐ | ☐ | ☐ |
| 29. I want to go to college so that I can get a good job.* | ☐ | ☐ | ☐ | ☐ |
| 30. I can do my schoolwork well if I try hard. | ☐ | ☐ | ☐ | ☐ |
| 31. Working hard in school now will help me in my future. | ☐ | ☐ | ☐ | ☐ |
| 32. I will finish college even if there are obstacles in my way. | ☐ | ☐ | ☐ | ☐ |

| | Strongly disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 33. I would rather do poorly on my schoolwork than ask for help.* | ☐ | ☐ | ☐ | ☐ |
| 34. If I work hard, I will succeed in college. | ☐ | ☐ | ☐ | ☐ |
| 35. If something better came along, I would not go to college.* | ☐ | ☐ | ☐ | ☐ |
| 36. I can keep up academically with my classmates.* | ☐ | ☐ | ☐ | ☐ |
| 37. I am capable of succeeding in challenging courses.* | ☐ | ☐ | ☐ | ☐ |
| 38. Doing well in school now will not help me in my future.* | ☐ | ☐ | ☐ | ☐ |
| 39. I am hopeful about my future. | ☐ | ☐ | ☐ | ☐ |
| 40. I work hard in school so that I don't look stupid.* | ☐ | ☐ | ☐ | ☐ |

**Determine whether you do the following never, rarely, occasionally, or regularly and mark ☒ the appropriate box.**

| | Never | Rarely | Occasion-ally | Regularly |
|---|---|---|---|---|
| 41. Even when my schoolwork is boring, I keep working until I finish it. | ☐ | ☐ | ☐ | ☐ |
| 42. When I do my schoolwork, it's important to understand what I'm doing.* | ☐ | ☐ | ☐ | ☐ |
| 43. Other activities keep me from doing my homework.* | ☐ | ☐ | ☐ | ☐ |
| 44. I am easily frustrated by difficult tasks.* | ☐ | ☐ | ☐ | ☐ |
| 45. I try to get rid of distractions when I study.* | ☐ | ☐ | ☐ | ☐ |
| 46. If I fail at something, I try again.* | ☐ | ☐ | ☐ | ☐ |
| 47. I work hard to achieve the goals I set for myself. | ☐ | ☐ | ☐ | ☐ |
| 48. I try to avoid looking smarter than my classmates.* | ☐ | ☐ | ☐ | ☐ |
| 49. I try to do my best in my classes. | ☐ | ☐ | ☐ | ☐ |
| 50. I give up watching T.V. to do my schoolwork.* | ☐ | ☐ | ☐ | ☐ |

| | Never | Rarely | Occasion-ally | Regularly |
|---|---|---|---|---|
| 51. If I don't understand my schoolwork, I ask my teacher for help.* | ☐ | ☐ | ☐ | ☐ |
| 52. When I come to a hard question in my schoolwork, I skip it.* | ☐ | ☐ | ☐ | ☐ |
| 53. While reading for class, I stop once in a while to review what I've read. | ☐ | ☐ | ☐ | ☐ |
| 54. When I face a problem, I try to come up with the best solution before I act.* | ☐ | ☐ | ☐ | ☐ |
| 55. When I work on an assignment, I focus on getting it done correctly. | ☐ | ☐ | ☐ | ☐ |
| 56. I pretend to work in class.* | ☐ | ☐ | ☐ | ☐ |
| 57. I try to put important ideas into my own words when I study.* | ☐ | ☐ | ☐ | ☐ |
| 58. When I get stuck on a question, I talk through it with someone. | ☐ | ☐ | ☐ | ☐ |
| 59. I plan things out before I begin my schoolwork. | ☐ | ☐ | ☐ | ☐ |
| 60. I combine information from class and from the book when I study for a test. | ☐ | ☐ | ☐ | ☐ |
| 61. I do just enough work to get by in my classes.* | ☐ | ☐ | ☐ | ☐ |
| 62. While I study, I ask myself questions to make sure I understand what I'm studying. | ☐ | ☐ | ☐ | ☐ |
| 63. I use feedback from my teachers to improve my assignments. | ☐ | ☐ | ☐ | ☐ |
| 64. I make sure I understand an assignment when I work on it. | ☐ | ☐ | ☐ | ☐ |
| 65. I turn in my schoolwork on time. | ☐ | ☐ | ☐ | ☐ |
| 66. After I solve a problem, I evaluate the solution I came up with. | ☐ | ☐ | ☐ | ☐ |
| 67. If my solution to a problem fails, I try to figure out why it didn't work.* | ☐ | ☐ | ☐ | ☐ |
| 68. When I come to a hard question in my schoolwork, I try to answer it. | ☐ | ☐ | ☐ | ☐ |
| 69. I follow through on commitments that I make. | ☐ | ☐ | ☐ | ☐ |
| 70. When I do an assignment, I try to connect it to my life somehow.* | ☐ | ☐ | ☐ | ☐ |
| 71. I ask for help to avoid doing the work myself.* | ☐ | ☐ | ☐ | ☐ |

| | Never | Rarely | Occasion-ally | Regularly |
|---|---|---|---|---|
| 72. When I work on an assignment, I only focus on getting it done.* | ☐ | ☐ | ☐ | ☐ |
| 73. I give up hanging out with friends to do my schoolwork.* | ☐ | ☐ | ☐ | ☐ |
| 74. I make sure I finish what I start. | ☐ | ☐ | ☐ | ☐ |
| 75. I check over my completed schoolwork to make sure it's correct. | ☐ | ☐ | ☐ | ☐ |
| 76. When I don't understand what I read, I reread the section.* | ☐ | ☐ | ☐ | ☐ |
| 77. If a school project is large, I break it into manageable chunks.* | ☐ | ☐ | ☐ | ☐ |
| 78. I make an outline before I write a paper, even if it is not required. | ☐ | ☐ | ☐ | ☐ |
| 79. I use a planner/assignment book to keep track of my assignments. | ☐ | ☐ | ☐ | ☐ |
| 80. I try to connect class reading to something interesting. | ☐ | ☐ | ☐ | ☐ |

## Biographical Information

For each question, mark ☒ only one box.

What grade are you in?

- ☐ 6th
- ☐ 7th
- ☐ 8th
- ☐ 9th
- ☐ 10th
- ☐ 11th
- ☐ 12th

Are you male or female?

- ☐ Male
- ☐ Female

What is your ethnicity?

- ☐ American Indian
- ☐ Asian
- ☐ Black
- ☐ Hispanic
- ☐ White

Is English the primary language spoken in your home?

- ☐ Yes
- ☐ No

In what range is your overall grade point average?

- ☐ A- to A (3.5 – 4.0)
- ☐ B to A- (3.0 – 3.4)
- ☐ B- to B (2.5 – 2.9)
- ☐ C to B- (2.4 – 2.0)
- ☐ C- to C (1.5 – 1.9)
- ☐ D to C- (1.0 – 1.4)
- ☐ D- to D (0.5 – 0.9)

***Indicates that the item was not included in the final version of the PREP**

# Appendix C

XXXX XX$^{th}$ Ave S
Minneapolis, MN 55417
March 15$^{th}$, 2011

Principal Jane Smith
Washington High School
101 Delaware Ave
Mount Vernon, MN 55000

Dear Principal Smith:

**How ready for college are your students?** I am writing to let you know that your school has been selected to participate in a study examining the personal readiness for college of your students. I am a doctoral candidate in Educational Psychology at the University of Minnesota and have developed an instrument, the ***Personal Readiness Evaluation for Postsecondary (PREP),*** that measures students' personal readiness for college, such as their self-management, self-beliefs, effort and persistence, and their expectations for the future. I will be conducting a study this spring to ensure that the PREP is a strong instrument that can be used to help inform intervention in the future. I am inviting selected schools to participate in this study.

Currently, readiness for college is primarily measured by the ACT or SAT, but research has demonstrated that academic readiness is not enough to ensure success in college and that personal readiness had a great deal to do with whether or not students complete a postsecondary certificate or degree program. The PREP measures personal college readiness of high school students in order to provide students, teachers, and parents a picture of the students' personal readiness for college at the time of taking the survey. The hope is that this information will be obtained early enough in the students' journey to college that the information can be used to develop interventions to increase the students' personal readiness. The PREP in combination with academic measures of college readiness should provide a more complete picture of students' college readiness.

Participation in this study involves administering the PREP survey to 30-60 of your 9th-12th grade students this spring. The survey takes approximately 10-15 minutes to administer and is available on paper or online. Upon completion of the survey, **your school will be provided a report on the combined results of the students who took the survey in your school as well as a comprehensive report on the results of all students in MN** who took the survey. These reports will offer you a better understanding of your students' personal readiness for college.

The window for administering the survey will be between April 1$^{st}$ – June 1$^{st}$. If you wish to participate, please complete the attached letter and return it to the address, fax, or email at the bottom of the letter. If you do not wish to participate, please reply to this email. If you have questions, please call me at xxx-xxx-xxxx or email me at pohl0042@umn.edu.

Thank you for your consideration!

Sincerely,

Angie Pohl

Enclosed: Agreement Letter, sample of the PREP

## Appendix D

# PERSONAL READINESS EVALUATION FOR POSTSECONDARY (PREP)

Note: In this survey, the word ***college*** refers to all educational opportunities available to students after high school, including four-year, two-year, community, and technical college.

School Name: _____

**MARKING INSTRUCTIONS**

- **Use a No. 2 pencil or a blue or black ink pen only.**
- **Do not use pens with ink that soaks through the paper.**
- **Make solid marks that fill the response completely.**
- **Make no stray marks on this form.**

**CORRECT:** ● **INCORRECT:** ✓ ⊗ ◒ ◔

**Determine whether you strongly disagree, disagree, agree, or strongly agree with the following statements and fill in the appropriate response.**

| | STRONGLY DISAGREE | DISAGREE | AGREE | STRONGLY AGREE |
|---|---|---|---|---|
| 1. I will achieve my academic goals. | ○ | ○ | ○ | ○ |
| 2. I can do my schoolwork well if I try hard. | ○ | ○ | ○ | ○ |
| 3. Working hard in school now will help me in my future. | ○ | ○ | ○ | ○ |
| 4. I plan to get more education after I graduate from high school. | ○ | ○ | ○ | ○ |
| 5. I plan to earn a college degree. | ○ | ○ | ○ | ○ |
| 6. I can imagine myself as a successful college student. | ○ | ○ | ○ | ○ |
| 7. I will get into college. | ○ | ○ | ○ | ○ |
| 8. If I work hard, I will succeed in college. | ○ | ○ | ○ | ○ |
| 9. I will finish college even if there are obstacles in my way. | ○ | ○ | ○ | ○ |
| 10. Getting a college degree will help me achieve my future goals. | ○ | ○ | ○ | ○ |
| 11. I am hopeful about my future. | ○ | ○ | ○ | ○ |

**Determine whether you do the following never, rarely, sometimes, or often and fill in the appropriate response.**

| | NEVER | RARELY | SOMETIMES | OFTEN |
|---|---|---|---|---|
| 12. I try to do my best in my classes. | ○ | ○ | ○ | ○ |
| 13. I put my schoolwork before other activities. | ○ | ○ | ○ | ○ |
| 14. Even when my schoolwork is boring, I keep working until I finish it. | ○ | ○ | ○ | ○ |
| 15. I turn in my schoolwork on time. | ○ | ○ | ○ | ○ |
| 16. When I work on an assignment, I focus on getting it done correctly. | ○ | ○ | ○ | ○ |
| 17. I make sure I understand an assignment when I work on it. | ○ | ○ | ○ | ○ |
| 18. When I come to a difficult question in my schoolwork, I try to answer it. | ○ | ○ | ○ | ○ |
| 19. I use feedback from my teachers to improve my assignments. | ○ | ○ | ○ | ○ |
| 20. I follow through on commitments that I make. | ○ | ○ | ○ | ○ |
| 21. I make sure I finish what I start. | ○ | ○ | ○ | ○ |
| 22. I work hard to achieve the goals I set for myself. | ○ | ○ | ○ | ○ |
| 23. If I fail at something, I try again. | ○ | ○ | ○ | ○ |
| 24. I set academic goals for myself. | ○ | ○ | ○ | ○ |
| 25. I use a planner/assignment book/agenda to keep track of my assignments. | ○ | ○ | ○ | ○ |
| 26. I plan things out before I begin my schoolwork. | ○ | ○ | ○ | ○ |
| 27. I make an outline before I write a paper, even if it is not required. | ○ | ○ | ○ | ○ |
| 28. While I study I ask myself questions to make sure I understand what I'm studying. | ○ | ○ | ○ | ○ |
| 29. When I do an assignment, I try to connect it to my life somehow. | ○ | ○ | ○ | ○ |
| 30. I try to connect class reading to something interesting. | ○ | ○ | ○ | ○ |
| 31. While reading for class, I stop once in a while to review what I've read. | ○ | ○ | ○ | ○ |
| 32. I combine information from class and from the book when I study for a test. | ○ | ○ | ○ | ○ |
| 33. When I get stuck on a question, I talk through it with someone. | ○ | ○ | ○ | ○ |
| 34. I ask for help with my schoolwork when I need it. | ○ | ○ | ○ | ○ |
| 35. After I solve a problem, I make sure the solution worked. | ○ | ○ | ○ | ○ |
| 36. I check over my completed schoolwork to make sure it's correct. | ○ | ○ | ○ | ○ |

*For the following items, please select only one response.*

**What grade are you in?**

- ○ 6th
- ○ 7th
- ○ 8th
- ○ 9th
- ○ 10th
- ○ 11th
- ○ 12th

**Are you male or female?**

- ○ Male
- ○ Female

**If you go to college, will you be the first in your immediate family to do so?**

- ○ Yes
- ○ No

**Is English the primary language spoken in your home?**

- ○ Yes
- ○ No

**In what range is your grade point average?**

- ○ A- to A (3.5-4.0+)
- ○ B to A- (3.0-3.4)
- ○ B- to B (2.5-2.9)
- ○ C to B- (2.0-2.4)
- ○ C- to C (1.5-1.9)
- ○ D to C- (1.0-1.4)
- ○ D- to D (0.5-0.9)
- ○ F (0-0.4)

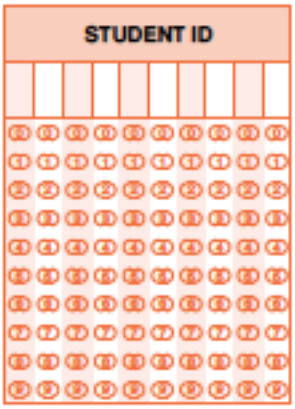
**What do you believe about your intelligence/ability?**

- ○ It cannot be changed at all, even with effort
- ○ It can be changed a little with effort
- ○ It can be changed quite a bit with effort

*For the following item, you may mark all the responses that apply to you.*

**How would you describe yourself? (Choose one or more from the following groups)**

- ○ American Indian
- ○ Asian
- ○ Black or African-American
- ○ Hispanic
- ○ White



# Appendix E

## PARENT INFORMATION AND CONSENT FORM

Personal Readiness Evaluation for Postsecondary Study

A team of University of Minnesota researchers will be conducting a study of a college readiness instrument, the Personal Readiness Evaluation for Postsecondary (PREP), in your child's school. The purpose of this research is to develop a tool that will measure students' personal readiness for postsecondary education, such as their motivation, effort, self-regulated learning, and self-efficacy. A pilot study of the instrument helps the researchers ensure that they are asking questions that students understand and that measure what they intend to measure. This study is being conducted by Angie Pohl in the Department of Educational Psychology at the University of Minnesota.

**Procedures:**
In this study, your child will complete a survey about their effort, self-management, study skills, expectations for the future, persistence, motivation, and their beliefs about their ability to succeed academically. The PREP will take students approximately 10-20 minutes to complete.

**Risks and Benefits of Being in the Study:**
There are no known risks and no direct benefits of participation in this study.

**Confidentiality:**
The records of this study will be kept private and will be stored securely so that only researchers will have access to the records. A summary report of how all students in the school responded will be shared with the school, but students' individual survey responses are confidential and will not be shared with anyone.

**Voluntary Nature of the Study:**
Participation in this study is voluntary. A parent's or student's decision whether or not to participate will not affect current or future relations with the University of Minnesota or the student's school. If the student participates, he/she is free to not answer specific questions and to withdraw at any time without affecting those relationships.

**Contacts and Questions**
If you have any questions, you are encouraged to contact Angie Pohl, University of Minnesota, at pohl0042@umn.edu, or the principal of your child's school. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

**If you <u>do not want</u> your son or daughter to participate, you must return this form in the enclosed self-addressed envelope by _____ (two weeks)**.

| | |
|---|---|
| _____ | _____ |
| Student Name--Printed | Date |
| _____ | _____ |
| Parent Name--Printed | Parent Signature |

## Appendix F

**STUDENT ASSENT FORM**

Personal Readiness Evaluation for Postsecondary Study (PREP)

The PREP survey measures students' personal readiness for postsecondary education, such as their effort, study skills, expectations for the future, persistence, and beliefs about their ability to succeed academically. The purpose of this study is to make sure that the PREP has questions that you understand and that the questions measure what they are supposed to measure.

**Procedures:**
If you agree to participate, you will be asked to fill out a survey that will take anywhere between 10-20 minutes to complete. Please understand that there are no right or wrong answers and that different students will respond differently to the questions on the survey.

**Risks and Benefits of Being in the Study:**
There are no immediate or direct risks or benefits of participating in this study.

**Confidentiality:**
The records of this study will be kept private and will be stored securely so that only researchers will have access to the records. A summary report of how all students in your school responded will be shared with your school, but your individual survey responses are confidential and will not be shared with your teachers, principal, parents, or anyone else.

**Voluntary Nature of the Study:**
Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or your school. If you decide to participate, you are free to choose not to answer specific questions or to withdraw at any time without affecting those relationships.

**Contacts and Questions:**
You may ask any questions you have now. If you have questions later, you are encouraged to contact Angie Pohl, University of Minnesota, at pohl0042@umn.edu, or the principal of your school.

**Statement of Consent:**
I have read the above information and agree to participate in the study.

_____ _____

Printed Name Date

_____

Signature

_____

Signature of Investigator

## Appendix G

### PREP Administration Instructions

1. Students need a pencil, blue, or black ink to complete the survey.

2. Distribute a Student Assent form to each student.

3. Read the following to students:
   ***The PREP survey measures students' personal readiness for postsecondary education. The purpose of this study is to make sure that the PREP has questions that you understand and that the questions measure what they are supposed to measure.***

   ***There are no right or wrong answers and different students will respond differently to the questions on the survey. A summary report of how all students in your school responded will be shared with your school, but your individual survey responses are confidential and will not be shared with your teachers, principal, parents, or anyone else.***

   ***Participation is not mandatory, but please understand that your participation will help your school to better prepare students for college and will help make a stronger survey from which more students can benefit. However, if you decide not to participate, this will not affect your current or future relations with the University of Minnesota or your school. If you agree to participate, please print and sign your name and date at the bottom of the assent form.***

4. Collect signed assent forms.

5. Hand out a PREP survey form to each student who signed the assent form. Students who did not sign the form may not participate.

6. Read the following instructions aloud to the students:
   ***In this survey, the word college refers to all educational opportunities available to students after high school including four-year college, two-year college, community college, and technical school.***

   ***On the back of the survey is a place to fill in your ID number. You may skip this. You do not need to put your ID on this survey.***

   ***You may begin the survey. Be sure to fill in the circles completely.***

7. If students have questions during the survey, please refrain from answering them. "I'm sorry, I can't answer questions, just do your best" is a suitable response.

8. Collect the forms from students when they are finished. Return all student assent forms and surveys to the designated location.

**Thank you!**