Title

Unpacking College Readiness: An Investigation of the Predictors of Postsecondary Success Among First-Time Freshmen through Structural Equation Modeling

Author

Iler, Terri Marie

Publication Date

2016

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

Unpacking College Readiness: An Investigation of the Predictors of Postsecondary Success Among First-Time Freshmen through Structural Equation Modeling

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Education

by

Terri Marie Iler

2016

ABSTRACT OF THE DISSERTATION

Unpacking College Readiness: An Investigation of the Predictors of Postsecondary Success Among First-Time Freshmen through Structural Equation Modeling

by

Terri Marie Iler

Doctor of Education

University of California, Los Angeles, 2016

Professor Christina A. Christie, Co-Chair

Professor Mark P. Hansen, Co-Chair

Despite increases in college enrollment nationally, student postsecondary outcome data are less impressive. Among the root causes identified in the research as contributing to prolonged time-to-degree and low graduation rates lies a core problem: students are un- or under-prepared for college. College completion data also speak towards an undercurrent of inequality, as the higher education sector remains stratified along racial and socioeconomic lines. This study centered on the interrelationships between multiple "college readiness" factors and the complex process by which they collectively influenced college success. While the construct of

college readiness tends to be conceived as a conglomerate of abilities and knowledge that are universally needed by all students, I strove to explore the ways predictors of postsecondary success vary by student group (i.e., sex and race) and field of study.

In this study, I sought to unpack college readiness through the investigation of the interrelationships between the contexts, dispositions, and habits of incoming first-time freshmen (FTF) and their long-term postsecondary outcomes. As I investigated multiple independent and dependent variables, I employed structural equation modeling (SEM). SEM was particularly well suited to the exploration of this complex phenomenon as it allowed me to specify a number of measurement models – each with multiple indicators – in my analysis of variable relationships, which cannot be performed through traditional regression analysis. To achieve my study aims, I partnered with California State University, Long Beach (CSULB), and utilized a dataset for the Fall 2008 incoming FTF cohort (N = 1793). Data culled from the students' responses on the Cooperative Institutional Research Program (CIRP) Freshman Survey were merged with postsecondary outcome variables to allow for a longitudinal analysis of students' multiple-year trajectories at the University.

Overall, among the 2008 FTF cohort at CSULB, contextual affordances of students' pre-college environments (i.e., their communities, schools, and families) exerted influence on their academic and standardized test performance in high school. In addition to the impacts of context, the frequency with which students engaged in productive habits of mind positively influenced their high school performance. In turn, traditional academic preparedness metrics impacted students' formation of their academic self-efficacy as well as their expectations of future performance in college. While academic self-efficacy ratings and performance

expectations were relatively high for this incoming cohort, these factors were not significant predictors of students' eventual postsecondary performance and culmination. Instead, measures of academic preparedness appeared to be the most salient. Furthermore, an investigation of these interrelationships across student groups (i.e., sex, race, and major) revealed both commonality and divergence; however, further analysis should be conducted to parcel out the ways college readiness takes shape at the nexus of sex, race, and major.

Ultimately, findings from this study can provide K-12 and higher education institutions (particularly large, public four-year universities) a more nuanced understanding of the complex inner workings of college readiness indicators and their varying impacts on students' postsecondary success. These findings can also empower educators in their efforts to more seamlessly prepare and support students as they progress along the K-16 continuum, so students are better positioned to succeed in college.

The dissertation of Terri Marie Iler is approved.

Mark Kevin Eagan

James W. Stigler

Christina A. Christie, Committee Co-Chair

Mark P. Hansen, Committee Co-Chair

University of California, Los Angeles

2016

To my students – past, present, and future –
who inspire passion and purpose in all I do.

Table of Contents

List of Tables

List of Figures

Acknowledgements

As I reflect on the past three years in the Educational Leadership Program, I see a village of supporters before me, whose guidance and love made this journey not only possible but transformative. I cannot adequately capture in words the gratitude I feel for the exceptional professors, mentors, colleagues, friends, and family who have seen me through the life-altering experience of completing this doctoral degree.

To my co-Chairs, Dr. Christina Christie and Dr. Mark Hansen, please accept my heartfelt thanks for fielding my frenetic, seemingly unending questions during our meetings. Your unwavering commitment to and confidence in me – particularly with respect to my tackling a quantitative study – brought this project to fruition. I aspire to bring the same level of intellect, dedication, and assiduous care to my work with students as you both have shown me. I also extend sincere thanks to my committee members, Dr. Kevin Eagan and Dr. James Stigler, for their support and encouragement throughout the dissertation writing process. I acknowledge the exceptional faculty and staff of the Educational Leadership Program as well. For over twenty years, you have cultivated a forum for educators to challenge and be challenged, thoughtfully nurturing in us the capacity to question the society we inhabit and the institutions we lead. Many thanks also to the members of Cohort 21, whose perspectives and talents created a learning environment characterized by dynamism, mutual admiration, and humor.

I would be remiss if I did not also recognize a number of mentors who have been instrumental to my growth as an educator and researcher: Dr. Nele Hempel-Lamer, Dr. Lynn Mahoney, Dr. Ronald Strahl, Dr. Caesar Sereseres, and Dr. George Farkas. Special thanks are also due to Peter McPartlan for employing his Stata wizardry in the service of my project as well as to

my former teammate Kashima Samuels for her collegiality and friendship during my time at the University Honors Program.

I must also thank the friends and family members who forged this path with me. Thank you to my parents, Karyn Valentine and Don Iler. From an early age, you fostered in me a love of learning and a fervent desire to make positive change in this world, all the while ensuring I never took myself too seriously! Your unconditional support of and belief in me has been the single most powerful catalyst for my academic and personal successes. I share words of gratitude for my Finnish family, Birgitta and Pentti Jokinen, who – despite the miles of distance that separate us – have been close, enthusiastic, and loving supporters. Your educational system has inspired the world to look at teaching and learning in groundbreaking ways. To my brother, Stuart Iler, thank you for remaining a forever role model, leading me – through your own drive, passion, and achievements – to never settle for less than my best in school and in life.

And, these meager thanks cannot fully encompass the level of gratitude I feel for my husband, Kristian Jokinen. For every green smoothie, yoga session, late-night pep talk, sacrificed weekend, and small act of love and companionship that went unrecognized, I express my deepest appreciation. Over the past decade, you have been my foundation, my cheerleader, and my best friend. I share this momentous milestone with you, my love.

Vita

Education

2008	B.A., English Education and Italian Studies California State University, Long Beach

Professional Experience

2009-2010	Academic Advisor University Center for Undergraduate Advising California State University, Long Beach
2010-2014	Assistant Director University Honors Program California State University, Long Beach
2014-2015	Regional Coordinator California College Guidance Initiative Foundation for California Community Colleges
2015-Present	Program Coordinator Office of Student Activities, School of Social Sciences University of California, Irvine

Chapter One: Problem Statement

Research reveals the multifaceted, lifelong benefits of earning a college degree. Given these documented advantages, it should come as no surprise national trends in college-going show more students are pursuing higher education degrees, with a noteworthy increase in college attendance among underrepresented students. Despite increases in college enrollment, however, student outcome data are less impressive: average degree attainment within six years is low, especially at community colleges and less-selective four-year universities. College completion data also speak towards an undercurrent of inequality, as the higher education sector remains stratified along racial and socioeconomic lines. These emergent trends have led some researchers to conclude that college access concerns should also encompass considerations of college success, as educators wrestle with the reality that many of their students who successfully enroll in higher education face seemingly insurmountable obstacles on their path to degree attainment, resulting in progress delays and even dropout.

Among the root causes identified in the research as contributing to prolonged time-to-degree and low graduation rates lies a core problem: students are un- or under-prepared for college. There are signs of an overall lack of "college readiness" among significant portions of college-going students. In some contexts, such as the widespread use of the SAT and ACT in admissions considerations, students' readiness for college has been reduced to the assessment of academic preparedness vis-à-vis standardized tests. Recent research aimed at deconstructing the college readiness phenomenon, however, has identified a myriad of skills, attributes, dispositions, and knowledge linked to students' postsecondary success. Much research has been dedicated to deepening our understanding of the impacts of individual factors or domains on

students' postsecondary outcomes; however, relatively little research has centered on the interrelationships between these factors and the complex process by which they collectively influence college success – the primary aim of this study. Furthermore, the construct of college readiness tends to be conceived as a conglomerate of abilities and knowledge that are universally needed by all students. This study, conversely, explored the ways indicators of college readiness – conceived as an intricate web of interrelated variables – differentially influenced postsecondary outcomes by student group (i.e., sex and race) and field of study.

The College Readiness Imperative

In the wake of the Great Recession, the necessity to secure and maintain economic prosperity – both as a nation and as individual citizens – features prominently in American public discourse. Central to this ongoing dialogue are the economic implications of attaining higher levels of education. Labor market research reveals that obtaining a college degree now represents the gateway to the skills, knowledge, and credentials needed to perform advanced societal functions (Carnevale, Smith, & Strohl, 2010; Danziger & Ratner, 2010; Matthews, 2012). In 2013, the wage earnings increased and the percentage of unemployment decreased with each ascending echelon of educational attainment (Bureau of Labor Statistics, 2013). Overall, college degree holders weathered the Great Recession better than their high school graduate counterparts and, both preceding and following the recession, degree holders were more likely to gain access to jobs that provided future training, higher real wages, and increased access to private pensions and employer-subsidized health insurance (Carnevale et al., 2010; Danziger & Ratner, 2010; Matthews, 2012; *The Condition of Education 2014*, 2014). Also, earning a college degree can enable students from families in the lowest income bracket to surpass the

socioeconomic status of their parents (Haskins, 2011). Not unexpectedly, the lifetime earnings of college graduates in comparison to their high school graduate counterparts are also substantially higher. According to Carnevale et al. (2010), "the range in lifetime earnings by educational attainment is greatest between high school dropouts and professional degrees – a range of $1,198,000 to $4,650,000, or a difference of $3,452,000" (p. 5).

In addition to these individual benefits, college access and success for all students also poses ramifications for the nation's economy as a whole and its post-recession recovery. In fact, Carnevale et al. (2010) project that by 2018 there will be 46.8 million job openings in America, created through a combination of new jobs as well as positions vacated by retirees. They also predict a growing percentage of these jobs will necessitate workers possess at least some college education. At the current rate of educational attainment, however, labor experts fear that by 2025 the nation will be 23 million degree holders shy of meeting these workforce demands (Matthews, 2012).

Given these documented advantages of attaining a college degree, it should seem natural that national trends in college-going reveal more students are pursuing higher education degrees, with a noteworthy upsurge in college attendance among underrepresented students (National Center for Education Statistics [NCES], 2013). Despite increases in college enrollment, however, college degree attainment remains elusive for many. Among students seeking a bachelor's degree at a four-year degree-granting institution, only 59% completed a degree within six years (NCES, 2012). At the community college level, the statistics are more disheartening: at two-year degree-granting institutions, only 31% of students pursuing a certificate or degree obtained their credential within 150% of the regular time required to do so

(NCES, 2012). Furthermore, disparities in student outcomes between institution types suggest that students of underrepresented and low-socioeconomic status – whose postsecondary enrollment tends towards less selective institutions – face compounded disadvantages in their pursuit of a college degree (Bastedo & Jaquette, 2011; Carnevale & Rose, 2003; Moore & Shulock, 2010). Research also shows the quality of the institutions students attend and the fields of study they pursue impact their post-college earnings and their likelihood of attending graduate school (Thomas & Zhang, 2005; Zhang, 2005a; Zhang, 2005b). Failure to graduate or prolonged time-to-degree can also burden students financially: they must grapple with the direct costs of tuition and related educational expenses as well as the "indirect opportunity costs" born from either delayed entry into the workforce or ineligibility to assume jobs requiring a college degree (Shulock & Koester, 2014, p. 3). Ensuring college readiness, therefore, assumes a number of economic, educational, and equity dimensions.

These data, in part, undergird recent calls at the federal and state levels to increase college readiness among degree-seeking students as well as to hold K-12 and higher education institutions accountable for their students' postsecondary readiness and success (*A Test of Leadership*, 2006; Assembly Bill 94, 2013; "ESEA Reauthorization," 2011; "Every Student Succeeds Act," 2015; Legislative Analyst's Office, 2013; "President's Plan to Make College More Affordable," 2013; Senate Bill 195, 2013; Senate Bill 1458, 2012). These appeals for K-16 accountability are not entirely misplaced. In its current state, the policy, finance, academic, and communication structures underpinning each segment – K-12 and higher education, respectively – are not mutually reinforcing, creating a systemic disjuncture (Kirst, 2008). The past century has witnessed an increasing disassociation of higher education from its K-12 counterpart, resulting in

poor signaling to secondary educators and students of colleges' academic expectations (Kirst, 2008; Venezia & Kirst, 2005). High schools and postsecondary institutions now operate within foundationally unique paradigms, characterized by differences: "different leaders, priorities, incentives, accountability mechanisms, financial systems, data systems, norms, academic expectations, ways to measure progress and success, and pedagogies or instructional strategies" (Venezia & Jaeger, 2013, p. 131). The more decoupled the systems, the more students must rely on their social and cultural capital to navigate within and between segments (Karp, 2015). Through the legislative process, federal and state entities aim to ensure all students – regardless of background – are not only prepared to enroll in college but are also equipped with the requisite skills and knowledge to attain their degree. Indeed, the need to identify the curricular content and classroom supports necessary for fostering universal college and career readiness catalyzed the state-initiated creation of the Common Core State Standards (Common Core State Standards Initiative, 2015). In a sense, these standards – now adopted by 42 states – implicate teachers, schools, and districts in ensuring not only their students' academic preparation for college, but the development of other college and career skillsets as well (e.g., independence, evidence-based thinking, and multi-cultural perspective-taking).

Unpacking College Readiness

Not unlike many issues facing education, however, the problem of inadequate and inequitable degree attainment may be easier to identify than to solve. Research investigating the factors that influence students' postsecondary pathways and success unearths a myriad of variables, which interact in multiple environments across childhood, adolescence, and early adulthood. Perna (2006) posits that students' pursuit of higher education occurs within four

nested contexts: the student and family context; the school and community context; the higher education context; and the broader social, economic, and policy context. Not only are students' postsecondary pursuits embedded within these spheres of influence; research also suggests that students begin to form career aspirations and, in turn, their future educational plans well before high school (Akos, Lambie, Milsom, & Gilbert, 2007; Blackhurst & Auger, 2008; Gottfredson, 1981; Mau, 1995; Trice & Hughes, 1995; Wahl & Blackhurst, 2000). Therefore, when identifying and studying the factors that contribute to college readiness, one can draw from literature that accounts for these overlapping contexts as well as the evolutionary nature of students' college-going trajectories.

Existing conceptual frameworks aimed at understanding college and career choice and postsecondary persistence help frame the college readiness conversation. They cite influential factors such as social class, intelligence, and sex (Gottfredson, 1981); goals, actions, performance attainments, and contextual supports and barriers (Lent, Brown, & Hackett, 1994; Lent, Brown, & Hackett, 2000); parental encouragement and support, parental saving for college, parental collegiate experiences, and college information (Cabrera & La Nasa, 2000); student socioeconomic status, aptitude and achievement, and significant persons (Chapman, 1981; Hossler & Gallagher, 1987); and goal and institutional commitment as well as academic and social integration (Tinto, 1975). Augmenting these frameworks are studies that investigate other pre-college factors, which have also been linked to students' college-going planning and enrollment: students' access to private college counseling (Liu, 2011; McDonough, Yamasaki, & Korn, 1997; McDonough, 1994; Park & Eagan, 2011); students' networks of college-going information and supports (Bell, Rowan-Kenyon, & Perna, 2009; Corwin, Venegas, Oliverez, &

Colyar, 2004; Hossler & Maple, 1993; Perna, Li, Anderson, Thomas, Rowan-Kenyon, & Bell, 2008; Plank & Jordan, 2001; Tierney, 2009; Venegas, 2006); and students' exposure to college-going cultures in high school (Engberg & Wolniak, 2010; Hill, 2008; Martinez & Deil-Amen, 2015; Roderick, Coca, & Nagaoka, 2011). The findings from many of these studies illuminate persistent, inequitable access to college-going networks of information, resources, and supports – a form of "social capital" – which itself has been identified as an influential factor in students' college-going experiences (Cerna, Perez, & Saenz, 2009; Dika & Singh, 2002; Fallon, 1997; Holland, Reynolds, & Weller, 2007; Smith, 2009; Stanton-Salazar, 2011; Welton & Martinez, 2014).

In a sense, the more recent conceptualization of college readiness borrows from and builds upon the multi-dimensionality of these earlier frameworks and studies. Today, college readiness can be conceived as "an umbrella term that refers to the multidimensional set of skills, traits, habits, and knowledge that students need to enter college with the capacity to succeed once they are enrolled" (Arnold, Lu, & Armstrong, 2012, p. 2). Indeed, an initial probe into recent literature aimed at defining and measuring college readiness unearths a plethora of variables that complement and expand upon those above: academic skills and practices; practical knowledge; and aspirations, motivation, and self-efficacy (Arnold et al., 2012; Brown, Tramayne, Hoxha, Telander, Fan, & Lent, 2008; Crede & Kuncel, 2008; Komarraju, Ramsey, & Rinella, 2013). In their meta-analysis of 109 studies from both educational and psychological strands of research, Robbins, Lauver, Le, Davis, Langley, and Carlstrom (2004) found that indicators of college readiness fall within nine global categories or broad constructs: achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills, and contextual influences

(p. 266). Other researchers have further collapsed these constructs into overarching domains: academic preparedness, academic tenacity, and college knowledge ("Beyond College Eligibility," 2014). While such frameworks provide a helpful taxonomy for categorizing the factors that have been linked to college outcomes, they do not offer insight into the ways these factors interact to jointly influence students' postsecondary trajectories. As Arnold et al. (2012) explain, "what is needed, in short, is a way of making sense of the complexity of college readiness without simplifying it" (p. 5).

Study Rationale

As revealed by the body of research explored above, college going represents a complex phenomenon, characterized and influenced by biological, cognitive, emotional, and behavioral processes (Arnold et al., 2012). Students' postsecondary pathways encapsulate many facets of decision-making and action-taking, from the decision to attend college to the subsequent choices and actions that bring degree attainment to fruition: completing a college-preparatory track in high school, exploring postsecondary schools, applying to these institutions, securing financial aid, selecting a course of study, progressing towards degree completion, and many nuanced steps in between. Students tread these pathways within multiple environments and across many developmental stages. National efforts to cultivate a more college ready student population must, therefore, seek to identify, study, and assess all college readiness indicators and their joint influence – as a constellation of interrelated variables – on students' postsecondary outcomes.

By neglecting to address the interrelationships between college readiness indicators identified in the literature, oversimplified frameworks may impose artificial delineations between

variables, which are meaningfully connected. A growing community of scholars promotes the study and assessment of college readiness in ways that accommodate the full scope of academic and non-academic variables at play in students' postsecondary success (Arnold et al., 2012; Brown et al., 2008; Camara, 2013; Crede & Kuncel, 2008; DeAngelo, Franke, Hurtado, Pryor, & Tran, 2011; Komarraju et al., 2013; Maruyama, 2012; Moreira, Dias, Vaz, & Vaz, 2013; Robbins et al., 2004). Porter and Polikoff (2012) further suggest the investigation of readiness standards across different majors. Indeed, research centered on the joint influences of students' multiple group identities, their enrollment and engagement behaviors, institutional contextual factors, and major-specific cultures – specifically within the fields of science, engineering, technology, and math (STEM) – illuminate an interplay between students' individual readiness traits and their collegiate environments (Arbona & Nora, 2007; Armstrong & Jovanovic, 2016; Espinosa, 2011; Gonzales, Blanton, & Williams, 2002; Hurtado, Eagan, Tran, Newman, Chang, & Velasco, 2011; Hurtado, Han, Sáenz, Espinosa, Cabrera, & Cerna, 2007; Syed & Chemers, 2011).

Ultimately, if ensuring college readiness remains a central objective of national K-12 curriculum and the means by which we position students for postsecondary success, then the construct of college readiness and its relationship to college outcomes warrants further investigation. Moreover, a granular look at college readiness could clarify the ways indicators of readiness work independently and collectively to predict students' postsecondary trajectories, as well as elucidate the ways readiness takes shape across different student groups and fields of study. This research may also aid educators in their work to streamline the academic and non-academic reinforcements students receive along their K-16 pathways, augmenting their likelihood of degree attainment.

Study Aims & Methodology

In this study, I sought to unpack college readiness through the investigation of the interrelationships between the contexts, dispositions, and habits of incoming first-time freshmen (FTF) and their long-term postsecondary outcomes (e.g., time-to-degree, college performance, and degree attainment). As I investigated multiple independent variables – some of which were measured by a number of indicators – as well as multiple dependent variables, I employed a structural equation modeling (SEM) approach. SEM is particularly well suited to the exploration of complex phenomena that are often represented in theories or models, like the career choice and college-going frameworks presented here (Keith, 2015; Raykov & Marcoulides, 2006). Moreover, SEM accommodates for latent variables or measurement models, which encompass multiple indicators, allowing for analyses not possible through traditional regression; this explicit acknowledgement of measurement error renders SEM an ideal approach to studying college readiness, a phenomenon replete with interrelationships between observed and latent variables. My goal in applying SEM in this context was to achieve a deeper understanding of the ways indicators of college readiness at the onset of students' college careers influenced their subsequent postsecondary outcomes.

Insights gained from this study could aid high school educators in identifying students' college preparation needs prior to their postsecondary entry. And, a more robust understanding of students' college readiness could also inform programming and advising efforts underway at the collegiate level, as university educators acclimate students to the norms, practices, and expectations of their new school environment.

Study Site

California State University, Long Beach (CSULB), is a large, urban university located within the sprawling limits of Los Angeles County. According to the statistics available in the recently launched College Scorecard, CSULB serves a student population of approximately 30,440 undergraduate students (College Scorecard, 2015). The largest represented race/ethnicity among undergraduates is the Hispanic population at 37%, followed by 23% Asian and 21% White. Low-income students (i.e., federal Pell Grant recipients) comprise 47% of the undergraduate population at the University. In all, CSULB constitutes both a minority- and Hispanic-serving institution.

Like higher education institutions across the nation, CSULB faces increased pressure from the federal and state levels as well as from the University's constituencies (e.g., business industries, students, and parents) to lower units-to-degree, increase graduation rates, and close the achievement gap among underrepresented students, especially in light of substantial cuts in state support to the CSU and the ensuing upsurge in student tuition. Due to these internal and external forces, CSULB has made a concerted effort to raise its four- and six-year graduation rates for both FTF and transfer populations (graduation data are explored in greater detail in Chapter Three). Among its efforts to increase these graduation rates and compensate for deficiencies in college readiness has been an institutional commitment to increasing the academic advising services provided to students to aid in their understanding of degree requirements and navigation of campus policy towards a timely graduation. Within the scope of these institutional efforts has been the introduction of technology-based eAdvising tools – which rely on predictive analytics – to equip cross-departmental advising units with a common tool for

guiding students along their college-going trajectories and with a common clearinghouse of career and major exploration resources.

As CSULB undertakes steps in increasing students' college success, it offered the ideal setting for researching college readiness phenomena. For one, the predictive analytics – on which its eAdvising tools rely – are informed by years of institutional data around students' course-taking patterns and long-term outcomes. However, these analytics do not account for more affective variables, such as academic self-efficacy, in the assessment of students' suitability for various major pathways. Findings from this study could, therefore, improve the use of these (and similar) eAdvising tools by expanding the data points under consideration in determining students' likelihood of successfully navigating specific postsecondary trajectories. Furthermore, insights gained from this study could aid high school counselors from feeder districts as well as CSULB advisors in developing programming intended to inform and equip students with the requisite knowledge and tools to make a successful transition between segments.

Research Questions

The research questions (RQs) driving this study were the following:

> *RQ #1: What contexts, dispositions, and habits of incoming first-time freshmen comprise college readiness as demonstrated by students' postsecondary outcomes?*
>
> *RQ #2: Does the impact of these contexts, dispositions, and habits on students' postsecondary outcomes vary by student group or major? That is, is the meaning of 'college ready' the same for all students?*

Significance of the Study

As Matthews (2012) concludes, "America needs more college graduates. It's the only viable route to economic prosperity – for individuals and for the nation" (p. 7). In light of growing national awareness of the need to increase degree attainment, government officials at the

federal and state levels have crafted legislation to facilitate college and career readiness among students. In California, for example, a recent overhaul of the State's K-12 funding system, known as the Local Control Funding Formula (LCFF), was accompanied by accountability legislation that includes college and career readiness provisions. Under the new law, districts must adopt Local Control and Accountability Plans (LCAPs), which seek to hold schools accountable for meeting student outcomes in a number of priority areas, including increasing the share of college and career ready students (Legislative Analyst's Office, 2013). Furthermore, in 2012, a college and career preparedness measure was added to the indicators that comprise California's Academic Performance Index (API), a tool to both benchmark K-12 public school progress and rank schools for recognition and improvement purposes (Senate Bill 1458, 2012). Accountability legislation at the higher education level is also afoot, with timely graduation among its key objectives.

The ramifications of these laws on K-12 and higher education practitioners has not yet been fully realized. However, because these educators and their institutions may face consequences in response to unmet expectations, it seems imperative we clarify the ways we conceive of and measure college readiness – above and beyond academic preparedness. In the end, the findings from this study could not only inform a strategy for the development of mutually reinforcing college preparation supports across segments, but also contribute to our understanding of the role college readiness plays in students' realization of their postsecondary goals. Indeed, the data analyses and subsequent conclusions of this study revealed that measures of academic preparedness for college among the 2008 FTF cohort at CSULB were sensitive to broader community, school, and familial contexts. Moreover, measures of achievement in high school – and the multitude of factors that affect them – influenced

students' self-perceptions of their academic ability upon college entry and strongly predicted their eventual postsecondary outcomes.

Chapter Two: Literature Review

Research on students' college-going experiences reveals that the process of selecting and pursing a postsecondary pathway unfolds across time and context. That is, students' college-going decisions and actions are embedded within many spheres of influence (Perna, 2006). These spheres are governed by key individuals, such as parents, peers, teachers, school counselors, and college advisors, who help shape students' college-going aspirations and expectations from their earliest career considerations in preschool to the selection of a postsecondary pathway in their high school senior year to the realization of their college degree. As increasing numbers of students aspire to higher levels of educational attainment, it becomes all the more necessary to equip them with the requisite skills and knowledge to succeed in navigating not only the college application process, but the complex pathway to degree completion as well. However, many students' – particularly those from underrepresented and low-socioeconomic status (SES) populations – network of close relatives and peers may lack the collective know-how to successfully guide them through the selection and pursuit of an optimal postsecondary route. For these students, therefore, school supports and resources – both at the high school and collegiate levels – play an especially crucial role in ensuring equal access to the academic content, skill development, and knowledge capital necessary for their college success.

In the review of literature to follow, I begin by situating calls for universal college readiness within the national higher education landscape, exploring the broad social, economic, and policy issues concerning postsecondary access and success. I then explore the joint roles of student, family, school and community in promoting (or hindering) early postsecondary aspiration, planning, choice and success, with a specific emphasis on school counselors and high

school cultures. This section dovetails with the review of college readiness literature to follow, which fleshes out a holistic picture of the ecosystem of factors that influence students' college preparation and persistence. Frameworks within these sections contribute to the categorization of factors associated with students' overall readiness to pursue postsecondary education, providing the conceptual basis for the study's statistical analyses. This chapter also examines the impacts of poor alignment between the K-12 and higher education segments on students' high school to college transition, illuminating the ways academic and non-academic abilities fostered at the secondary level may not sufficiently address students' postsecondary readiness needs. Throughout this review, I highlight the ways the K-16 education pipeline can compound disadvantages for students of color and low SES. In the exploration of research below, I also situate – within a broad discussion of college access and success – the specific role school counselors and college advisors can collectively play in addressing deficiencies in college readiness through their development of students' knowledge capital.

The National Higher Education Landscape

The following three subsections explore the higher education landscape in America. This research shows that while college degree attainment can provide traditionally underrepresented students a pathway to economic security and prosperity, their poor completion rates threaten to undermine these prospects. Instead, a stratified system of higher education reveals that privilege begets more privilege. Recent legislative action, however, seeks to hold educators throughout the K-16 continuum accountable for equitable outcomes in college access and success.

The Role of Degree Attainment in Economic Success

From mass media outlets to widely circulated government reports, a pervasive discourse resounds: a strong educational infrastructure can sustain America's position as a prominent force in worldwide politics and commerce. Economic experts draw parallels between the industrial revolution and the technological and finance industries of the 21st century: the former catalyzed the development of a mass K-12 education system to meet the manufacturing demands of its day, while the latter has spawned a widespread need for postsecondary attainment among today's workforce (Carnevale et al., 2010). Labor market projections indicate that jobs created during the nation's continued economic recovery will largely require skilled labor, whereas low-skills jobs lost during the recent recession may be the permanent casualty of automation and the exodus of low-skills work overseas (Carnevale et al., 2010). Research reveals, in fact, that the economic recovery may have been hampered in part by the mismatch of high-skill job openings and a body of unemployed workers without the necessary education and training to fill them (Matthews, 2012). Despite the nationwide need to produce more degree holders, however, projections suggest that by 2018, the labor market will fall three million college graduates short of meeting its workforce demands (Carnevale et al., 2010).

Not only will improving college access and success for students impact the national economy and its post-recession recovery, individuals stand to gain financially from obtaining a college degree. Reaching higher echelons of degree attainment has shown to be directly correlated with lower unemployment rates, higher earning power, and an increased standard of living (Bureau of Labor Statistics, 2013). As industries evolve with technological advancements and the demand for college graduates increases, obtaining a high school diploma no longer

affords students the same employment prospects and wage earnings as enjoyed by earlier generations. Danziger and Ratner (2010) present compelling data in their comparison of entry-level workers' earnings by educational attainment, reflecting a marked decrease among high school graduates over the past several decades: "In 1973, male college graduates in entry-level jobs earned 33 percent more than men with a high school degree or less; for women, the difference was 52 percent. By 2007, the educational premium had grown to 79 percent for men and 92 percent for women" (p. 142). Furthermore, individuals in low-skill work tend to be more vulnerable to layoffs during recessions, and they face starker prospects in a post-recession hiring climate (Carnevale et al., 2010; Danziger & Ratner, 2010; Matthews, 2012; *The Condition of Education 2014*, 2014).

Additionally, data suggest that earning a college degree can help students transcend the SES of their parents, which poses significant ramifications for individuals from historically disadvantaged populations (Haskins, 2011). Research on the impacts of education on economic mobility confirms that "adult children from the bottom [income quintile] can move up if they attain a college degree, and adult children from the top risk falling if they do not attain a college degree" (Haskins, 2011, p. 5). Considering that in 2012 young adults with a bachelor's degree earned 57% more than their high school graduate counterparts (*The Condition of Education 2014*, 2014), these findings around economic mobility should come as no surprise.

Taken together, these studies reveal that postsecondary degree attainment poses ramifications for the economic prosperity of the nation and its people. While the nation weathers shortfalls in meeting its skilled workforce needs, high school graduates who fail to earn a college degree will face their own economic challenges vis-à-vis lower lifetime earnings, lower

rates of employment, and decreased access to secure jobs with continued training, pensions, and health insurance. These prospects make the following findings on higher education student outcomes even more poignant: poor national graduation rates and significant disparities along racial and socioeconomic lines exacerbate an increasing economic divide.

Disparities in College Readiness & Graduation Rates

Educational attainment patterns uncover a trend: "the middle class is dispersing into two opposing streams of upwardly mobile college-haves and downwardly mobile college-have-nots" (Carnevale et al., 2010, p. 3). Rates of college going alone cannot account for this divergence, however, as statistics reveal that the decades spanning 1976 to 2011 witnessed an uptick in college attendance with a noteworthy increase among underrepresented students (i.e., students of Hispanic origin, Asian and Pacific Islanders, and Black students) (NCES, 2013). Indeed, according to a recent study published by the National Center for Education Statistics (NCES), "by 2006, about 80 percent of 2004 high school graduates had ever attended a postsecondary institution. Among the graduating class, 71 percent enrolled immediately after graduation from high school, and 9 percent delayed enrollment" (*Gaps in Access and Persistence Study*, 2012, p. 170). Unfortunately, even though more students are pursuing higher education, many are falling short of their educational attainment goals. This phenomenon occurs more frequently among underrepresented and low SES populations.

These statistics warrant further investigation on multiple levels. Firstly, degree attainment rates generally suggest many students enter postsecondary education ill equipped to succeed. Among those students who sought a bachelor's degree at a four-year institution in fall 2006, over 40% failed to complete their degree within six years (NCES, 2012). Secondly, when

these data are further disaggregated by institution type, the graduation rates vary significantly: "the 6-year graduation rate was 57 percent at public institutions, 66 percent at private nonprofit institutions, and 32 percent at private for-profit institutions" (NCES, 2012, p. 2). Furthermore, disaggregated by level of selectivity, the data show marked differences in bachelor's degree attainment: the six-year graduation rate for students attending four-year institutions with open admissions was 33%, compared to 86% at four-year institutions with an acceptance rate below 25% of applicants (NCES, 2012). The implications of these statistics for underrepresented and low SES students are particularly acute, as these populations tend towards enrollment at less selective institutions.

In California, for example, a state where Hispanic/Latino students comprise over half of the K-12 enrollment, only 39.4% of 2013 high school graduates completed the A-G requirements needed for admission into the California State University (CSU) and University of California (UC) systems (California Department of Education [CDE], 2012-2013). The lowest A-G completion rates were among American Indian/Alaska Native, Hispanic/Latino, and African American students, all of whom fell below 30% CSU/UC eligible. The higher education alternatives available to these students include, therefore, community colleges and less selective four-year institutions. In their study of student outcomes among degree seekers at California community colleges (CCCs), Moore and Shulock (2010) found that only "31% completed a certificate or degree, or transferred to a university within six years of enrolling in the CCC" (p. 4), with the lowest completion rates among Black and Latino students.

Drawing on a nationally representative sample of high school completers from multiple high school senior classes between 1972 and 2004, Bastedo and Jaquette (2011) similarly found

that increases in postsecondary attendance among low SES students were concentrated in community colleges and noncompetitive four-year institutions. Additionally, Bastedo and Jaquette concluded that "increases in academic preparation for low-SES students have not been sufficient to catch up to the academic prerequisites for admission to selective institutions" (p. 335), so even academically advancing low SES students are failing to gain ground on their more advantaged peers. Carnevale and Rose (2003) reached similar conclusions in their analysis of national data, finding that admissions to selective colleges differed significantly along racial, ethnic, and socioeconomic lines: Blacks, Hispanics, and individuals in the bottom half of the socioeconomic scale were less likely to attend selective institutions, or they attended institutions with lower selectivity rates than their qualifications afforded them. These findings around the selectivity of institutions attended by underrepresented students are significant, as college quality has been linked to a number of critical student outcomes: degree completion; higher post-graduation earnings; and even graduate school attendance and outcomes (Carnevale & Rose, 2003; Thomas & Zhang, 2005; Zhang, 2005a; Zhang, 2005b).

In all, these studies suggest that despite gains in postsecondary attendance among traditionally underrepresented groups in college, the higher education system in America remains stratified. As college attendance becomes possible for more students, the caliber of higher education institutions serving these students and their educational success at these institutions (namely their likelihood of degree attainment) increasingly informs the discussion of national economic stability and socioeconomic mobility. Furthermore, more private for-profit institutions are joining the institutional ranks, and students who strive for degree attainment through these alternative pathways are the least likely to graduate with a degree in six years.

This last conclusion is particularly noteworthy for students at CCCs, whose transfer rates into the for-profit sector have been increasing dramatically, with the most transfers among Black and Latino students (Moore & Shulock, 2010).

Within the college readiness conversation, these phenomena arguably present more questions than answers, as scholars grapple with the multi-faceted factors that lead to students' college success. While seats as the most selective higher education institutions remain few and the number of students seeking a college degree continues to climb, it seems clear that educators must find a means of aiding students – regardless of the institution attended – in completing their degrees. Indeed, these efforts would target the majority of college-going students and, as explored above, would be particularly critical to buttressing the growing population of underrepresented and low SES students, who are statistically less likely to be found on the nation's most prestigious campuses.

National, State & Local Accountability Legislation

To address nationwide deficiencies in college readiness and improve the college-going experiences for disadvantaged youth, federal, state, and local governments have introduced legislation targeting key areas attributed to promoting college access and success. At the federal level, President Obama's administration introduced the Elementary and Secondary Education Act (ESEA) Reauthorization Act or his Blueprint for Reform, which addresses a number of key issues around college and career readiness ("ESEA Reauthorization," 2011). More recently, in December 2015, President Obama signed into law the Every Student Succeeds Act (ESSA), which both reauthorized the ESEA as well as set forth a number of educational priorities neglected by the No Child Left Behind (NCLB) legislation ("Every Student Succeeds Act," 2015). Not least

among these priorities are college- and career-ready standards. In response to poor student outcomes in postsecondary education, there is also a movement underway to hold institutions of higher education more accountable for meeting key milestones, such as degree completion and timely progress towards graduation. In 2005, former Secretary of Education Margaret Spellings established the Commission on the Future of Higher Education, whose final report released in September 2006 identified accountability as one of four key areas for improvement in higher education (*A Test of Leadership*, 2006). More recently, President Obama announced his "Plan to Make College More Affordable" under his overarching program "A Better Bargain for the Middle Class" ("President's Plan to Make College More Affordable," 2013). Among the performance measures included in the new college ratings – the "College Scorecard" – are access, affordability, and outcomes, such as graduation rates and graduate salaries. As evident by the performance measures outlined in two California laws signed by Governor Jerry Brown in 2013 – California Assembly Bill 94 and Senate Bill 195 – the accountability movement has taken hold at the state level as well (Assembly Bill 94, 2013; Senate Bill 195, 2013).

Within this context of mounting expectation from both the federal and state levels around student access to and success in college, school districts at the local level are being called to join the effort to better prepare their students for their postsecondary education as well as for the career pathways they pursue. Local Control Funding Formula (LCFF) and Local Control Accountability Plans (LCAPs) now contain college and career readiness provisions that seek to systematically address this charge (Legislative Analyst's Office, 2013). With the passing of California Senate Bill 1458 in September 2012, similar provisions aimed at increasing college and career preparedness now feature as key measures in the Academic Performance Index (API)

used to benchmark K-12 school performance and progress in California (Senate Bill 1458, 2012). The ways that these district mandates materialize into practice change and improved student outcomes at specific school sites varies, but school administrators, teachers, and counselors will ultimately shoulder the responsibility of bringing articulated college-going goals to fruition at their schools and, by extension, in their districts. For school counselors specifically, whether or not their Pupil Personnel Services (PPS) credential programs adequately prepare them to provide college and career counseling to their students does not preclude them from the responsibility of guiding their students in this area.

Therefore, as districts and higher education institutions seek to address challenges to college readiness and facilitate the development of their students around these goals, a comprehensive understanding of the college readiness construct itself becomes critical. The literature explored in more detail below begins to unpack this construct by addressing the multi-contextual, developmental nature of students' career and college trajectories.

College Readiness: Access & Success

The next six subsections explore the college readiness construct by pulling from research on the influences of students' immediate school environments as well as their network of adults and peers on their college access and success. When studying college readiness, it is conceptually and methodologically helpful to parcel out the factors, experiences, and individuals that influence students' college-going trajectories – both prior to their college enrollment and along their pathway to degree attainment. Previous research has often studied students' college going in separate spheres: access and success. However, some definitions – such as the one posited by the College Readiness Indicator Systems (CRIS) – conceive of college readiness "not

just as academic preparation but also as the knowledge, beliefs, and attitudes students need to access college and be successful once in college" ("Beyond College Eligibility," 2014, p. 3). This conception of college readiness implies that the variables governing students' college access are inextricably tied to those that influence their college success. For this reason, I synthesize research from both college access and college success literature below, thereby adopting a more holistic approach to the study of college readiness.

Research indicates that the formation of career aspirations and, in turn, the selection of an associated postsecondary pathway follows a sequence of developmental stages: as students mature, their choices are shaped by a number of contextual variables, including key figures in their life who exert influence over their consideration and elimination of career and college options. The research also identifies the ways race, SES, and gender associate with the careers and the corresponding level of education to which students aspire. Because this developmental evolution commences well before high school, I examine research findings for students in the middle grades as well. Furthermore, I describe issues that can contribute to counselors' inability to provide the career and college guidance their students need, touching on the ways a lack of student support in this area also follows racial and socioeconomic lines.

Early Aspirations & Postsecondary Outcomes

In her seminal theory on the development of occupational aspirations, Gottfredson (1981) presented a model of circumscription and compromise, wherein the sequential stages of child development narrow aspirations: broad, fantastical considerations informed by magical thinking characterize occupational aspirations in early childhood, which in turn undergo significant circumscription as maturing children reject jobs seen as incompatible with their self-

concept. The joint influence of social class, gender, ability, interests, and values plays a crucial role in the selection of children's ultimate job prospects; these options fall within Gottfredson's termed "zone of acceptable alternatives," which reside within the boundaries of a child's "self-defined social space" (p. 558). Gottfredson, therefore, contended that by adolescence children's vocational alternatives already exist within a bounded region whose delimitations are shaped by the powerful, yet subtle, influences of the community: "Children may be far from crystallizing specific choices, but the society of their elders is already reflected and being recreated in their general preferences" (Gottfredson, 1981, p. 566).

Furthermore, she asserted that these identities manifest in the curricular tracks students select in entering high school, which pose implications for their future access to higher prestige levels. Additional research in the field of occupational and educational aspiration largely corroborates the developmental framework underpinning Gottfredson's theory (Trice & Hughes, 1995). Other, more recent frameworks designed to articulate students' occupational and educational choices have posited similar models of development. Lent et al. (1994) proposed Social Cognitive Career Theory (SCCT), for example, to account for the interactions between individuals' formulated interests, the subsequent goals they express, the actions they take in bringing these goals to fruition, and their performance attainments, which function as a feedback loop for reassessment and recalibration of career and academic behavior. In a later iteration of their theory, Lent et al. (2000) incorporated environmental factors, such as career supports and barriers, into the career development process.

Through the employment of structural equation modeling (SEM), Brown et al. (2008) later scrutinized the validity of the SCCT framework in predicting academic persistence and

performance in college. By doing so, Brown et al. (2008) bridged earlier thinking around the development of aspirations with students' long-term postsecondary outcomes. They found that the effects of past academic performance (as measured by high school grade point average, GPA) on students' college GPA were mediated through students' self-efficacy beliefs, while students' general cognitive aptitude (as measure by ACT/SAT scores) exerted a more direct influence on students' academic performance in college (p. 304). Conversely, neither ACT/SAT scores nor high school GPA directly influenced college retention; instead, their influence appeared to stem from their association with self-efficacy beliefs and goals (p. 305). In their investigation of the cognitive and non-cognitive predictors of college performance, Komarraju et al. (2013) built on this research. They found that those students with stronger high school GPA and lower ACT scores may marshal their efforts towards developing "non-cognitive skills indicative of intrinsic motivation, commitment, sound study skills, and an overall readiness to succeed in college" (p. 108). As these frameworks speculate and the studies below reveal, other contextual or student characteristics, such as gender, SES, academic ability, and race, have also been shown to influence students' occupational and educational aspirations from an early age.

In their study of 522 8th grade students in North Carolina, Akos et al. (2007) found that middle school students' planned curricular pathways in high school were informed by their prior "performance, behavior, attendance, and ability classification" (p. 61). They also found that gender and SES played a significant role in students' high school curricular choices, with fewer males and fewer low SES students selecting the College/University standard course of study (SCOS) and opting instead for the Career and College Tech SCOS pathways. In their study of elementary and middle school children in a southern Minnesota school district, Blackhurst and

Auger (2008) added to this discussion around gender disparities in college-going expectations and enrollment, concluding that divergent career aspirations between males and females could account for the inequalities in their educational aspirations. Males were less likely than their female counterparts to aspire to careers that required a college education and even more significantly disinclined to aspire to careers that necessitated a graduate or post-baccalaureate professional degree. In addition to gender and SES, research has pointed to the influence of academic ability and race on educational aspirations among 8th grade students, suggesting that Hispanic, Native American, and Black students have lower educational aspirations and lower levels of academic achievement than their White and Asian counterparts (Mau, 1995). The implications of this research for career and college counseling is multi-faceted: it suggests that counseling efforts seeking to broaden students' exploration of their postsecondary options should begin well before high school and should consider the racial, socioeconomic, and gender influences undergirding students' early occupational and educational decision-making.

In all, early career and college counseling can equip students with the foundational competencies to make appropriate choices when faced with formulating their high school and postsecondary plans, so they are less at risk of tackling these important decisions unprepared (Akos et al., 2007). Ultimately, the educational options students weigh and select in their middle and high school years, such as their intended major in college, could impact their long-term postsecondary outcomes. Indeed, Porter and Umbach (2006) investigated the impact of a number of independent factors on students' college major choice (i.e., demographics, parental influence, academic preparation, future views of the academic career, political views, and personality/goals based on the Holland typology, p. 434) and found that personality, as defined

by the Holland Codes, was “extremely predictive” of students’ major selection (p. 445). Furthermore, in their analysis of student data from 15 four-year (N = 3,072) and 13 two-year (N = 788) postsecondary institutions, Allen and Robbins (2010) took this research another step and found that the congruence of students’ interests (as defined by the Holland Codes) exerted a direct effect on timely degree completion. Additional research has also established links between mismatched major selection and delays in students’ time-to-degree, citing students’ need to retake courses and eventual major redirection (Shulock & Koester, 2014). Fostering college-going competencies among middle and high school students not only aids students in making judicious course selections at the secondary level; this educational planning skillset, bolstered by students’ cultivated understanding of their interests, abilities, and values, could lead to more informed postsecondary pathway decisions, including the selection of a well-suited field of study or major in college.

For this reason, K-12 guidance programs centering on career exploration “should (a) be developmentally appropriate, (b) actively dispel limiting occupational stereotypes and broaden students’ awareness of potential occupations, (c) be responsive to cultural values, and (d) furnish practical and realistic information about a wide range of postsecondary options” (Wahl & Blackhurst, 2000, p. 371). Furthermore, Mau (1995) discovered that students, regardless of race or sex, seek high school planning input from non-school persons (e.g., parents and peers) more frequently than school personnel (e.g., teachers and counselors). Counselors who integrate parents and peer groups into the career, college, and high school planning processes may, therefore, more successfully reach students when they are young. Indeed, as the following section explores, the college choice process – wherein students’ career and college aspirations

materialize into postsecondary decisions – relies largely on the support and encouragement of key figures in students' lives.

College Choice & Persistence

Not unlike the model of sequential stages developed by Gottfredson, early seminal models outlining the college choice process also follow a developmental trajectory (Chapman, 1981; Hossler & Gallagher, 1987). Chapman (1981) recognized student characteristics (e.g., SES, aptitude, level of educational aspiration, and high school performance); significant persons (e.g., parents, counselors, and peers); and college characteristics (e.g., location, cost, campus environment, and available majors) as critical to the college choice experience. Furthermore, Hossler and Gallagher (1987) posited that students' college decision-making and selection processes are influenced by these contextual factors working in tandem through a three-stage process: predisposition, search, and choice. In this model, the predisposition stage precedes more intentional college exploration and planning that commences in high school, suggesting that the formation of the desire to attend college as well as the decision to attend are pre-high school phenomena. More recent research places the predisposition stage at the 7th through 9th grades and includes additional factors, such as parental saving for college, parental collegiate experiences, high school academic resources, and information about college, as influential in the college choice process (Cabrera & La Nasa, 2000). Early interest in, receiving information about, and planning for postsecondary education has also been positively linked to the decision to attend college (Hossler & Maple, 1993; Plank & Jordan, 2001).

Tinto's (1975) seminal theory on the college dropout process could be viewed as a conceptual and temporal extension of these college choice frameworks – although it pre-dates

them – because it extends beyond college choice to encompass the multi-dimensional factors that influence students' college persistence. Borrowing from the literature on suicidal ideation in the wider society, Tinto conceived of dropping out from college as an analogous phenomenon, as it represents students' voluntary removal from a broader social system in which they do not feel integrated. Within Tinto's longitudinal model of dropout are the variables that characterize students from the onset of their postsecondary careers: family background, individual attributes, and pre-college schooling. These factors call to mind those posited in the college choice literature and represent, in a sense, the baseline qualities and experiences with which students begin college. These factors, in turn, influence the goal and institutional commitments students carry with them into the collegiate environment. Through academically and socially reinforcing experiences (e.g., grade performance and faculty interactions), students find themselves on continua of low to high academic and social integration. Appraisals of integration lead students to recalibrate their commitments and, subsequently, to decide to persist or dropout. Tinto's model suggested that rather than adhering to a decided course of action, students modify their goals and commitments in response to collegiate-level experiences.

Taken together, this research on occupational and educational aspirations as well as the college choice and persistence process supports the conclusion that the factors influencing students' pursuit of a postsecondary pathway occur in many spheres and over the course of a child's entire upbringing, including throughout their undergraduate careers. As students interact with and rely on key figures in their lives, their college pursuits are shaped by exposure to the information, expectations, and social systems that constitute the communities and schools in which they live and learn. As explored in more detail below, however, students from

underrepresented and low SES backgrounds often find themselves at a compounded disadvantage: many of their family members lack the depth of college-going knowledge to effectively guide their students through the complex college exploration, selection, and application process (Smith, 2009). These family members may not have attended college and may lack the first-hand knowledge to provide their students insight into the purpose, academic demands, and social realities of the college experience (Fallon, 1997). These students and their families, therefore, must rely on their local schools and school counselors to fill in these knowledge gaps and provide agency, support, and resources to this underserved population. However, many of the urban and rural schools educating students of color and poor students struggle with "chronic overcrowding […], inadequate funding, and an overall acceptance of widespread failure" (Howard, 2010, p. 34). As the research details below, school counselors and the environments in which they are embedded often fail to create the brokering of college-linking resources found to be crucial in students' pursuit of higher education.

Social Capital in College Admissions & Success

In their analysis of the diverse application of social capital in educational literature, Dika and Singh (2002) cited the original work of Pierre Bourdieu and his conceptualization of social capital as "the aggregate of actual or potential resources linked to possession of a durable network of essentially institutionalized relationships of mutual acquaintance and recognition" (p. 33). Access to this network effectively affords access to the group's collectively held capital. As Dika and Singh explained, this sociological export has been utilized in the educational sphere as a lens through which researchers view students' differential experiences in school due to class, gender, and race/ethnicity.

By way of example, higher education's most elite institutions have come to be seen by some as the gateway to better life prospects. Unfortunately, those who possess the most financial and, in turn, social capital are often best positioned to compete for admissions at these sought-after schools. The conceptualization of higher education as a business (Slaughter & Leslie, 2001) poses significant implications for students, as they assume the role of clients in the college admissions marketplace (Liu, 2011; McDonough, 1994; McDonough et al., 1997). Private college counseling represents the nexus between the institution of higher education as a marketplace dealing in "admissions management" and the social construct of the "college applicant" (McDonough, 1994). In the exchange between the college and its applicant, private college counselors aid students in leveraging their capital to compete for a priceless commodity: a seat at a selective institution of higher education. In her research, McDonough (1994) found that parents' motivation in seeking private college counselors stemmed from both the desire to ensure their children maintained a competitive edge as well as the fear that a poor college choice may pose negative ramifications for their children's social and economic standing.

Expanding on this research, McDonough et al. (1997) found emergent trends among the students and families who utilize independent educational consultants (IECs): they proactively seek advice from many outlets; they are from a privileged class (i.e., higher rates of graduate degree attainment and higher income among parents than those who do not use IECs); and they submit higher numbers of applications and attend private institutions away from home, reflecting the fact that tuition and financial aid factor less in their college choices. In essence, private college counseling aids students in every step of the college application process, including crafting the personal statement and preparing for college entrance exams. The latter

advantage bears highlighting, as data reveal significant divides in performance on the SAT among students of different races and ethnicities (Howard, 2010), which could be explained in part by disparities in access to test preparation resources and support. Furthermore, in their research on early action and early decision admissions, Park and Eagan (2011) found that private college counseling most strongly predicted a student's decision to enroll in a college due to early admission, one advantageous way of securing a seat at more elite institutions.

These studies uncover a source of inherent inequality in the college admissions sector: "insider" knowledge and personalized services are available to those students and families who can afford them, while the less privileged often rely solely on informational resources available, however inadequate, through their public schools. In this way, students' financial capital enables the procurement of social capital vis-à-vis access to the institutional agents (i.e., private college counselors) who can best equip them to traverse a competitive admissions landscape. According to Stanton-Salazar (2011), institutional agents are high-status, non-kin individuals who are well positioned within stratified institutions or societies. They function as conduits to highly coveted resources, opportunities, privileges, and services, which are not equally available to all (p. 1075). For students of low SES or underrepresented backgrounds, these institutional agents may not occupy their immediate sociocultural space. These students must, therefore, occupy multiple spheres – beyond their communities or neighborhoods – to gain access to these influential mediators. In their exploration of the varying impact of students' social capital on their college-going trajectories, Holland et al. (2007) found that "bonding and bridging social capital are interwoven and interdependent" (p. 113). Students may find attachment to their childhood communities, on the one hand, constrain their college-going resources and institutional options,

while on the other, they may rely on their social networks to catalyze and support their mobility into new school environments beyond their hometowns. In this sense, Holland et al. (2007) saw young people as "active agents" in the development and utilization of social capital (p. 113).

Along these conceptual lines, Cerna et al. (2009) investigated the ways Latino/a students exercised their social, economic, cultural, and human capital in the pursuit of their bachelor's degrees. Relying on the Cooperative Institutional Research Program's (CIRP) 1994 annual survey, Cerna et al. (2009) analyzed the six-year degree attainment data for a sample of 2,957 entering Latino/a college students. In addition to high school GPA and the selectivity of the institution attended, the authors also found that measures of social and cultural capital proved influential in students' degree attainment. For example, inclinations among incoming freshmen towards projected peer group and purpose-driven behavior in college were positively linked to eventual degree attainment. DeAngelo et al. (2011), who also employed the CIRP Freshman Survey in their analysis of degree attainment, found that students' anticipated involvement in student clubs and groups during college as well as their self-ratings on emotional health and drive to achieve were positively associated with four-, five-, and six-year degree completion (p. 26). In light of their findings, Cerna et al. (2009) advocated for a reframing of the dialogue around students' social capital: rather than adopting a deficit-oriented perspective, they encouraged institutions to nurture those forms of capital shown to be influential in students' college success. In a similar way, other researchers have advanced approaches to studying social capital by adopting an epistemological viewpoint that recognizes the ways students of color draw from their culturally-rich resources and knowledge in navigating their college-going pathways (Welton & Martinez, 2014).

In all, this investigation of social capital offers another piece of a complex puzzle: degree attainment represents the gateway to more secure employment opportunities and socioeconomic well-being. Yet, underrepresented, low-income students most in need of a college degree often find themselves in communities and schools with limited access to institutional agents and postsecondary planning resources. These students may then seek admissions at regional universities, where resources to support them and effectively leverage their social capital in the pursuit of a degree may be scarce (Shulock & Koester, 2014). All the while, their more advantaged peers are the benefactors of a system wherein privilege seems to beget more privilege.

High School Culture & College Transitions

Utilizing data from the Educational Longitudinal Survey, which provided a nationally representative sample of high school seniors, Engberg and Wolniak (2010) found that "the average socioeconomic level of a high school's student-body and a school culture in which students' families and friends aspire for them to attend college significantly contribute to both 2-year and 4-year college enrollment" (p. 149). Furthermore, in addition to parent and peer networks, college-linking networks (i.e., postsecondary planning resources in high school) universally increased a student's likelihood of attending college. Among the variables used to define college-linking networks in this study were the students' information-seeking behaviors (i.e., the degree to which students consulted individuals like counselors, teachers, coaches, parents, friends, and college representatives regarding college entrance information).

Engberg and Wolniak (2010) built upon the concept of college-linking as it was originally explored by Hill (2008), who provided a taxonomy of schools' college-linking supports:

traditional, clearinghouse, and brokering. In the traditional model, schools function as a conduit to the labor market for the majority of their students, and only serve as a support for college going for a select few. The clearinghouse model represents those schools that offer more robust college-going information, but lack the structures to disseminate this information equally to all students and parents. And lastly, as its label suggests, brokering schools offer both the informational resources and institutional norms that aid in brokering these resources in support of college going among all students. Hill (2008) found that the more substantial impacts of the brokering strategy suggest that "schools that make strong commitments to practices that promote equitable access to resources reflect a more effective strategy for facilitating four-year college enrollment" (p. 67). Roderick et al. (2011) reached similar findings in their examination of 2005 Chicago Public School graduates and data archived in the Consortium on Chicago School Research. Their study revealed that schools assessed as having a stronger college-going climate by their teachers increased the likelihood of a student planning to attend, applying to, and being accepted into a four-year college. The school-level effect of a strong college-going climate could increase this likelihood by 9-13% between comparably qualified students with similar family background and school engagement.

Interestingly, in a recent study, Martinez and Deil-Amen (2015) extended this research to the postsecondary level, investigating the impact of students' high school college-going cultures on their post-enrollment experiences in college. Looking at students who had originated from high schools with either a gatekeeping or college-for-all ideology, the authors sought to capture students' lived realities following their postsecondary entry. Regardless of the college-linking strategies employed by their high school, the majority of students – in reflecting on their first-

year college challenges – cited "(a) an underestimation of the workload, (b) poor self-confidence regarding their academic performance in the first year, (c) underpreparedness, and (d) a misconception about advising and faculty accessibility at the university level" (Martinez & Deil-Amen, 2015, p. 21). Some students even expressed concerns with respect to their long-term ability to stay academically afloat, threatening their prospects of degree completion.

These findings add dimension to studies around the impacts of high school culture on students' college-going trajectories, as they suggest that even universal support of college going at the secondary level can lead to disillusionment among college freshmen. These are noteworthy conclusions for counselors who often find themselves in the difficult position of supporting their students' dreams of pursuing higher education, while remaining realistic about the potential pitfalls they may encounter. In interviewing 27 counselors in eight Chicago-metropolitan-area high schools, for example, Rosenbaum, Miller, and Krei (1996) found reluctance among counselors to dissuade their students from pursuing unrealistic college plans, and they concluded that "rather than commit sins of commission (keeping deserving students out of college), the current problem may be sins of omission (sending unprepared students to college)" (p. 277). Other researchers investigating K-16 articulation issues have reached similar conclusions, citing the adverse effects of inappropriate signaling, wherein students graduating high school are ill informed of the academic rigors awaiting them in college (Kirst, 2008; Venezia & Kirst, 2005).

High School Counselors & K-16 Partnerships

School counselors at the K-12 level, therefore, play a critical role in supporting students' self-exploration as well as the alignment of their curricular preparation, academic skillsets, and

personal interests with the postsecondary pathway most likely to lead to their success. In California, the numbers are telling: based on the most currently available statewide data reflecting the number of pupil services counselors in relation to K-12 student enrollment in 2012-2013, the approximate counselor to student ratio is 1:808 (CDE, 2012-2013). Working with caseloads of this magnitude, counselors must meet the daily challenges of serving hundreds of students while juggling numerous, often-competing responsibilities.

Corwin et al. (2004) investigated college preparation programs in 12 northern and southern California high schools that served primarily students of color, many of whom qualified for free lunch. At each high school, factors such as large caseloads, copious duties, and limited resources constrained counselors' abilities to provide their students guidance around college and career planning. Many counselors found themselves marshaling their time and efforts towards their schools' graduation rates, or dealing with "disruptive" students who were not perceived as being on the college-bound track. Students at these high schools expressed frustration with their counselors' inaccessibility and a perception that their counselors did not care about them; these feelings of alienation led to the majority of students seeking academic guidance and college information from alternative sources, such as teachers, siblings, and cousins. Bell et al. (2009) reached a similar finding in their study of college knowledge among 9th and 11th grade students across five states, concluding that family members served as the primary source of college information for most students; the Internet and the high school followed in second and third place, respectively. This trend may pose a problem, particularly for underrepresented and low SES students, whose families may lack the social capital to strategically navigate the college-going process.

While high student-to-counselor ratios have been shown to negatively impact counselors' ability to provide comprehensive college and career planning guidance, other factors also influence counselors' daily work and priorities. As mentioned above, counselors must often juggle numerous responsibilities, which can range from academic guidance, to class scheduling, to monitoring duties (Corwin et al., 2004). In their study of actual versus preferred practices among school counselors, Scarborough and Culbreth (2008) cited non-guidance-related duties, such as clerical, fair share, and administrative activities that exist beyond the scope of student guidance work (p. 449). Research has also shown that duties assigned to counselors, and the relative emphasis placed on college counseling among these duties, depends on a number of contextual factors, including the school site, the school's student population, and the district (Corwin et al., 2004; Perna et al., 2008). Often, these contextual factors are, in turn, influenced by available resources, so the least funded schools lack the structures and personnel to provide comprehensive college advising to their students. Like the findings around private college counseling, these findings also point towards a system of inequity, where those students most in need of college-going support are the least likely to receive it (Bell et al., 2009; Corwin et al., 2004; Perna et al., 2008; Tierney, 2009).

College readiness responsibilities do not rest with school counselors at the K-12 level alone, however. Academic advisors at the collegiate level often build upon the efforts of their K-12 counterparts. Ultimately, as more students pursue postsecondary education, it is incumbent upon K-12 and higher education educators to create mutually reinforcing structures for the adequate preparation and support of each student along their educational trajectories. However, Domina and Ruzek (2012) warn that "not all K-16 partnerships are created equal" (p.

261): in their study, comprehensive partnerships – wherein the collaboration of K-12 and higher education practitioners came to bear on district educational policy-making – resulted in better student outcomes than programmatic partnerships that were oriented towards providing student and teacher services without influencing policy. This study also revealed that measurable impacts of comprehensive partnerships on student outcomes are not immediate, but rather partnerships often take many years of patient tending to build the structures and trust that lead to positive impacts, which – in turn – may not be evident until adequate time has passed. Furthermore, in their case study, Jarsky, McDonough, and Nunez (2009) found that tension can arise among K-12 college counselors who marshal their energies towards a college mission and their fellow administrators and teachers who believe promoting college going "should take a back seat to more pressing organizational priorities such as scheduling and dropout prevention" (p. 358). Not only may priorities among high school counselors and college-based advisors diverge; priorities within K-12 institutions may vary by stakeholder group and agenda.

Ideally, inter-segmental articulation – the joining or juncture of the two educational segments – establishes embedded structures, communication, and practices for college access and success for all students as they transition from the K-12 to the higher education sector. As Karp (2015) persuasively argues, "structures that assume all students will attend college create conditions for college aspirations and preparation that include, rather than exclude, disadvantaged and underrepresented students" (p. 108). Efforts to articulate students' transitions from high school to college will need to also address the often-misaligned messages, signals, and expectations that comprise the college-going information students receive as they prepare for and enter postsecondary education. In fact, as addressed above, research around

students' transition into college points towards a systemic disjuncture in the K-16 pipeline: misaligned and deficient guidance, messaging, and support available to students as they consider their postsecondary options, make critical educational choices, and experience the lived reality of these choices in college.

Technology-Based Tools & Their Adoption

Technology-based tools that allow both students and their counselors an information-rich forum for exploring a multitude of postsecondary pathways could offer one possible solution for overcoming challenges in meeting counseling demands. Technology offers school counselors a means of addressing disparities in access to educational planning supports by allowing a more equitable distribution of career and college-going information to all students and parents. However, as research reveals, simply having access to the Internet and the vast network of information it provides does not guarantee that students and their parents are equipped to be sophisticated information consumers. In investigating the financial aid process of low-income urban high school students, for example, Venegas (2006) found that while these students had access to computers, "what is missing from these particular environments is access to the instrumental knowledge that is needed to effectively navigate the financial aid process" (p. 1666). Without this requisite instrumental knowledge, students lacked the skillset to proactively advocate for their interests in this critical college-going step. Indeed, a number of studies conducted at the middle school level around the impact of computer-assisted career and college exploration interventions reveal that mediating factors such as teacher mentoring, tutoring, discipline-based career development activities within curricula, guided exploration, and facilitated reflection help students develop more robust career and college exploration

competencies at an early age (Peterson, Long, & Billups, 1999; Radcliffe & Stephens, 2008; Schaefer & Rivera, 2012; Turner & Conkel, 2010; Turner & Lapan, 2005).

Literature shows that this process of technology adoption and utilization does not represent a purely binary decision wherein practitioners simply choose to either use or not use a new technology or innovation (Hall, 2010); rather, "schools becoming high-quality users of technology innovations is a process, not an event" (Hall, 2010, p. 233). Prominent theories and frameworks around the adoption of technologies account for numerous contextual factors that may influence the use of a new technology or innovation (Hall, 2010; Karp & Fletcher, 2014; Straub, 2009). In his review of key technology diffusion and adoption theories, Straub (2009) concluded that these models, taken together, account for a broad swath of influential variables: the personal characteristics of adopters, the qualities of the innovation itself, and the environment or context of the adoption. According to Straub (2009), "technology adoption is a complex, inherently social, developmental process" (p. 645), and administrators charged with overseeing the implementation of new technology should be attuned to the cognitive, affective, and contextual concerns that characterize the technology adoption experience for their staffs. Indeed, Dawson and Heinecke (2004) found that school-wide transformational uses of technology rely on more than single users choosing to employ the technology in innovative ways, but rather a systems-based approach defined by an organized reform strategy.

College Readiness: Future Research

As the research above illuminates, the preparation, skillsets, knowledge, and multi-dimensional capital with which students enter their postsecondary pathways pose ramifications for their college transition and success – a reality that is most aptly uncovered by the joint

examination of college access and success literature. It should come as little surprise, therefore, that current research around college readiness reflects a shift towards more holistic inventorying of readiness indicators. For instance, in their case for the adoption of an ecological approach to understanding and researching college readiness, Arnold et al. (2012) contended "a major reason that increasing college readiness has proven so intractable is the complexity of the interacting personal, organizational, and societal factors in play" (p. 91). By their assessment, statistical approaches to studying students' readiness for college that isolate the predictive power of single indicators neglect to account for the construct's microsystem of influences. Frameworks that define and catalog this microsystem can, on the one hand, provide a helpful taxonomy for categorizing college readiness phenomena into delineated realms; these realms, in turn, can provide decipherable scaffolding for future research. On the other hand, the college readiness construct – comprised of a multitude of interrelated variables – may not lend itself to simple classification and analysis.

Launched in 2011 by the Bill and Melinda Gates Foundation, the College Readiness Indicator Systems (CRIS) Initiative spanned the nation, involving numerous stakeholders: three university-based research partners (the John W. Gardner Center for Youth and Their Communities at Stanford University, the Annenberg Institute for School Reform at Brown University, and the University of Chicago Consortium on Chicago School Research); four urban districts (Dallas Independent School District, Pittsburgh Public Schools, San Jose Unified School District, and the School District of Philadelphia); and one school support network (New Visions for Public Schools in New York City). In this three-year initiative, university-based researchers provided their K-12 partner districts with a framework for assessing key domains of college

readiness (i.e., academic preparedness, academic tenacity, and college knowledge) at three levels (i.e., individual, setting, and system) ("Beyond College Eligibility," 2014). Similarly, in their meta analysis of 109 studies, Robbins et al. (2004) parceled out indicators of college readiness from the education and psychology disciplines into nine categories: achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self efficacy, general self-concept, academic-related skills, and contextual influences (p. 266). However, neither schema provides insight into the interconnectedness of its proposed domains, or the ways they may impact postsecondary outcomes differentially by student group or major. Nevertheless, these frameworks do provide a useful foundation on which future research may build. As discussed in more detail in Chapter Three, these frameworks provided the categorization schema by which I selected individual survey items and clusters of items for the analyses performed in this study.

Adding to the complexity of defining and measuring college readiness is the fact that it is often conflated with career readiness. Calls for accountability at the K-12 and higher education levels often refer to college and career readiness (CCR) as a single objective, and yet these phenomena are substantively different and require "empirical associations with relevant criteria" to be effectively measured (Camara, 2013, p. 23). Additionally, the assessment of college readiness also necessitates an operationalization of postsecondary success, so the outcome criteria by which we deem students ready for college are defined and measurable. As Porter and Polikoff (2012) highlighted, commonly used postsecondary outcomes – such as degree attainment, four-year completion, and cumulative GPA – are influenced by the entirety of students' college experiences, not only their readiness at the time of college entry. This fact may

render such outcome variables conceptually and methodically challenging to use in measuring students' college readiness at the onset of their postsecondary careers. Despite the intricacy of assessing college readiness, Maruyama (2012) offered some recommendations as a starting point: "(a) use benchmarks with meaning and consequences for students, (b) employ multiple measures to provide readiness information more precise than from a threshold score derived from any single assessment, and (c) present readiness in terms of probabilities or likelihoods rather than as ready or not" (p. 252).

College Readiness By Sex, Race & Major

Among the areas for continued research within the college readiness literature remains the study of predictors of students' postsecondary success by student group (i.e., sex, race, and major) as well as the ways readiness takes shape at the nexus of these student groups (e.g., underrepresented women pursuing a major within the science, technology, engineering, and math, STEM, fields). Indeed, as discussed earlier in this chapter, a plethora of research reveals inequitable outcomes in postsecondary attainment by race and SES, but there are also signs of disparity in the attainment of degrees within specific fields of study. The data on degree attainment by field of study reveal that students' ability to obtain a degree within their intended major may also be sensitive to their sex and race as well as the collegiate environments in which they pursue their degrees. For example, national statistics on the percentage of females who culminated with a bachelor's degree in 2013-2014 within a STEM field compared to their male counterparts are noteworthy: 35% of the total STEM bachelor's degrees were conferred to females compared to 65% to males (NCES, 2015). Similarly, disaggregated by race/ethnicity, the respective percentages of STEM degree attainment point towards disparities in students'

readiness to pursue these more technical fields of study. With 63.3% of all STEM bachelor's degrees conferred to White students, their Black, Hispanic, and Asian/Pacific Islander peers culminated at significantly lower rates: 6.8%, 9.0%, and 12.4%, respectively (NCES, 2015). Examining these statistics at the nexus of sex and race, ones sees that 42.2% of the total STEM degrees conferred in 2013-2014 went to White males.

The paucity of underrepresented minority students entering and persisting in the STEM pipeline remains stubbornly slow-to-change and widespread (Syed & Chemers, 2011). Research aimed at understanding the root causes of this proportional underrepresentation of women and minority students in the STEM fields has investigated the interplay of a number of variables: identity (including psychological factors); relational and institutional contexts; support programming; motivation and commitment; and social support (e.g., mentor, family, peers) (Syed & Chemers, 2011). Furthermore, rather than attribute disparities in STEM degree attainment solely to a lack of readiness for the rigorous curricula that characterize these majors, researchers have also investigated the ways students' sex and race interact – separately and jointly – with surrounding university and departmental environments. Undertaking this research first requires the adoption of an intersectional lens, "characterized by a focus on the mutually constitutive effects of multiple, subordinated identities" (Armstrong & Jovanovic, 2016, p. 2). Armstrong and Jovanovic (2016) argued that the role each aspect of identity – whether gender, sexual orientation, or race – plays in shaping individuals' lived realities is modulated by the others. Treating these identities as separate inevitably fails to capture the complex interplay of these characteristics within institutions of higher education. Research centered on the ways stereotype threat impacts test performance among students of multiple identity groups confirms

the notion that these students face unique challenges in college. For instance, in a performance simulation, Gonzales et al. (2002) administered a 50-item mathematical and spatial ability test to 60 Hispanic and 60 White undergraduates. They found that while females did not experience significantly greater ethnicity-based stereotype impacts in comparison to males, Latinos/as did experience greater gender-based stereotype threats than their White peers. Ultimately, Latina women were more at risk of experiencing stereotype threat than their Latino male counterparts, suggesting a compounded influence of a double-minority stereotype threat posed by being both female and Hispanic.

Related research has studied the intersectionality of students' identities embedded within university contexts. Espinosa (2011) studied women of color who persisted in the STEM fields, specifically probing their experiences within "hostile subenvironments" (p. 215). She investigated the experiences of both White women at 123 institutions and women of color at 96 institutions in their pursuit of a STEM degree. Espinosa (2011) found that all women, irrespective of their race, reported departing their chosen STEM major due in part to the inaccessibility of the science curriculum (i.e., its lack of relevancy to their goals of advancing their communities). She found White women enjoyed more faculty interaction outside of the classroom and identified fewer incidences of racial or ethnic stereotyping by faculty in the classroom, as compared to their women of color peers. Espinosa also discovered that women of color experienced an increased likelihood of persisting if they availed themselves of certain opportunities and forums: peer discussion, major-related clubs, and research programs. In their study of degree attainment among Hispanic students, Arbona and Nora (2007) similarly found that those students who displayed certain academic engagement behaviors stood a better chance of culminating:

maintaining full-time, continuous enrollment; completing a larger proportion of their attempted units; and achieving stronger academic performance during their first year in college.

Complementing these studies, Hurtado et al. (2011) explored the impact of different institutional contexts on students' postsecondary outcomes within the STEM fields. In addition to their analysis of the frequency with which students reported interacting with faculty at their respective campuses, Hurtado et al. (2011) also investigated students' ability to manage the academic environment, their sense of belonging within the campus community, and their cross-racial interactions. Among the study's findings, they discovered that student-faculty interaction was sensitive to institutional context. For example, Black students tended to engage less with faculty at primarily White, less selective, and smaller institutions, respectively. Additionally, students and administrators reported attributes of their science departments – uncaring, competitive, and gatekeeping – that suggested these departmental cultures were not conducive to breeding aspirations to continue in the science field, particularly among first-generation and underrepresented students. Furthermore, in their investigation of the first-year transition and adjustment experiences of biomedical and behavioral sciences majors, Hurtado et al. (2007) found that while students' experiences are influenced by "broader institutional characteristics, such as selectivity, more often than not, it is their immediate environments, including informal peers groups and formal structures that link academic and social systems, which shape their adjustment experience" (p. 883).

In many ways, this research complicates the already complex phenomenon of college readiness as it integrates considerations of students' multiple group identities, their enrollment and engagement behaviors, institutional contextual factors, and major-specific cultures into the

exploration of the driving forces behind students' postsecondary success. Moreover, this research refrains from presupposing that students' college readiness constitutes only the dispositions, habits, and skillsets with which students begin their college tenures; instead, it effectively assigns a portion of the responsibility of students' postsecondary success to the institutions and departments by which they are served.

Bringing It All Together

In a time when higher education degree attainment poses implications for the economic prosperity of the nation and its people, K-12 districts and higher education institutions must respond to mounting pressure to prepare their students to make judicious postsecondary decisions and to successfully attain their degrees. Inequities in higher education outcomes also necessitate the distribution of college-going supports and resources to ensure all students have equal opportunity to make informed choices about their career and college pathways. For students and families who cannot leverage their capital to obtain private counseling and compete in an emerging admissions marketplace, schools must often fill college knowledge and preparation gaps. In many school and community contexts, counselors are relied upon to provide students and parents college-going support and agency, especially to those from underrepresented and low SES groups. However, with untenable caseloads, counselors must find ways to meet these postsecondary guidance responsibilities, while also juggling their extant counseling demands. Technology-based counseling tools offer one possible avenue for increasing the equitable distribution of college-going resources and information, but their adoption at K-12 schools and university campuses represents a socially and organizationally complex process.

Through a more nuanced study of the interrelationships between indicators of college readiness and their influence – individually and collectively – on postsecondary outcomes, I hope to contribute to our understanding of the readiness construct. Furthermore, by studying the meaning and implications of college readiness across student groups and majors, I can avoid oversimplification of college readiness as "universal" for all students and offer a more granular look at the ways students' readiness levels and needs may vary. This and future research could better inform K-12 and higher education practitioners as they devise ways and technological applications to bolster students in meeting college readiness and graduation objectives set forth in accountability legislation.

Chapter Three: Methodology

The latest national statistics reveal a growing number of students are enrolling in postsecondary education. However, many of these students fail to attain a college degree or take far more than the minimum time required to do so. A plethora of skills, attributes, dispositions, and knowledge have been identified in the literature as contributing to students' ultimate degree completion. Investigation of the interrelationships of these factors within the multifaceted college readiness construct could provide insight into the reasons some students tread an often circuitous – and even outright unsuccessful – pathway to degree completion and others do not. This study relies on extant research around the factors that influence students' postsecondary success and seeks to develop a model that deepens our understanding of the interrelationships of these factors. This study could contribute to the dialogue around the ways K-12 and higher education institutions can holistically assess their students' readiness for college and provide targeted supports better aligned to their needs.

Research Questions

The research questions (RQs) driving this study are the following:

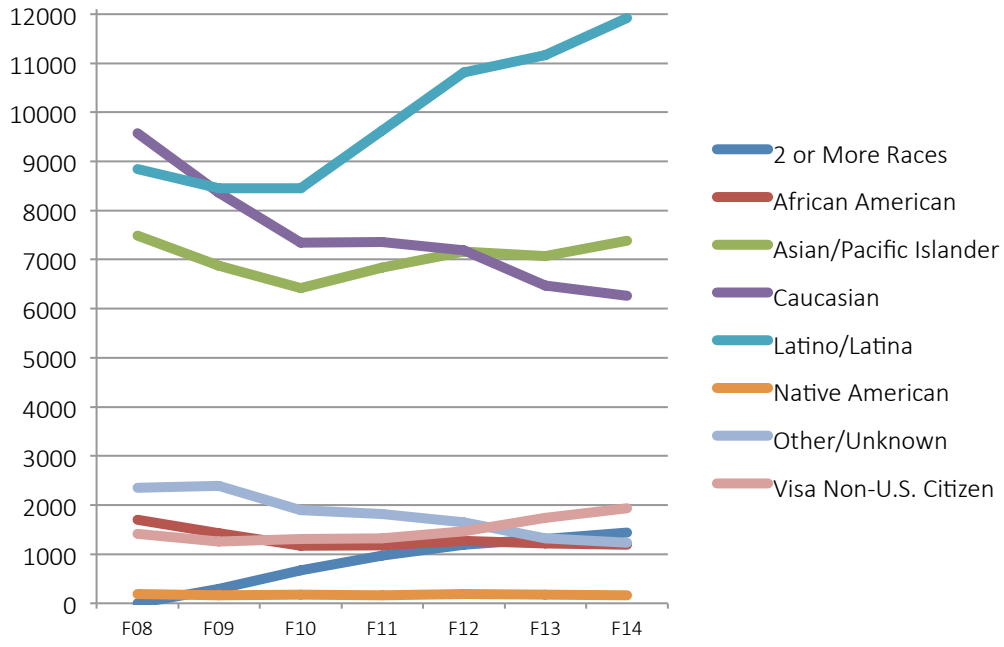
> *RQ #1: What contexts, dispositions, and habits of incoming first-time freshmen comprise college readiness as demonstrated by students' postsecondary outcomes?*
>
> *RQ #2: Does the impact of these contexts, dispositions, and habits on students' postsecondary outcomes vary by student group or major? That is, is the meaning of 'college ready' the same for all students?*

Site Rationale

As addressed in Chapter One, California State University, Long Beach (CSULB), served as the site for investigation in this study. A large, urban, public university, CSULB provided an ideal setting for this study for multiple reasons. This institution could best be categorized as

moderately selective, admitting approximately 20,300 of its 56,300 applicants in 2014 ("Admission Trend," 2015). It, therefore, represents a regional university that serves a broad base of students, not simply the most competitive. Also, its diverse student body lends itself to the exploration of college readiness across various student populations, including students of traditionally underrepresented ethnicities as well as first-generation students and Pell Grant recipients. As demonstrated in Figure 3.1 below, the enrollment trends at the University have shifted notably over the past several years towards a majority Latino/a student body. According to the University's Office of Institutional Research and Assessment (IRA), the Fall 2014 semester boasted an enrollment of approximately 38% Latino/a undergraduates, while the population of African American, Asian/Pacific Islander, and Caucasian students constituted about 4%, 23%, and 20% of the undergraduate total, respectively ("11-Year Enrollment Trend Report," 2015).

Figure 3.1
CSULB Undergraduate Enrollment by Ethnicity (Fall 2008 through Fall 2014)



Note: Data for "2 or More Races" are not available for Fall 2008.

These percentages represent an almost 10 percentage point increase of Latino/a undergraduates and an equivalent 10 percentage point decrease of Caucasian undergraduates at the University since Fall 2008. Furthermore, according to the most recent data available in the newly released College Scorecard, 47% of undergraduates at CSULB qualify for federal Pell Grants due to their family's annual income falling below $40,000 (College Scorecard, 2015). The University serves, therefore, a diverse student body with respect to both ethnicity and socioeconomic status (SES). These data are significant partly due to the University's strides in increasing graduation and retention rates over the past several years, leading to the second reason CSULB lent fodder to the exploration of college readiness.

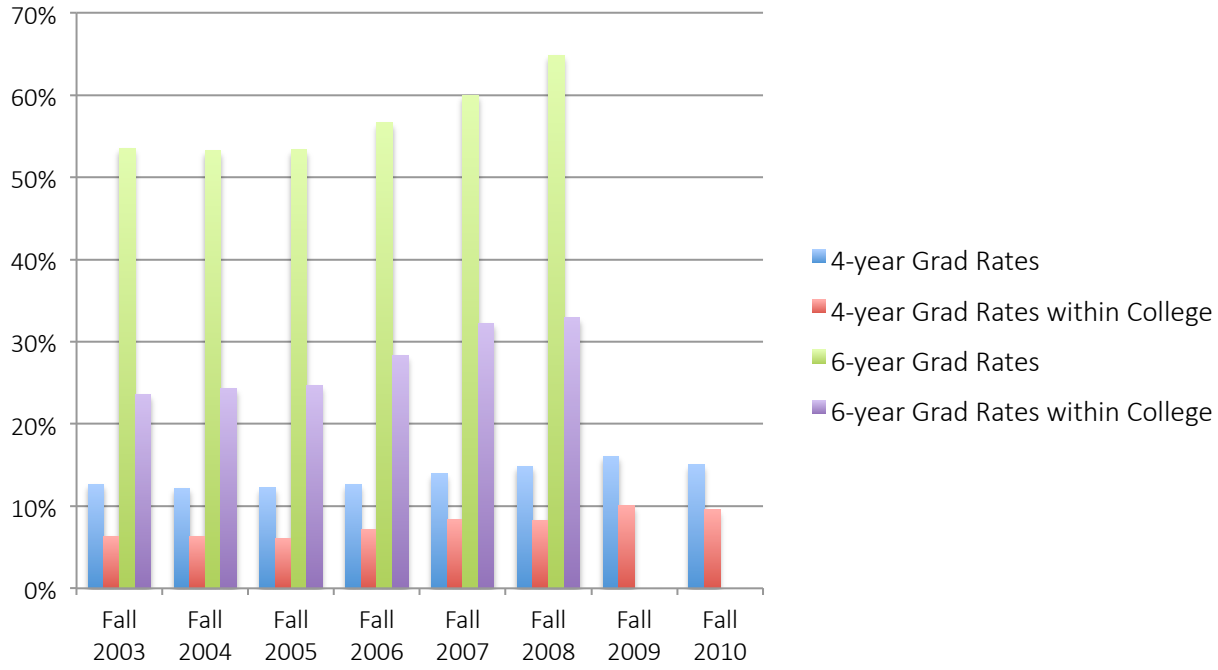
Over the past decade, the scope of advising services available at CSULB has grown substantially. From a single office serving the general advising needs of the University's students in tandem with designated faculty advisors, the University now operates an advising center staffed by student services professionals for each of the campus' seven colleges: Arts, Business Administration, Education, Engineering, Health and Human Services, Liberal Arts, and Natural Sciences and Mathematics. There has also been a shift from relying on faculty members who provide advising at the departmental level towards professional staff performing the bulk of advising regarding major and course selection within these college-specific advising units. Moreover, professional staff advisors housed within special student groups also serve, advise, and mentor their respective student populations (e.g., athletes; disabled students; Educational Opportunity Program, EOP, students; Honors Program students; international students; veterans, etc.). These shifts in the student support infrastructure on campus – coupled with more stringent policies around major change timelines, course repeat/withdrawal limitations,

and overall unit caps – can be credited in part for increases in student graduation rates over the same period of time.

As reflected in Figure 3.2 below, the University has achieved significant progress in raising its six-year graduation rates among first-time freshmen (FTF). An approximate 11 percentage point increase in this six-year graduation rate between the Fall 2003 and Fall 2008 native cohorts could point towards the impact of the campus' institutional commitment to academic advising and provision of information networks to its students. Alternatively, these graduation increases could also be attributable to more "college ready" incoming cohorts. These shifts in institutional priorities and policies also made CSULB fertile ground for studying students' transition and navigation experiences following their postsecondary entry. Furthermore, the University's recent launch of an eAdvising initiative has equipped advisors and students with technology-based tools that rely on predictive analytics to guide students' course-taking and major-related decisions. However, Figure 3.2 also demonstrates that the University's four-year graduation rates remain stubbornly low, hovering around 12-16% across the past eight cohorts for which four-year graduation data are available, suggesting there are still areas for improvement with respect to decreasing time-to-degree and increasing graduation rates.

Figure 3.2

CSULB First-Time Freshmen (FTF) Four- and Six-year Graduation Rates by Cohort (Fall 2003 to Fall 2010)



Additionally, the graduation rates within college are also telling. Among those six-year completers who graduated within the past six native cohorts, around 70-75% did not remain within the same college as the one they entered as freshmen. This clear majority indicates that students are not simply changing majors, but they are seeking alternative degree routes within wholly different fields of study. Drilling down further, the descriptive data become even more revealing. Focusing on the most recent cohort for whom six-year data are available, the Fall 2008 FTF statistics suggest that graduation rates within college vary by both field of study and ethnicity. Table 3.1 below reveals that fewer students who entered the University in the colleges of Business Administration, Engineering, and Natural Sciences and Mathematics completed their degrees within their initially-selected fields of study than students in the University's other colleges. With a graduation rate within college of approximately 22%, Natural Sciences and

Mathematics experienced the greatest attrition of all the University's colleges, losing nearly 80% of its students to other fields of study during the six-year period following the cohort's postsecondary entry. These data warrant further exploration to determine the predictive factors that may contribute to this phenomenon and to parcel out the ways college readiness may play a role in students' ultimate degree trajectories.

Table 3.1
CSULB First-Time Freshmen (FTF) Six-Year Within-College Graduation Rate, by College of Initial Enrollment (Fall 2008 Cohort)

College	Cohort Size	# Graduates	Within-College Graduation Rate
Arts	568	254	44.7%
Business Administration	515	189	36.7%
Education	179	95	53.1%
Engineering	419	143	34.1%
Health and Human Services	784	309	39.4%
Liberal Arts	748	414	55.3%
Natural Sciences and Mathematics	509	111	21.8%
All Colleges	3,722	1,515	40.7%

Furthermore, disaggregated by ethnicity, the graduation rates within college suggest that the percentage of six-year completers who graduate within their initially chosen college vary by ethnic group as well. Of note, African American and Latino/a students completed their degrees within their original college at lower rates than their Asian/Pacific Islander and Caucasian counterparts. This discrepancy also exists for graduation rates at large, as Caucasian students boasted the highest six-year completion rates with Asian/Pacific Islander students as a close second. See Table 3.2 below for a breakdown of these data.

Table 3.2
CSULB First-Time Freshmen (FTF) Six-Year Graduation Rates by Ethnicity (Fall 2008 Cohort)

Ethnicity	Cohort Size	# Grads (any College)	% Graduated (any College)	# Grads (w/in College)	% Graduated (w/in College)
African American	245	133	54.3%	60	24.5%
Asian/Pacific Islander	1,080	727	67.3%	402	37.2%
Caucasian	1,339	963	71.9%	491	36.7%
Latino/Latina	1,568	915	58.4%	432	27.6%
Native American	26	15	57.7%	8	30.8%
Other/Unknown	242	163	67.4%	83	34.3%
Visa Non-U.S. Citizen	106	71	67.0%	39	36.8%
All Undergraduates	4,606	2,987	64.9%	1,515	32.9%

Without speculating at this juncture to the reasons behind these data, I hope this study will begin to make meaning of the ways "pre-college" college readiness may vary across ethnicities and the possible impact of these variations on students' postsecondary outcomes. In all, conducting the study at this particular institution allowed me to explore students' college transition and navigation experiences within a context of diversity and, in some respects, disparity. Furthermore, it represented an institution at a critical crossroads: successful institutional and advising policies and practices have begun to bear fruit, but there remains room to better understand the factors that lead to divergent student experiences and progress as well as the ways the University – through further policy and program development – can address inequities in student success.

Population Rationale

This study focused primarily on data from the Fall 2008 cohort of FTF (i.e., those who entered CSULB as FTF in the Fall of 2008). These students provided an ideal study population as the available data for their cohort spanned their entire undergraduate trajectories, from their

first semester to seven years following their postsecondary entry. As described in more detail in the sections to follow, I intended to reconstruct a longitudinal study by drawing on quantitative data that provided a picture of students' undergraduate pathways. To achieve this goal within the timeline available, this study relied on data already captured by the University and made available to me through my working partnership with CSULB. It should be noted that my access to CSULB data was facilitated by collaboration with CSULB's Associate Vice President of Undergraduate Studies, who aided in the transfer of unidentifiable student census and Cooperative Institutional Research Program (CIRP) Freshman Survey data to me. The Associate Vice President also oversaw the merging of these data for the statistical analyses performed in the study.

As this study sought to investigate the impact of students' college readiness – as cultivated in high school – on their postsecondary outcomes, I circumscribed the scope of my study population to FTF only. This way, I eliminated confounding influences that may arise from time spent at a community college or another four-year university.

Research Design & Analysis

For this study, a single dataset provided the basis for a purely quantitative analysis of the college readiness phenomenon. This dataset encompassed entry-level variables for the incoming cohort of 2008 FTF or "census" data provided by IRA; the CIRP Freshman Survey data for this incoming class; and variables around these students' postsecondary outcomes also provided by IRA (outlined in more detail below). The University merged these separate datasets utilizing student identification numbers; this way, I investigated entering freshmen's contexts, dispositions, and habits captured in the CIRP Freshman Survey in relation to their postsecondary

outcomes over a seven-year span of time. These data were categorized into college readiness domains, so I could determine the interrelationships between college readiness indicators and postsecondary outcomes. Through the combined use of these census and CIRP Freshman Survey data, I analyzed the degree to which each college readiness indicator cluster or domain predicted measurable student outcomes. Before articulating the details of the statistical analyses I performed in this study, I must first provide some background information about the CIRP Freshman Survey to contextualize its utility within the investigation of college readiness undertaken here.

CIRP Freshman Survey

Rather than construct my own instrument to measure indicators of college readiness among incoming FTF, I relied on the already established and widely used CIRP Freshman Survey, which CSULB administers annually to its incoming freshman cohorts. According to the University of California, Los Angeles, Higher Education Research Institute (HERI) – who administers the CIRP Freshman Survey nationally – 2015 marked this instrument's 50th administration ("CIRP Overview," 2015). This tool has been utilized over the past half-century by two-year colleges and four-year colleges and universities to gain insight into the composition and dispositions of the incoming freshman class. In a sense, nationwide results from this survey capture the evolution of the character of entering college freshmen, reflecting broader societal trends in America. At CSULB, the CIRP Freshman Survey provides a snapshot of the pre-college attributes, perspectives, and habits of freshmen. It is administered during the Summer Orientation Advising and Registration (SOAR) program, which transpires during the summer months before students' first semesters on campus. Given this unique position within students' high school to college

transition, prior research has employed the CIRP Freshman Survey in the investigation of the influence of college readiness variables on postsecondary outcomes (Cerna et al., 2009; DeAngelo et al., 2011; Espinosa, 2011; Hurtado et al., 2007; Hurtado et al., 2011).

This instrument encompasses individual questions or survey items that seek to measure the phenomena of interest (Sharkness, DeAngelo, & Pryor, 2010). When items capturing different facets of a specific disposition or behavior (e.g., student and faculty interaction) are combined, they can illuminate an underlying, latent trait or construct more accurately than can a single item individually (Sharkness et al., 2010). In the CIRP Construct Technical Report, Sharkness et al. (2010) articulated the process employed in developing the key constructs in the CIRP instrument. Utilizing primarily 2008 data, researchers pooled all survey items that were deemed relevant to the respective phenomena of interest and performed exploratory factor analysis to further evaluate the fitness of each item in measuring the constructs in question. Through subsequent stages of parameter estimation and scoring, a number of constructs emerged. The report's accompanying Appendix outlines in further detail these emergent constructs, which include measures of academic self-concept, habits of mind, and social agency, among others ("CIRP Construct Technical Report Appendix," 2009). For the purposes of this study, I relied on a number of CIRP constructs and individual survey items in my analysis of CSULB's data. While the CIRP instrument was not originally conceived as an assessment of college readiness, the student traits and behaviors it measures among incoming freshmen have been linked to postsecondary student outcomes in the literature. For this reason, it provided a readily available instrument for the exploration of college readiness.

The first step of my data analysis involved the categorization of CIRP Freshman Survey items into domains or constructs. To effectively utilize this instrument within the context of this study, I performed an in-depth review of the survey items contained within the 2008 CIRP Freshman Survey instrument (over 200 items in all). The meta-analytic study authored by Robbins et al. (2004) provided a particularly helpful taxonomy for my categorization of these items into global domains: achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills, and contextual influences (p. 266). This clustering of survey items within college readiness categories provided a starting point, from which I added other domains shown to be influential in students' college-going pathways: demographic characteristics, family background, high school context, and academic preparation. Due to the nature of the skills, dispositions, and behaviors measured in the CIRP Freshman Survey, I also modified categories to accommodate the available data. The conceptual model represented in Figure 3.3 below provides an overview of these categories and their relation to one another (see Appendix A for a complete list of all possible constructs and their respective survey items). It should be noted that I also cross-referenced clusters of survey items with the established CIRP constructs that had been developed through previous exploratory factor analysis (Sharkness et al., 2010). Where there was overlap, I replaced groupings of individual items with the corresponding constructs (the extant CIRP constructs are highlighted in red in Appendix A). In all, I strove to reduce or categorize the survey items in a way that enabled me to make meaning of the data through the college readiness lens. In a sense, Appendix A provides an exhaustive list of the variables that were considered in this study's analysis.

Structural Equation Modeling

Structural equation modeling (SEM) provided the statistical backbone for this study. In their overview of the strengths and uses of SEM, Raykov and Marcoulides (2006) explain that this statistical approach is well suited for the analysis of theoretical models containing multiple observed and latent variables, making explicit measurement error that often goes unexamined in traditional regression analysis. "Structural equation models can be utilized to represent knowledge or hypotheses about phenomena studied in substantive domains" (Raykov & Marcoulides, 2006, p. 6), which rendered this approach particularly appropriate to the study of a multi-variable phenomenon like college readiness. SEM involves the fitting of a proposed or theoretical model to a dataset and enables researchers to systematically study the interrelationships between variables for a more robust understanding of the phenomenon under investigation (Keith, 2015; Raykov & Marcoulides, 2006).

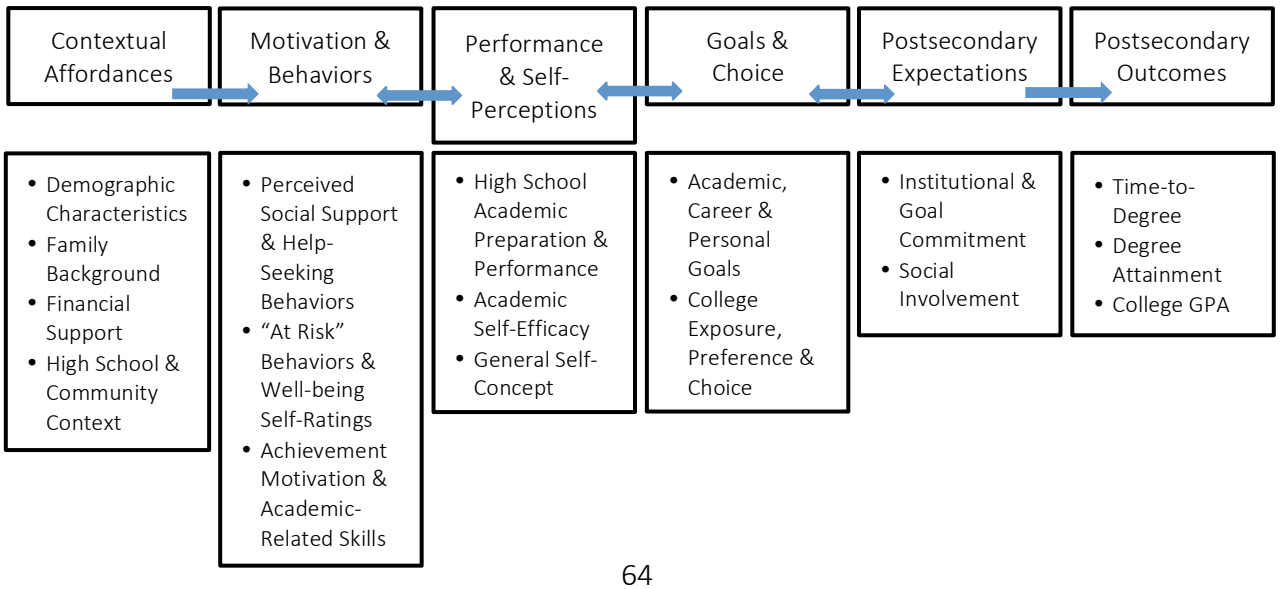
In my investigation of college access and success literature, I did not find a model that encompassed indicators of college readiness and their multi-directional connections with other predictor variables and with multiple postsecondary outcomes. However, the literature provided a number of frameworks and conceptual models that, together, meaningfully informed the specification of such a model (Cabrera & La Nasa, 2000; Chapman, 1981; Hossler & Gallagher, 1987; Lent et al., 1994; Tinto, 1975). Drawing from this literature and my available dataset, I proposed a preliminary conceptual model (Figure 3.3) below. As the literature in Chapter Two presents, measures of college success used in accountability legislation generally rely on students' successful – and often timely – degree completion. Measures of postsecondary success have also included "persistence, graduation/degree completion, time to degree, placement into

college credit courses, exemption from remediation courses, grades, grade-point average" (Camara, 2013, p. 17). The dataset provided by CSULB enabled the analysis of a number of these postsecondary outcome variables, including first-year grade point average (GPA), time-to-degree, and graduation.

In constructing the framework of interrelationships represented in Figure 3.3, I suggested that each college readiness indicator (or predictor variable) had the potential to influence the other predictor variables as well as the outcome variables. The arrows contained within the model represented these directions of influence. The two-way arrows suggested the possibility of reciprocal influence between constructs, while the one-way arrows suggested that the construct(s) preceding the arrow exert influence on the construct(s) to follow. Also, each construct in the diagram below (e.g., family background, high school academic performance and preparation, social involvement) coincided with the category – of the same name – included in Appendix A. To maintain clarity in the model, the survey items associated with each respective construct are listed in the Appendix.

Figure 3.3

Preliminary Conceptual Model: Indicators of College Readiness and Postsecondary Outcomes



The second step in my data analysis sought to narrow down the domains or constructs shown in this preliminary conceptual model to those that could be best measured and explored in this study. This paring down of my original model aimed, in a sense, to reach an equilibrium between somewhat conflicting parameters: incorporating as many domains shown in the literature to be salient to college readiness as possible, while also working within the constraints of the CIRP survey instrument itself and the limitations of the postsecondary outcome data I received from CSULB.

As detailed in Chapters Four and Five to follow, I adopted a two-step modeling approach recommended by Anderson and Gerbing (1988) by first exploring the properties of each measurement model or scale to assess their reliability in measuring their intended construct before estimating the entire structural model. Anderson and Gerbing (1988) explain, "there is much to gain in theory testing and the assessment of construct validity from separate estimation (and respecification) of the measurement model prior to the simultaneous estimation of the measurement and structural submodels" (p. 411). Then, through sequential stages of exploratory data analysis, I investigated the two-way correlations between variables and ruled out redundant predictor variables. In this stage, I looked for discriminant evidence, wherein variables intended to measure substantively different constructs were not so highly related as to call their validity into question (Crocker & Algina, 2008). In this way, I pared down the variables under consideration to those that were deemed to be most statistically relevant. Indeed, the viability of the models relied upon a judicious selection of variables. In the end, the pursuit of this balance resulted in models that both encapsulated a number of college readiness domains and could also be fitted to the available data. Among the predictor variables included in the

models were those that measured students' pre-college contextual affordances; academic preparation, aptitude, and self-efficacy; and performance expectations. Ultimately, my models represented this study's narrative, a means of describing and analyzing students' college-going pathways through a selection of variables that, together, told a piece of an arguably larger story. Furthermore, relying on these models, I examined the extent to which the relationships between indicators of college readiness and postsecondary outcomes varied across student groups (i.e., sex/gender, race/ethnicity, and major) (Lomax, 1983). This multiple-groups analysis allowed me to determine if college readiness takes shape in different ways depending on students' demographic characteristics or their chosen field of study.

Chapter Four: Exploratory Data Analysis

Each year, the Cooperative Institutional Research Program (CIRP) Freshman Survey captures data around many facets of students' contexts, dispositions, and habits as they enter California State University, Long Beach (CSULB), as first-time freshmen (FTF). By administrating this comprehensive survey to its incoming freshman cohorts during summer orientation, CSULB takes a snapshot of recently graduated high school seniors, who have not yet attended the University as enrolled students. Merging these survey responses with postsecondary outcome data (e.g., first-year grade point average, GPA; graduation; major changes; and time-to-degree) for the 2008 FTF cohort, I constructed a longitudinal sample to examine the extent to which long-term postsecondary outcomes could be predicted by variables measured at the time of students' transition into college. In doing so, I identified a number of predictors of students' postsecondary success that provide insight into the ways we might define and measure college readiness among incoming freshmen.

In the sections to follow, I describe each step of my model development. Beginning with the observed variables in the model, I briefly provide the descriptive statistics for these stand-alone covariates. Then, I explore the unobserved variables, evaluating the appropriateness of survey items for each latent variable through an examination of their descriptive statistics, their inter-item polychoric correlations, and their factor loadings within their respective measurement models. In Chapter Five, I continue this line of inquiry through a series of bivariate correlations and regressions between and among these observed and unobserved variables to demonstrate the significance and intuitiveness of their interrelationships. That is, in relation to one another, I sought to ascertain whether or not these variables behaved in expected ways, as understood

from prior literature and common sense. Finally, I conclude the following chapter with the comprehensive structural models for further analysis and fit testing. In addition to exploring the soundness of the "final" models against data for all students, I also compare the group-specific parameter estimates across student groups. The latter step allowed for a more nuanced investigation of college readiness across sex, race, and major. Through the building of my models, variable-by-variable, a narrative also takes shape – not only the narrative driving this study, but also the one that undergirds the students' college-going experience itself.

A Note on Methodology

The CIRP Freshman Survey provided nearly all of the predictor variables present in my models. CSULB has administered the CIRP survey to its incoming FTF cohorts for over 20 years. The FTF cohorts under investigation here are 2005, 2006, 2007, and 2008; these cohort years represented relatively current freshman classes, but also allowed an analysis of six-year outcome data not yet available for the most recent incoming freshmen. To develop my measurement models, I relied on the CIRP survey responses for the 2005 (N = 2353), 2006 (N = 5191), 2007 (N = 3011), and 2008 (N = 1793) cohorts. The difference in sample sizes between these cohorts could be explained, in part, by the CIRP response rate for each respective year, coupled with the number of students who permitted their student identification numbers to be available for future research. In all, between these four cohorts, the CIRP survey responses totaled 12,348.

Before selecting any predictor variable for inclusion in the models, I identified survey items that were administered across years and excluded those items (whether as stand-alone covariates or factors embedded within latent variables) with data missing for greater than 10% of the student respondents. Utilizing multiple cohorts in this way afforded me, firstly, the ability

to analyze student responses to the same survey items across years and, subsequently, to determine whether or not the survey questions produced reliably consistent or stable responses across different FTF student groups. Furthermore, in constructing the latent variables, I relied on one cohort (i.e., 2007 FTF) as an exploratory sample and on another (i.e., 2008 FTF) as a final confirmatory or cross-validation sample (Anderson & Gerbing, 1988). Moreover, CSULB data analysts merged the CIRP survey data for the 2008 FTF cohort with postsecondary outcome data for these same students, so these 2008 CIRP survey data were also employed in the fitting of the complete models as well as the comparison of group-specific parameter estimates across student groups.

A Note on Chronology & Variable Order

By design, the CIRP survey captured phenomena measured on a single day (i.e., the juncture in time when students were administered the survey at their freshman orientation during the summer). However, there are a number of survey items on the instrument that ask students to reflect on contexts, dispositions, or habits in the past; their present states of being or currently held beliefs; and their expectations for the future. Due to the chronology underpinning these questions, I posited a model that follows a temporal logic. That is, the latent variable representing students' exposure to counseling influences prior to deciding on their college choice "pre-dates" their current self-rating of their general self-concept. The presentation of variables below follows this chronological ordering where applicable and where it is conceptually justifiable. (I explore the ordering of variables in more detail when I present the full structural models in Chapter Five.)

Observed Variables

In the subsections to follow, I provide descriptive statistics for the observed variables included in my models. These observed variables (both independent and dependent) represent stand-alone factors, measured on categorical, ordinal, or ratio scales. It should be noted that the observed standardized test score variables (i.e., SAT Verbal and SAT Math) as well as all outcome variables were not derived from responses on the CIRP survey, but rather were provided by CSULB's Office of Institutional Research and Assessment (IRA).

Demographic Characteristics

While the demographic characteristics of the incoming freshmen, namely their sex (or gender) and race (or ethnicity), were not directly included in the model as covariates, they were utilized in my multiple-groups analysis. Fitting the structural models against these student characteristics allowed me to examine the interrelationships between predictor and outcome variables across student groups. Outlined below in Table 4.1 are the descriptive statistics for the sex and race variables measured on the CIRP survey. These data were derived from the administration of the CIRP survey to the 2005, 2006, 2007, and 2008 FTF cohorts at CSULB. The statistics reveal there were more female than male respondents each year, reflecting the overall gender breakdown of the University, which historically enrolls more female than male students ("11-Year Enrollment Trend Report," 2015). Additionally, the trend in the racial composition of respondents towards a decrease among White/Caucasian students and an increase among Mexican American/Chicano students also mirrors the University's larger shift towards enrolling more students of Hispanic backgrounds, as described in more detail in the preceding chapter ("11-Year Enrollment Trend Report," 2015).

Table 4.1
CIRP Freshman Survey Descriptive Statistics (Sex and Race)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
SEX (*Your sex*)				
Male (%)	36.8	37.8	36.7	34.2
Female (%)	62.8	61.9	63.0	65.1
Missing (%)	0.4	0.3	0.4	0.7
RACE (*Are you - Mark all that apply*)				
White/Caucasian (%)	52.0	42.7	37.6	40.8
African American/Black (%)	4.5	5.3	6.8	5.5
American Indian/Alaska Native (%)	3.3	2.2	2.1	2.2
Asian American/Asian (%)	19.5	21.2	24.4	21.8
Native Hawaiian/Pacific Islander (%)	5.7	5.0	6.8	5.6
Mexican American/Chicano (%)	20.2	22.2	23.7	27.3
Puerto Rican (%)	1.0	0.9	1.0	0.8
Other Latino (%)	8.2	7.8	8.7	7.5
Other Race/Ethnicity (%)	6.0	7.6	6.1	5.2
Missing (%)	0	0	0	0.2

Financial Concern

I also included in the model an observed variable that measured students' level of financial concern, which afforded additional dimension to other measures of students' financial capital included in the model (namely the socioeconomic status, SES, latent variable discussed in the following 'Unobserved Variables' section). This variable gauged students' perceptions of their own level of concern with respect to covering the cost of college. This perceived level of concern might impact students' performance in college in unique ways beyond parents' estimated income and education, indicators that constitute the SES latent variable. As reflected by the descriptive statistics shown in Table 4.2, nearly 70% of respondents within each cohort indicated that they had *some* to *major* concern about the sufficiency of their funds. Interestingly, students within the Fall 2008 cohort, who entered the University during the onset of the economic recession, did not exhibit higher rates of concern in comparison to their earlier cohort

counterparts. On the contrary, there was a marked decrease in the percentage of respondents who indicated *major* financial concern between the 2005 and 2008 FTF cohorts, dropping nearly six percentage points.

Table 4.2
CIRP Freshman Survey Descriptive Statistics (Financial Concern)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
FINCON (*Do you have any concern about your ability to finance your college education?*)				
1 = None - I am confident that I will have sufficient funds (%)	30.0	31.6	34.2	31.4
2 = Some - but I probably will have enough funds (%)	52.6	53.8	55.5	56.7
3 = Major - not sure I will have enough funds to complete college (%)	16.1	13.4	9.1	10.4
Missing (%)	1.3	1.2	1.2	1.5
Mean	1.86	1.82	1.75	1.79
SD	0.67	0.65	0.61	0.62

Prior Academic Achievement – High School GPA

Variables that measured students' prior academic achievement and standardized test performance accounted for academic preparedness factors that have been tied to students' postsecondary success in the literature ("Beyond College Eligibility," 2014). By controlling for these variables, I more effectively analyzed the influence of other predictors of postsecondary success that may comprise students' college readiness beyond these widely utilized academic attainment and performance metrics. Below in Table 4.3, I have outlined the descriptive statistics for students' self-reported average grade in high school for all four FTF cohorts. This GPA functioned as a stand-alone observed variable in the models. A comparison of means between cohorts suggests a trend towards slightly higher GPAs among entering freshmen, although all cohorts reported an average earned grade of *B* to *B+* in high school. Of note, over

92% of respondents within the Fall 2008 cohort reported having earned an average grade of *B* or higher in high school, suggesting a level of academic preparedness shared among a significant majority of this freshman class.

Table 4.3
CIRP Freshman Survey Descriptive Statistics (High School GPA)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
HSGPA (*What was your average grade in high school?*)				
1 = D (%)	0.3	0.1	0.1	0.0
2 = C (%)	3.2	3.1	1.5	0.3
3 = C+ (%)	4.8	5.9	1.8	1.8
4 = B- (%)	9.2	9.0	9.2	5.0
5 = B (%)	29.4	29.8	22.1	27.9
6 = B+ (%)	24.7	23.9	35.4	31.0
7 = A- (%)	16.1	17.3	16.3	20.8
8 = A or A+ (%)	11.1	9.6	12.5	12.4
Missing (%)	1.1	1.2	1.1	0.7
Mean	5.62	5.57	5.89	6.01
SD	1.47	1.46	1.30	1.19

Standardized Test Performance – SAT Verbal & SAT Math

For the standardized test performance variable, I did not rely on self-reported scores provided by the students on the CIRP survey, as these scores were missing over 50% of their observations across all cohorts. Instead, I utilized SAT Verbal, SAT Math, and SAT Composite scores provided by CSULB's IRA office. These scores were made available for only the Fall 2008 FTF cohort. Therefore, Table 4.4 below outlines the descriptive statistics for these SAT variables in the Fall 2008 dataset only. The cutoff points listed in the table for each variable represent the scores that exempted students from taking the placement exams to determine their English and math course-taking level at CSULB. For example, students who entered the University with a score of 500 or greater on the SAT Verbal were not required to take the English Placement Test

(EPT) and were, instead, allowed to enroll directly in credit-bearing General Education English coursework. The cutoff for the SAT Composite score represents those students who were exempt from taking both the EPT and Entry Level Math (ELM) placement tests.

Rather than create a latent variable utilizing two measured variables (i.e., SAT Verbal and SAT Math) or relying on the SAT Composite score, I included in my models both the SAT Verbal and SAT Math scores as stand-alone covariates. To the degree these scores represent students' level of competency or mastery in these domains (i.e., verbal and mathematical), I was able to distinguish between their respective influences on students' postsecondary outcomes. Maintaining separateness between these two variables also allowed for a more nuanced comparison of the path coefficients between these scores and students' long-term outcomes across majors (e.g., SAT Math scores may be more salient in predicting successful graduation among science, technology, engineering, and math, STEM, majors than non-STEM majors).

An examination of Table 4.4 shows that while the mean score on the SAT Verbal was comparatively lower than the mean score on SAT Math (both were measured on a 800-point scale), the percentage of students who met or surpassed the cutoff for entry directly into credit-bearing General Education coursework was lower for math entry than English entry: 40.4% compared to 52.3%, respectively. This can be attributed, at least in part, to the University's designated cutoff points (i.e., eligibility to enter into credit-bearing General Education math required a higher score on the SAT Math test). In all, one can conclude that fewer students within the Fall 2008 FTF cohort were designated "math ready" than were designated "English ready" as determined by the University's set cutoff points.

Table 4.4
Fall 2008 FTF Cohort Institutional Research and Assessment Statistics (SAT Verbal, SAT Math, and SAT Composite Scores)

	SATV N=1793	SATM N=1793	SATCOMP N=1793
Range	220,800	230,780	500,1500
≤ 499 (%)	44.5		
≥ 500 (%)	52.3		
≤ 549 (%)		56.3	
≥ 550 (%)		40.4	
≤ 1049 (%)			52.3
≥ 1050 (%)			44.5
Missing (%)	3.3	3.2	3.3
Mean	504.26	524.78	1029.07
SD	83.13	86.73	151.16

Expectation of Future Academic Performance

The final observed predictor variable included in the model measured students' anticipated academic performance at the University. Unlike any other variable in the model, this covariate represented students' future orientation, capturing their anticipation of the likelihood of an act transpiring in the unforeseen years to come. As Lent et al. (1994) explain, "constructivist theories emphasize cognitive feedforward (as opposed to feedback-only) mechanisms, highlighting the importance of anticipation, forethought, and active construction of meaning in interaction with environmental events" (p. 87). In this way, students' performance expectations exiting high school may be seen as both the by-product of past academic experiences in the K-12 segment as well as the catalyst for future interaction with the academic rigors of college. Table 4.5 below shows that the majority of freshman respondents (nearly 60% or greater across all four cohorts) felt they stood a *very good chance* of making at least a "B" average during their tenure at the University. A comparatively stable mean of 3.6 (to errors of

rounding) over this four-year period suggests these freshman cohorts shared a high confidence level with respect to their anticipated academic performance in college.

Table 4.5
CIRP Freshman Survey Descriptive Statistics (Performance Expectation)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
FUTACT08 (*Make at least a 'B' average*)				
1 = No chance (%)	0.4	0.7	0.3	0.3
2 = Very little chance (%)	2.4	3.1	2.6	2.1
3 = Some chance (%)	32.0	33.2	36.1	32.3
4 = Very good chance (%)	64.4	59.4	58.0	60.2
Missing (%)	0.8	3.6	2.9	5.0
Mean	3.62	3.57	3.56	3.61
SD	0.55	0.59	0.57	0.55

Intermediary Outcome: First-Year Grade Point Average

CSULB's IRA office provided outcome variables for the Fall 2008 FTF cohort only. These outcome variables were provided for the same students for whom CIRP Freshman Survey data were available (N = 1793), not for the entire Fall 2008 FTF cohort. Among these variables were three that measured intermediary outcomes (i.e., outcomes measured after the time of students' college entry in Fall 2008 but prior to their expected culmination four to six years later). The first of these intermediary outcomes was students' cumulative GPA measured at the close of their third semester (i.e., Fall 2009). I labeled this variable First-Year GPA to represent students' academic performance following their first year at the University. (Technically, for those students enrolled all three terms, this GPA variable demonstrated their academic performance over the first year and a half, but I did not feel this delineation was conceptually meaningful to warrant a change in the variable label.) This variable lent insight into students' academic transition from high school into college, suggesting that those who failed their classes

experienced a measurably less successful academic transition than their peers who excelled in their coursework. Furthermore, research suggests that students' first-year college successes predict their likelihood of continued retention and eventual graduation (Arbona & Nora, 2007). This intermediary outcome, therefore, also served as a predictor variable of the long-term postsecondary outcomes in the models.

A review of Table 4.6 below reveals that 10.4% of the Fall 2008 FTF survey respondents later fell below the University's cutoff point for determining academic "good standing" (i.e., a minimum cumulative GPA of 2.0). Another 13.6% of the class landed within the bottom quartile of the 2.0 to 4.0 scale and would have, therefore, been considered at risk of eventual academic probation or dismissal if they had continued on a similar trajectory. On the other end of the scale, a full 50.8% of the cohort respondents earned a cumulative GPA of 3.0 over their first three semesters at the University.

Table 4.6
Fall 2008 FTF Cohort Institutional Research and Assessment Statistics (Fall 2009 Cumulative GPA)

	End of Fall 2009 N=1793	
	N	%
≤ 1.99	186	10.4
2.00 to 2.49	244	13.6
2.50 to 2.99	416	23.2
3.00 to 3.49	540	30.1
≥ 3.50	372	20.7
Missing	35	2.0
Mean	2.88	2.88
SD	0.74	0.74

Intermediary Outcome: First-Year Units

While the variable above represented a cumulative statistic, taking three semesters of performance into account, this variable measured the number of units earned by the Fall 2008 FTF during the Fall 2009 term only. The University considers 12 units to be a full load. It bears noting that the University awards units for a grade of "D." In some cases, as with most General Education coursework, a "D" grade can meet students' degree requirements. However, many departments require students earn a minimum of "C" or better to fulfill their major-specific requirements. With this in mind, units earned cannot be interpreted as the successful fulfillment of all requirements attempted; rather, units earned can be employed to gauge courses that were not failed (students are awarded zero units for 'F' grades). Table 4.7 below demonstrates that 76.7% of survey respondents within the 2008 cohort earned a full load's worth of units during their third term at CSULB; that is, they passed with a grade of "D" or higher at least 12 units of coursework. Conversely, those students who earned zero units – 10.7% of the cohort – could have failed all their coursework, requested to be placed on academic leave, or withdrawn from the University.

Table 4.7
Fall 2008 FTF Cohort Institutional Research and Assessment Statistics (Fall 2009 Earned Units)

	End of Fall 2009 N=1793	
	N	%
0	191	10.7
1 to 6	27	1.5
7 to 11	165	9.2
≥ 12	1376	76.7
Missing	34	1.9
Mean	11.88	11.88
SD	4.73	4.73

Intermediary Outcome: Retention

This retention variable indicated the students' status at the close of each respective Fall term. For example, three semesters into their undergraduate careers at CSULB, 87.3% of 2008 FTF survey respondents were still enrolled at the close of the Fall 2009 term. Similarly, five years following their entering term, the University had retained 16% of these native students. Unlike the missing percentages for other variables, these missing percentages do not reflect missing data per se; rather, these percentages take into account students who had departed the University, whether through graduation, withdrawal, or dismissal. That is, by the end of Fall 2013, almost 50% of the Fall 2008 CIRP survey respondents had left the University as graduates, voluntary withdrawals, or forced disqualifications. It should be noted that the statuses of those students who departed the University during a Winter, Spring, or Summer term were "logged" at the close of the following Fall semester in the table below. For example, the 30.9% of the cohort respondents who graduated in Fall 2013 (per the table below) could have technically graduated at any juncture following the close of the preceding Fall 2012 term (i.e., Winter 2013, Spring 2013, Summer 2013, or Fall 2013).

Table 4.8
Fall 2008 FTF Cohort Institutional Research and Assessment Statistics (Fall 2009 through Fall 2013 Year-to-Year Retention)

	Fall 2009 N=1793	Fall 2010 N=1793	Fall 2011 N=1793	Fall 2012 N=1793	Fall 2013 N=1793
1 = enrolled (%)	87.3	82.9	78.0	49.0	16.0
2 = withdrawn (%)	5.4	4.9	4.1	2.7	1.9
3 = dismissed (%)	2.3	1.6	1.1	0.8	0.8
4 = graduated (%)	0.0	0.0	1.1	26.4	30.9
5 = active but not enrolled (%)	4.6	3.0	2.2	2.1	1.3
6 = other (%)	0.0	0.1	0.0	0.0	0.2
Missing (%)	0.4	7.5	13.4	19.0	49.0

Final Outcome: Graduation

In addition to these intermediary outcome variables, CSULB's IRA office also made available two "final" or culminating outcome variables for the Fall 2008 FTF cohort: graduation term and primary major at the time of graduation. Utilizing these two data points, I calculated a number of related outcome variables to flesh out my understanding of students' pathways to their degree.

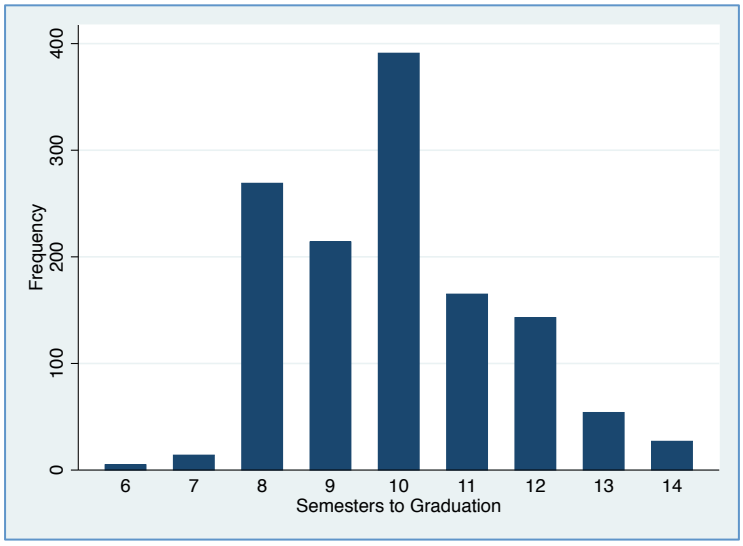
Firstly, the graduation variable used in this model was a dichotomous – *Yes* or *No* – variable. While the preceding data around retention offered a trajectory of students' persistence over time, this final graduation variable functioned as a definitive success metric in response to a fundamental question: did the student ultimately graduate from the institution within seven years? The data for this variable show that among the original 1793 CIRP freshman respondents, 1282 graduated from CSULB by Summer 2015; 508 did not graduate from CSULB; and three were missing graduation data. In sum, a full 71.5% of this sample from the Fall 2008 FTF cohort graduated from the University within seven years of their entry, and 28.3% did not graduate from the University. Unfortunately, there were no data made available that differentiated between those students who left CSULB to successfully graduate with their bachelor's degree at another four-year institution versus those who departed the University and either completed some additional college coursework towards an alternative credential or completed no additional college. Furthermore, the gap in data between the retention statistics provided by the University shown above (which end at Fall 2013) and the graduation data (which extend through Summer 2015) made creating a single variable with all the nuanced statuses (i.e., enrolled, withdrawn, dismissed, graduated, etc.) impossible.

Secondly, in comparing students' graduation term to their incoming semester (i.e., Fall 2008), I generated a new variable, titled Semesters to Graduation, that allowed for an analysis of the number of semesters needed for each graduating student to attain his or her bachelor's degree at CSULB. It should be noted that CSULB operates on a two-semester calendar – Fall and Spring – with two "auxiliary" sessions in Winter and Summer that are shorter in duration and do not require enrollment by students to maintain their active status. Therefore, in my calculation of this variable, I collapsed those students whose degrees were processed during a Winter session into the preceding Fall semester (i.e., Winter 2014 graduates were recoded as Fall 2013 graduates). Similarly, those who were awarded their degrees during a Summer session were included among the graduates of the preceding Spring semester (i.e., Summer 2014 graduates were recoded as Spring 2014 graduates). This re-categorization of the data allowed for a clearer representation of students' time to degree (in semesters) without forfeiting accuracy.

As the bar graph in Figure 4.1 below demonstrates, these data follow a bimodal distribution with the majority of students taking either eight or 10 semesters to graduate and comparatively fewer students graduating earlier or later than this threshold of four to five academic years. In terms of percentages, 39.2% of students graduated within four and a half years or fewer; 30.5% graduated in five years; and the remaining 30.3% took longer than five years to attain their degrees.

Figure 4.1

Fall 2008 FTF Cohort Institutional Research and Assessment Statistics (Semesters to Graduation)



Final Outcome: Major Trajectories – Non-STEM & STEM

Like the graduation variable, CSULB's IRA office provided the students' primary major at graduation and, by comparing this major against the students' probable field of study indicated on the CIRP survey, I determined whether and in what manner each student had changed his or her major. Firstly, however, I analyzed the CIRP survey statistics across the 2005, 2006, 2007, and 2008 cohorts to gain an understanding of the trend in students' intentions to pursue certain fields of study across FTF years. Table 4.9 below demonstrates an increased interest in select STEM fields (e.g., biological science, engineering, and the health professions) and an accompanying decrease in interest in select Non-STEM fields (e.g., education, English, history or political science, the fine arts, and the social sciences). It should be noted that the statistics below represent aggregated information, not the full scope of major options available on the CIRP instrument; these aggregated statistics were provided to CSULB by the Higher Education

Research Institute (HERI) team at UCLA. Below, I explain the process I undertook in categorizing the complete range of major choices on the CIRP survey into STEM and Non-STEM domains.

Table 4.9
CIRP Freshman Survey Descriptive Statistics (Student's Major Aggregated)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
MAJORA (*Your probable field of study)*				
1 = Agriculture (%)	0.0	0.0	0.0	0.1
2 = Biological Science (%)	6.8	5.3	8.2	9.6
3 = Business (%)	16.7	16.6	14.7	14.7
4 = Education (%)	8.7	7.8	6.2	4.9
5 = Engineering (%)	4.6	6.8	10.0	8.1
6 = English (%)	2.8	2.6	1.6	1.3
7 = Health Professional (%)	9.3	9.3	13.7	13.5
8 = History or Political Science (%)	3.9	3.6	3.1	2.9
9 = Humanities (%)	4.9	4.5	4.2	4.7
10 = Fine Arts (%)	9.5	8.3	7.1	7.4
11 = Mathematics or Statistics (%)	1.0	0.6	1.2	0.9
12 = Physical Science (%)	1.2	1.0	1.2	1.3
13 = Social Science (%)	11.3	10.6	7.7	8.3
14 = Other Technical (%)	1.5	1.8	1.6	1.6
15 = Other Non-Technical (%)	12.4	13.3	11.0	10.4
16 = Undecided (%)	2.8	3.9	4.9	5.6
Missing (%)	2.4	4.2	3.6	4.8

Relying on the values assigned to each major on the CIRP instrument (for the non-aggregated MAJOR survey item), I recoded students' degrees at the time of graduation to align with these CIRP survey categories to enable a more precise comparison between students' self-identified intended field of study as freshmen and the field of study of their earned degree. See Appendix B for a complete list of these CIRP instrument codes and their associated CSULB degree plans. Where needed, I collapsed or removed categories that did not have an associated CSULB degree track to attain the most accurate alignment possible. Next, I created two aggregated major categories: Non-STEM and STEM. The Non-STEM aggregated code was assigned to majors

within the following fields: education, fine arts, humanities, social sciences, and non science-based health professions (e.g., social work). Conversely, the STEM aggregated code was assigned to majors within the following fields: business, engineering, natural sciences/mathematics, and science-based health professions (e.g., medicine, dentistry, and kinesiology). By creating two new variables – aggregated major at the time of entry and graduation – I could make meaning of students' major change trajectories within and between Non-STEM and STEM fields. The data in Table 4.10 below reveal that while 53.1% of CIRP freshman respondents who answered the MAJOR survey item indicated their intention to purse a STEM major, only 38.8% of the total graduates obtained a degree within a STEM field. In terms of raw frequencies, the comparison represents 907 aspiring STEM freshmen versus 497 successful STEM graduates.

Table 4.10
Fall 2008 FTF Cohort CIRP Freshman Survey Descriptive Statistics & Institutional Research and Assessment Statistics (Majors)

	Non-STEM	STEM	Undecided	Total
Incoming Freshmen (per CIRP) (N)	668	907	132	1707
Percent of Total Respondents (%)	39.1	53.1	7.7	100.0
Graduating Seniors (per CSULB IRA) (N)	785	497		1282
Percent of Total Graduates (%)	61.2	38.8		100.0

And lastly, relying on these two newly created variables, I generated a third variable that categorized students' major trajectories between their entering year and graduation within 14 semesters of entry (i.e., by Spring 2015). For example, this variable differentiated between those students who entered the University intending to pursue a Non-STEM field and graduated with a Non-STEM degree; those who changed between Non-STEM and STEM fields; those who maintained a STEM pathway during their University tenure; and the eventual trajectories of originally undecided students. In the model, this outcome variable allowed for an analysis of the

impact of the predictor variables on students' graduation within seven years in their original field of study. Those students who changed fields of study undertook a significant departure from their originally conceived plans and, in some cases, their expectations. The data shown in Table 4.11 below demonstrate, for example, that 12.8% of survey respondents changed their majors from a STEM to a Non-STEM field in comparison to only 2.9% who achieved the reverse. These data do not include the 564 "missing" students for whom major/degree data were not provided on the CIRP survey and/or at the time of graduation (due to departure from the University).

Table 4.11
Fall 2008 FTF Cohort CIRP Freshman Survey Descriptive Statistics & Institutional Research and Assessment Statistics (Major Changes)

Initial Major (per CIRP)	Graduated w/in Non-STEM N (%)	Graduated w/in STEM N (%)	Unknown N (%)	Total N (%)
Non-STEM	453 (25.3%)	52 (2.9%)	163 (9.1%)	668 (37.3%)
STEM	229 (12.8%)	394 (22.0%)	284 (15.8%)	907 (50.6%)
Undecided	73 (4.1%)	28 (1.6%)	31 (1.7%)	132 (7.4%)
Unknown	30 (1.7%)	23 (1.3%)	33 (1.8%)	86 (4.8%)
Total	785 (43.8%)	497 (27.7%)	511 (28.5%)	1793 (100.0%)

Unobserved Variables

In the subsections to follow, I provide descriptive statistics, polychoric correlations, and confirmatory factor analyses (CFAs) for the unobserved variables included in my models. As nearly all the survey items regressed in the measurement models here utilized ordinal scales, polychoric correlations provided more accurate appraisals of inter-item correlations than would Pearson correlations. However, while I display the polychoric correlation matrices for all latent variables, the estimation procedure I employed in conducting the CFAs treated all indicators as continuous. Conceptually, the model's unobserved variables (all independent predictors) represented latent constructs. Two or more manifest variables or factors were regressed onto

each latent construct. Like their name suggests, these latent variables underlie or influenced responses to their respective CIRP survey items.

Of note, I specified these latent variables – along with all model components presented and analyzed within this and subsequent chapters – by utilizing the Structural Equation Modeling (SEM) Builder functionality available in the data analysis software package Stata IC (Acock, 2013). This SEM Builder functionality allowed me to perform CFA and path analysis for all the measurement and structural models included here and to display these models in graphical form. This SEM Builder functionality relies on commonly used graphical notations characteristic of SEM: circles or ovals designate latent variables; squares or rectangles designate observed variables; single-headed arrows represent unidirectional paths; double-headed, curved arrows represent correlations between variables; and small circles pointing into latent variables indicate disturbance or error terms (Raykov & Marcoulides, 2006, p. 9). In the measurement and structural figures to follow, the path coefficients or factor loadings appear beside each uni- or multi-directional line; the variances and/or means of each variable are nested within their respective shapes (whether latent or observed); and the error coefficients appear directly adjacent to their respective error terms. And lastly, unless otherwise stated, maximum likelihood was employed in developing each measurement model, which relied on listwise deletion to estimate the latent variable in question.

Contextual Affordances

The first set of latent variables included in the model can be considered background characteristics, or contextual affordances as termed by Lent et al. (1994) in their Social Cognitive Career Theory (SCCT) model. These variables are often cited in the literature as sources of social

and economic capital, representing degrees of access students have to community, school, family, and financial resources that orient and prepare them for college going (Cerna et al., 2009; Dika & Singh, 2002; Fallon, 1997; Holland et al., 2007; Smith, 2009; Stanton-Salazar, 2011; Welton & Martinez, 2014). Given the fact that these variables can be embedded within contexts of privilege and disadvantage, they are often correlated, while also exerting their unique, independent influence on other predictor and outcome variables. I explore this concept further when discussing the theoretical underpinnings of the structural model.

Community and school context. While the CIRP survey includes very few items measuring students' community and high school contexts, it does contain two questions that ask students to rate the degree of "whiteness" of the high school they last attended as well as the neighborhood in which they grew up. I chose to incorporate these two survey items into a single Context latent variable in my model to lend insight into the degree of ethnic diversity to which students were exposed both at school and in their surrounding community prior to their attendance at CSULB. Particularly for African American/Black students coming to CSULB from mostly or completely non-White schools and communities, transitioning to a large university campus that serves a proportionally low number of Black students in relation to White students may impact their sense of belonging on campus. Furthermore, students' high school contexts have been linked to college enrollment decision-making and K-12 to higher education transitional experiences (Engberg & Wolniak, 2010; Hill, 2008; Martinez & Deil-Amen, 2015; Roderick et al., 2011).

These questions were not present in the 2005 CIRP survey, but they were included in the 2006, 2007, and 2008 instruments. See below in Table 4.12 the descriptive statistics for these

two survey items among the 2006, 2007, and 2008 FTF cohorts at CSULB. As the means across years for both survey items suggest, student respondents tended to originate from high school and community contexts that were *roughly half non-White* or *mostly/completely non-White*. For example, for the most recent 2008 cohort, students who attended either *mostly* or *completely White* high schools constituted less than 25% of the incoming freshman survey respondents. Those students originating from *mostly* or *completely White* neighborhoods were similarly few: less than 35% of survey respondents.

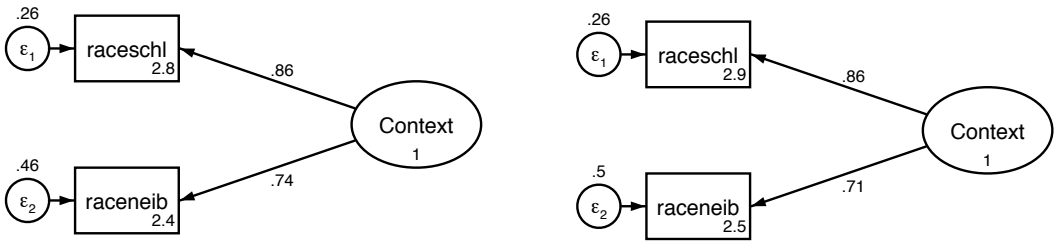
Table 4.12
CIRP Freshman Survey Descriptive Statistics (Race of School and Neighborhood)

	2006 N=5191	2007 N=3011	2008 N=1793
RACESCHL (*High school I last attended*)			
1 = Completely non-White (%)	8.6	10.5	8.6
2 = Mostly non-White (%)	28.2	32.7	32.4
3 = Roughly half non-White (%)	30.4	31.0	33.4
4 = Mostly White (%)	28.2	23.0	22.6
5 = Completely White (%)	2.7	1.6	1.6
Missing (%)	1.8	1.1	1.4
Mean	2.88	2.72	2.76
SD	1.01	0.99	0.96
RACENEIB (*Neighborhood where I grew up*)			
1 = Completely non-White (%)	13.0	14.7	14.3
2 = Mostly non-White (%)	23.6	26.3	25.2
3 = Roughly half non-White (%)	19.3	21.0	20.7
4 = Mostly White (%)	32.3	28.4	30.1
5 = Completely White (%)	5.5	4.3	4.4
Missing (%)	6.3	5.3	5.4
Mean	2.93	2.80	2.84
SD	1.18	1.16	1.16

Utilizing these two survey items, I created a latent variable Context for inclusion in my models. While an argument could be made for the conceptual distinctiveness between high school and neighborhood contexts, the strong bivariate polychoric correlations between these

two items across years suggests these variables are highly positively related: ρ = 0.71 for the 2006 cohort (N = 4849); ρ = 0.70 for the 2007 cohort (N = 2845); ρ = 0.68 for the 2008 cohort (N = 1691). Thus, the ethnic composition of school environments and their broader community ecosystems often mirror one another and may, therefore, exert a joint influence on students' college-going experiences. Below are the factor loadings displayed in graphical format of this latent variable estimated with data from the exploratory sample (i.e., 2007 FTF) and the confirmatory or cross-validation sample (i.e., 2008 FTF). Due to the under-identified nature of a two-factor measurement model (wherein one correlation is available to estimate two unknown parameters), I set the path coefficients equal to "a" to estimate the model. As seen below, all factor loadings exceed 0.70 in both the 2007 (N = 2845) and 2008 (N = 1691) cohorts, and all standardized path coefficients were significant at the $p < 0.001$ level.

Figure 4.2
Context Latent Variable from 2007 and 2008 CIRP Freshman Survey Responses



Unlike for a number of latent variables to follow, I did not run "goodness of fit" post-estimation tests against this Context latent variable, as the model is saturated.

Counseling Influences. As explored in greater detail in Chapter Two, the availability and robustness of college-going counseling resources in high school have been linked to students' pursuit of a postsecondary degree and an increased likelihood of their attending a four-year

university (i.e., college access) (Bell et al., 2009; Corwin et al., 2004; Hossler & Maple, 1993; Perna et al., 2008; Plank & Jordan, 2001; Tierney, 2009; Venegas, 2006). Furthermore, research suggests access to private college counseling can afford privileged populations an added advantage in the college admissions marketplace (Liu, 2011; McDonough et al., 1997; McDonough, 1994; Park & Eagan, 2011). However, relatively less research has demonstrated a relationship between students' counseling resources in high school and their ultimate postsecondary outcomes (i.e., college success). To address this gap in the literature, I explored a Counseling latent variable as a candidate for inclusion in my models. The CIRP instrument utilized in this study included a battery of questions that asked students to identify the importance level of a number of reasons behind their decision to attend the University. The ordinal scale of these questions allowed students to select one of three options: *not important*, *somewhat important*, or *very important*. While these questions did not directly measure students' access to school- or private-based counseling resources per se, they implied a level of access. That is, if a student were to identify private college counseling as *very important* in her decision to attend CSULB, then one may justifiably assume that this student enjoyed such access. The limitation of this proxy measure, however, arises with respect to those students who indicate *not important*, as this response could be interpreted in at least two ways: the student did not have access to the counseling resource in question or she had access, but did not deem it important in her decision-making process. Despite this limitation, I included the Counseling latent variable here to account, at least in part, for a degree of access to such influences during students' pre-college years.

Contained in Table 4.13 below are the descriptive statistics for the four survey items used in estimating this latent variable. It should be noted that I excluded other influences on

students' decision to attend CSULB (e.g., parents and relatives) to narrow the scope to those "institutional" counseling influences that fall beyond a student's immediate family. As such, this latent variable should be viewed as an extension of the students' community and school context. The data here suggest that school-based resources, such as teacher and high school counselor advice, were more important to students in their decision to attend the University than were either private college counselors or participation in an early action/decision program (to which students are often exposed through privately-acquired counseling channels). For instance, among FTF in the 2008 sample, over 40% of respondents cited teacher and high school counselor advice as either *somewhat important* or *very important*, compared to less than 15% for the other two counseling influences. However, in none of the four cohorts were any of the school- or private-based counseling resources deemed *very important* for more than 12% of the survey respondents.

Table 4.13
CIRP Freshman Survey Descriptive Statistics (Counseling Influences)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
CHOOSE03 (*My teacher advised me*)				
1 = Not important (%)	64.4	59.9	52.4	51.3
2 = Somewhat important (%)	27.3	28.5	35.5	35.5
3 = Very important (%)	6.7	7.7	8.4	8.4
Missing (%)	1.6	4.0	3.7	4.9
Mean	1.41	1.46	1.54	1.55
SD	0.62	0.64	0.65	0.65
CHOOSE08 (*High school counselor advised me*)				
1 = Not important (%)	73.7	67.4	54.7	52.8
2 = Somewhat important (%)	18.9	21.0	30.0	30.7
3 = Very important (%)	5.3	6.9	11.4	11.8
Missing (%)	2.1	4.7	3.9	4.7
Mean	1.30	1.37	1.55	1.57
SD	0.57	0.61	0.70	0.70

Table 4.13
CIRP Freshman Survey Descriptive Statistics (Counseling Influences)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
CHOOSE09 (*Private college counselor advised me*)				
1 = Not important (%)	83.5	79.7	79.9	80.1
2 = Somewhat important (%)	10.5	11.4	12.2	12.2
3 = Very important (%)	3.5	3.5	3.4	2.1
Missing (%)	2.5	5.3	4.6	5.6
Mean	1.18	1.20	1.20	1.17
SD	0.47	0.48	0.48	0.43
CHOOSE19 (*I was admitted through an early action or early decision program*)				
1 = Not important (%)	87.9	83.2	81.0	82.8
2 = Somewhat important (%)	8.3	8.3	11.3	8.5
3 = Very important (%)	1.5	2.9	2.5	2.7
Missing (%)	2.3	5.6	5.2	6.1
Mean	1.12	1.15	1.17	1.15
SD	0.36	0.43	0.44	0.43

Below are the polychoric correlations among these four variables for the 2007 FTF exploratory sample (N = 2816) and the 2008 FTF confirmatory sample (N = 1670). In this matrix (and in all other polychoric matrices included in this chapter), the correlations highlighted in green indicate those relationships with $\rho > 0.4$; yellow cells indicate correlations between 0.30 and 0.39; and red cells designate correlations less than or equal to 0.29. As the correlations within both tables demonstrate, there were relatively strong relationships between the variables measuring the importance of advice provided by teachers, high school counselors, and private college counselors, suggesting that those who found one source of input *very important* also found the other two sources similarly important. Interestingly, within both cohorts, the measure of importance of early action/decision programs appeared to be less related to school-based counseling resources (i.e., teacher and high school counselor input) than to private college

counseling resources. This pattern of inter-item correlation was particularly prominent within the Fall 2008 cohort dataset.

Table 4.14
Polychoric Correlation Matrix (2007 FTF Cohort Counseling Influences)

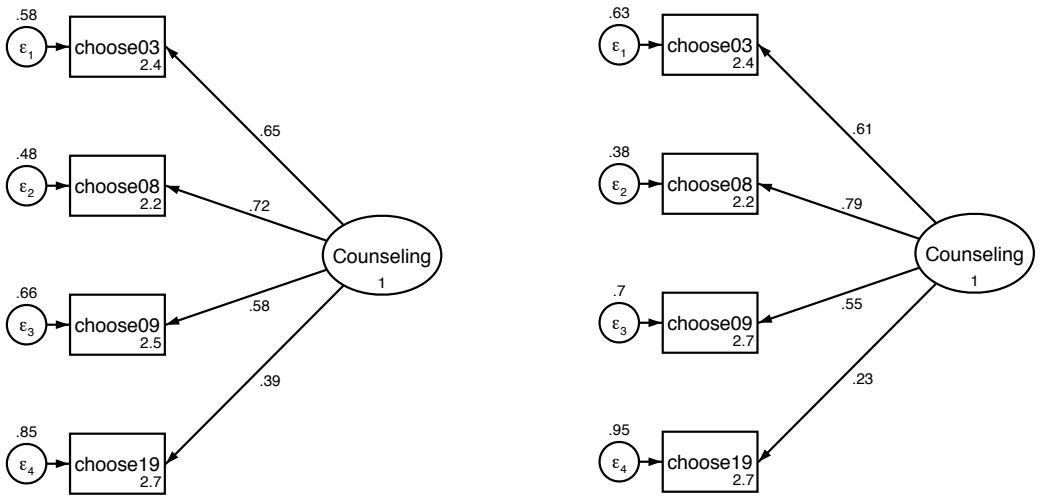
	CH03	CH08	CH09	CH19
CH03	1.000			
CH08	0.633	1.000		
CH09	0.558	0.634	1.000	
CH19	0.359	0.407	0.571	1.000

Table 4.15
Polychoric Correlation Matrix (2008 FTF Cohort Counseling Influences)

	CH03	CH08	CH09	CH19
CH03	1.000			
CH08	0.624	1.000		
CH09	0.498	0.673	1.000	
CH19	0.222	0.275	0.501	1.000

The estimation of the Counseling latent variable also reflected these observed relationships. Shown in Figure 4.3 below, I used CFA to assess the measurement properties of a scale of Counseling. All four indicators of counseling loaded significantly and strongly on a single counseling dimension, exhibiting significance at the 0.001 level. In Figure 4.3 below, factor loadings of 0.55 or greater were observed for all paths, excluding to the early action/decision manifest variable; at 0.23, the path coefficient for this variable in the 2008 measurement model was particularly small. Despite this comparatively small coefficient, all standardized path coefficients were significant at the $p < 0.001$ level.

Figure 4.3
Counseling Latent Variable from 2007 and 2008 CIRP Freshman Survey Responses



To further analyze the goodness of fit of this latent variable, I ran a number of post-estimation tests, including the following: root mean squared error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean squared residual (SRMR). The data from the 2007 cohort were not perfectly modeled by the Counseling latent variable: RMSEA = 0.137, CFI = 0.942, and SRMR = 0.038. This latent variable produced similar fit values for the 2008 cohort dataset: RMSEA = 0.140, CFI = 0.932, and SRMR = 0.042. As explored in greater detail in the following section on inter-variable relationships, correlating the error terms between the private college counseling and early action/decision indicators (CHOOSE09 and CHOOSE19) in this measurement model resulted in a stronger fit and may better represent conceptually the relationship between these two manifest variables.

Family background or socioeconomic status. Adding to the contextual affordances examined above, I also included a latent variable in my model that represented students' family background or, more specifically, their socioeconomic status (SES). This latent variable was comprised of three manifest variables, measured on ordinal scales, in the CIRP survey for all cohorts under investigation: parents' estimated total income and the highest level of education attained by the father and the mother, respectively. As explored in depth in the preceding literature synthesis, students' SES has been linked to a number of college-going phenomena, including – but not limited to – students' educational and occupational aspirations; college enrollment decision-making; access to college-going information, resources, and supports; and college-going experiences (Cabrera & La Nasa, 2000; Chapman, 1981; Gottfredson, 1981; Hossler & Gallagher, 1987; Lent et al., 1994; Lent et al., 2000; Tinto, 1975). Inclusion of this latent variable in the model allowed me to explore the direct and indirect effects of students' SES at

the time of college entry on their later postsecondary outcomes. Furthermore, this family-specific variable explored another layer of contextual influence, taking into account the level of college exposure of students' parents and their financial resources – two forms of capital. I have included below the descriptive statistics for the three indicators that comprised the SES measurement model.

Of note, I converted the Income variable from an ordinal scale to a ratio scale by replacing the survey item's original values (1 to 14) and their associated income ranges with a single dollar amount, effectively the midway point (or average) of each range. These dollar amounts are shown in parentheses in Table 4.16 below. This conversion allowed me to calculate a meaningful mean and standard deviation for this variable as well as utilize it in estimating the SES latent variable. A comparison of means between cohorts reveals a relatively stable average income for survey respondents, ranging from about $77,000 to $80,000 across all four years. Similarly, the means for highest education attained by students' parents appear consistent: fathers and mothers pursued, on average, a level of education that placed them between a *postsecondary education at an institution other than college* and *some college*.

Table 4.16
CIRP Survey Descriptive Statistics (Income, Father's Education, and Mother's Education)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
INCOME (*What is your best estimate of your parents' total income last year?*)				
1 = Less than $10,000 ($5,000) (%)	5.4	5.9	5.1	4.6
2 = $10,000 to 14,999 ($12,500) (%)	5.1	4.9	4.7	3.8
3 = $15,000 to 19,999 ($17,500) (%)	3.1	3.9	3.5	3.9
4 = $20,000 to 24,999 ($22,500) (%)	5.3	4.9	5.4	6.2
5 = $25,000 to 29,999 ($27,500) (%)	3.7	4.1	4.1	4.6
6 = $30,000 to 39,999 ($35,000) (%)	6.3	7.5	7.7	7.0
7 = $40,000 to 49,999 ($45,000) (%)	6.7	6.7	7.8	7.6

Table 4.16

CIRP Survey Descriptive Statistics (Income, Father's Education, and Mother's Education)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
8 = $50,000 to 59,999 ($55,000) (%)	7.8	6.9	7.3	7.8
9 = $60,000 to 74,999 ($67,500) (%)	9.8	9.5	9.9	9.1
10 = $75,000 to 99,999 ($87,500) (%)	12.6	10.7	11.9	12.3
11 = $100,000 to 149,999 ($125,000) (%)	14.7	13.5	13.7	13.8
12 = $150,000 to 199,999 ($175,000) (%)	4.9	5.0	5.2	5.5
13 = $200,000 to 249,999 ($225,000) (%)	2.3	1.9	1.8	2.8
14 = $250,000 or more ($275,000) (%)	3.7	3.5	3.5	3.0
Missing (%)	8.5	11.1	8.1	8.0
Mean	79997.68	77139.92	77577.67	78734.85
SD	64912.23	64715.43	63609.28	63525.71
FATHEDUC (*Father's highest level of education*)				
1 = Grammar school or less (%)	8.2	11.2	11.1	12.4
2 = Some high school (%)	7.2	8.1	7.6	9.0
3 = High school graduate (%)	17.3	16.6	16.9	15.4
4 = Postsec. school other than college (%)	2.0	2.7	2.4	1.8
5 = Some college (%)	22.8	20.2	21.4	20.6
6 = College degree (%)	23.2	21.8	22.0	21.1
7 = Some graduate school (%)	1.8	1.6	2.2	1.6
8 = Graduate degree (%)	15.2	14.1	12.8	13.5
Missing (%)	2.3	3.8	3.7	4.5
Mean	4.81	4.61	4.60	4.54
SD	2.10	2.19	2.15	2.22
MOTHEDUC (*Mother's highest level of education*)				
1 = Grammar school or less (%)	9.3	12.0	11.6	12.1
2 = Some high school (%)	6.0	7.2	7.0	8.3
3 = High school graduate (%)	16.3	17.8	16.7	15.8
4 = Postsec. school other than college (%)	2.6	2.8	3.1	2.6
5 = Some college (%)	25.5	23.1	22.5	23.5
6 = College degree (%)	25.2	22.1	23.2	22.2
7 = Some graduate school (%)	1.9	1.9	2.2	2.1
8 = Graduate degree (%)	12.1	10.6	11.3	10.7
Missing (%)	1.0	2.6	2.3	2.7
Mean	4.74	4.48	4.57	4.50
SD	2.03	2.10	2.11	2.12

Included below are the polychoric correlation matrices for the exploratory 2007 FTF sample (N = 2663) and the confirmatory 2008 FTF sample (N = 1583). Levels of education between fathers and mothers were highly correlated, exhibiting a ρ greater than 0.70 for both cohorts. Moreover, across both cohorts, father's education and income were more highly correlated than mother's education and income, but the correlation values were not as high as those between the parents' level of education.

Table 4.17
Polychoric Correlation Matrix (2007 FTF Cohort SES)

	INCOME	FATHED	MOTHED
INCOME	1.000		
FATHED	0.434	1.000	
MOTHED	0.395	0.701	1.000

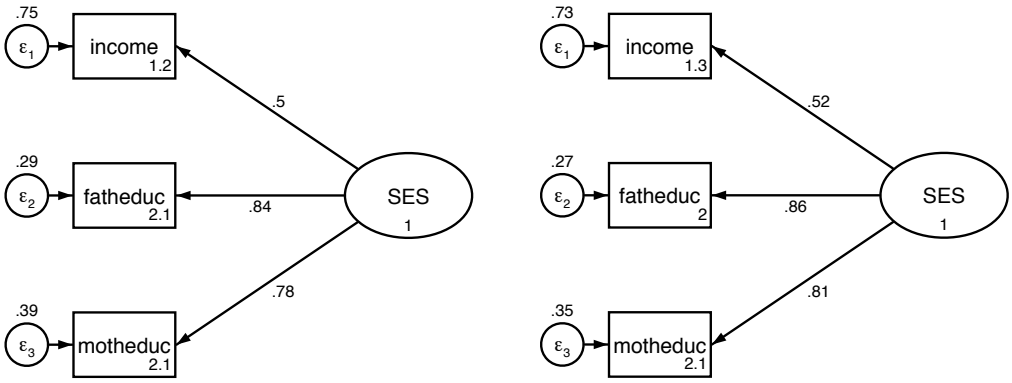
Table 4.18
Polychoric Correlation Matrix (2008 FTF Cohort SES)

	INCOME	FATHED	MOTHED
INCOME	1.000		
FATHED	0.460	1.000	
MOTHED	0.433	0.731	1.000

In Figure 4.4 below, the SES measurement models employing the 2007 and 2008 CIRP survey responses appear on the left and right, respectively. As the figure demonstrates, the factor loadings for all three manifest variables were strong with path coefficients equal to or greater than 0.50 across both cohorts. The standardized path coefficients were all significant at the $p < 0.001$ level. Overall, the CFA performed to assess the measurement properties of this SES scale within each cohort supported the notion that SES, in part, influenced all three observed variables in question, exerting a particularly strong influence on both father's and mother's level of education. Similar to my analysis of the Context variable above, I did not run goodness of fit post-estimation tests against this SES latent variable, as it is also saturated.

Figure 4.4

SES Latent Variable from 2007 and 2008 CIRP Freshman Survey Responses



Student Self-Ratings

The following subsections present latent variables that add dimension to the overall structural models by accounting for students' self-ratings on a number of "affective" factors (i.e., habits of mind, academic self-efficacy, and general self-concept). Augmenting the research on the influences of academic preparedness on college performance and degree attainment are studies that have centered on the skills, attributes, and dispositions that comprise the "other" dimensions of students' readiness for college (Arnold et al., 2012; Brown et al., 2008; Crede & Kuncel, 2008; Komarraju et al., 2013; Robbins et al., 2004). The structural models presented here, therefore, attempt to incorporate a gamut of variables in an effort to continue fleshing out our understanding of the college readiness phenomenon.

As described in more detail in the preceding chapter, the CIRP Construct Technical Report, authored by Sharkness et al. (2010), articulated the process undertaken by UCLA's HERI group to develop latent constructs from the 2008 CIRP instrument, employing exploratory factor analysis. I utilized this report and its accompanying appendix to inform my selection of survey items in the estimation of the three latent variables explored below ("CIRP Construct Technical

Report Appendix," 2009). While the Habits of Mind latent variable included the same 11 survey items as the construct parameters developed by Sharkness et al. (2010), the Academic Self-Efficacy and General Self-Concept latent variables utilized in this study encompassed additional survey items not incorporated into the original construct parameters.

Habits of mind. Survey items that measured students' habits of mind first appeared on the CIRP Freshman Survey instrument in 2007. For this reason, I utilized the responses from the 2007 FTF cohort to estimate the Habits of Mind latent variable and then employed the 2008 FTF cohort dataset to cross-validate the latent variable. In Table 4.19 below, the descriptive statistics for the 11 survey items included in the latent construct are provided. As reflected in the questions, this latent variable measured the study habits with which students entered CSULB. These habits arguably represented some of the cornerstone expectations of faculty members of their undergraduate students. In a sense, this latent variable provided insights into the behaviors students employed in approaching their studying both in and beyond the high school classroom. The exploration of this latent variable as a candidate for inclusion in the models relied on a key underlying assumption: those students inclined to more frequently engage in these behaviors or habits in high school were better equipped for the university classroom and may, therefore, achieve more robust postsecondary outcomes. Furthermore, these habits – while possibly correlated with academic performance – operated in another dimension beyond high school GPA and standardized test performance.

The descriptive statistics in Table 4.19 below reveal that, on average, students reported engaging in these behaviors during the past year between *occasionally* and *frequently*, with means across both cohorts around 2.4 for a number of questions. The lowest reported levels of

engagement were students' frequency in evaluating the quality or reliability of information they received; taking a risk because they felt they had more to gain; looking up scientific research articles and resources; and exploring topics on their own. Interestingly, the largest discrepancy in means across cohorts occurred for the 10th survey item: 2.02 and 2.57 for the 2007 and 2008 respondents, respectively. I attribute this discrepancy to the change in wording of this survey item between years. That is, the question was stated on the 2007 instrument as "accept failure as part of the learning process," and then "failure" was replaced with "mistakes" on the 2008 survey. It would seem students were, therefore, more reluctant to report accepting failure than mistakes, leading to a lower average on this item among the 2007 FTF.

Table 4.19
CIRP Freshman Survey Descriptive Statistics (Habits of Mind)

	2007 N=3011	2008 N=1793
MNDHAB01 (*Ask questions in class*)		
1 = Not at all (%)	4.6	3.5
2 = Occasionally (%)	50.2	48.4
3 = Frequently (%)	43.9	46.3
Missing (%)	1.2	1.7
Mean	2.40	2.44
SD	0.58	0.56
MNDHAB02 (*Support your opinions with a logical argument*)		
1 = Not at all (%)	6.1	4.0
2 = Occasionally (%)	46.4	45.6
3 = Frequently (%)	46.3	48.5
Missing (%)	1.3	2.0
Mean	2.41	2.45
SD	0.60	0.57
MNDHAB03 (*Seek solutions to problems and explain them to others*)		
1 = Not at all (%)	4.8	3.1
2 = Occasionally (%)	49.0	48.0
3 = Frequently (%)	44.4	46.5
Missing (%)	1.8	2.4
Mean	2.40	2.45

Table 4.19
CIRP Freshman Survey Descriptive Statistics (Habits of Mind)

	2007 N=3011	2008 N=1793
SD	0.58	0.56
MNDHAB04 (*Revise your papers to improve your writing*)		
1 = Not at all (%)	7.3	6.2
2 = Occasionally (%)	48.8	47.9
3 = Frequently (%)	42.5	43.7
Missing (%)	1.4	2.2
Mean	2.36	2.38
SD	0.62	0.60
MNDHAB05 (*Evaluate the quality or reliability of information you received*)		
1 = Not at all (%)	6.9	5.5
2 = Occasionally (%)	59.0	61.2
3 = Frequently (%)	32.6	31.1
Missing (%)	1.5	2.3
Mean	2.26	2.26
SD	0.58	0.55
MNDHAB06 (*Take a risk because you (felt) feel you have more to gain*)		
1 = Not at all (%)	9.2	5.5
2 = Occasionally (%)	55.7	53.7
3 = Frequently (%)	33.2	38.2
Missing (%)	1.9	2.6
Mean	2.25	2.34
SD	0.61	0.58
MNDHAB07 (*Seek alternative solutions to a problem*)		
1 = Not at all (%)	3.3	2.0
2 = Occasionally (%)	53.2	50.3
3 = Frequently (%)	41.3	44.8
Missing (%)	2.2	2.8
Mean	2.39	2.44
SD	0.55	0.54
MNDHAB08 (*Look up scientific research articles and resources*)		
1 = Not at all (%)	25.2	24.8
2 = Occasionally (%)	54.8	55.4
3 = Frequently (%)	18.2	17.3
Missing (%)	1.8	2.5
Mean	1.93	1.92

Table 4.19
CIRP Freshman Survey Descriptive Statistics (Habits of Mind)

	2007 N=3011	2008 N=1793
SD	0.66	0.65
MNDHAB09 (*Explore topics on your own*)		
1 = Not at all (%)	20.0	18.5
2 = Occasionally (%)	53.2	53.2
3 = Frequently (%)	24.9	25.9
Missing (%)	1.9	2.5
Mean	2.05	2.08
SD	0.68	0.67
MNDHAB10 (*Accept (failure) mistakes as part of the learning process*)		
1 = Not at all (%)	21.4	1.3
2 = Occasionally (%)	54.0	39.3
3 = Frequently (%)	22.8	56.8
Missing (%)	1.9	2.6
Mean	2.02	2.57
SD	0.67	0.52
MNDHAB11 (*Seek feedback on your academic work*)		
1 = Not at all (%)	6.2	4.2
2 = Occasionally (%)	50.4	47.5
3 = Frequently (%)	41.3	46.0
Missing (%)	2.1	2.3
Mean	2.36	2.43
SD	0.60	0.58

Before estimating the measurement model for this latent variable, I investigated the polychoric correlations between its 11 items to gain an understanding of their interrelationships. The correlations for the 2007 cohort were based on 2866 observations, while the correlations produced for the 2008 dataset relied on 1703 observations. Of note, the wording modification for survey item 10 resulted in markedly higher correlations for this question within the 2008 data than the 2007. For both cohorts, the bivariate correlation between survey items two and three was the highest, suggesting that those students who "support [their] opinions with a logical

argument" also tend to "seek solutions to problems and explain them to others." In the 2007 dataset, survey items three ('seek solutions to problems and explain them to others') and five ('evaluate the quality or reliability of information you received') exhibited the highest correlations among the greatest number of covariates. Similarly, the 2008 dataset reflected strong and diverse correlations for survey items five and seven ('seek alternative solutions to a problem').

Table 4.20

Polychoric Correlation Matrix (2007 FTF Cohort Habits of Mind)

	MH01	MH02	MH03	MH04	MH05	MH06	MH07	MH08	MH09	MH10	MH11
MH01	1.000										
MH02	0.544	1.000									
MH03	0.457	0.647	1.000								
MH04	0.245	0.209	0.305	1.000							
MH05	0.251	0.387	0.434	0.419	1.000						
MH06	0.307	0.380	0.357	0.225	0.354	1.000					
MH07	0.294	0.417	0.504	0.270	0.438	0.560	1.000				
MH08	0.210	0.253	0.249	0.244	0.309	0.240	0.330	1.000			
MH09	0.236	0.378	0.366	0.220	0.381	0.273	0.352	0.486	1.000		
MH10	0.053	0.086	0.142	0.118	0.194	0.196	0.231	0.140	0.231	1.000	
MH11	0.361	0.281	0.365	0.425	0.334	0.269	0.335	0.226	0.273	0.217	1.000

Table 4.21

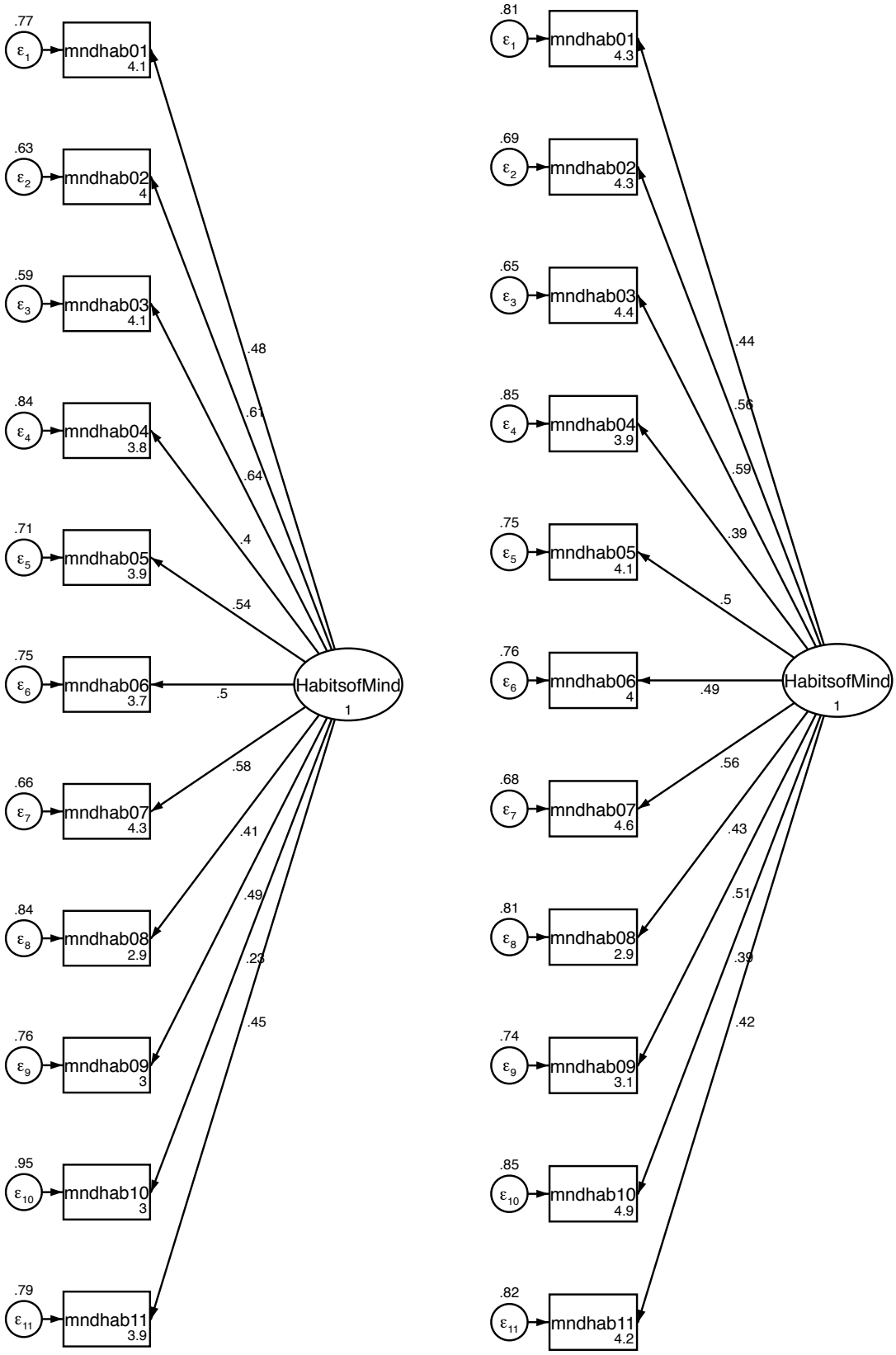
Polychoric Correlation Matrix (2008 FTF Cohort Habits of Mind)

	MH01	MH02	MH03	MH04	MH05	MH06	MH07	MH08	MH09	MH10	MH11
MH01	1.000										
MH02	0.506	1.000									
MH03	0.402	0.579	1.000								
MH04	0.213	0.201	0.264	1.000							
MH05	0.190	0.355	0.388	0.470	1.000						
MH06	0.269	0.339	0.352	0.152	0.319	1.000					
MH07	0.264	0.356	0.493	0.265	0.387	0.542	1.000				
MH08	0.208	0.269	0.281	0.294	0.303	0.246	0.314	1.000			
MH09	0.270	0.421	0.352	0.189	0.347	0.347	0.337	0.460	1.000		
MH10	0.229	0.225	0.272	0.213	0.267	0.268	0.380	0.191	0.256	1.000	
MH11	0.314	0.254	0.289	0.368	0.325	0.228	0.304	0.215	0.199	0.456	1.000

Shown in Figure 4.5 below, I fitted the Habits of Mind latent variable against the exploratory and confirmatory datasets (i.e., the 2007 and 2008 cohorts, respectively). As the figures demonstrate, excluding the path coefficient for survey item 10 in the 2007 cohort, the factor loadings for all 11 manifest variables were strong with path coefficients equal to or greater than 0.40 (to degrees of rounding) across both cohorts. Moreover, the standardized path coefficients were all significant at the $p < 0.001$ level. The path coefficient of 0.23 for survey item 10 in the 2007 cohort corroborates the discussion above: the wording, "accept failure as part of the learning process," led to a different response pattern than that observed on the other habit-related questions. The subsequent modification of the question – with "failure" replaced by "mistakes" – seemed to have rectified this discrepancy, as the factor loading reached 0.39 within the 2008 dataset for the same survey item. Despite this modification, however, the goodness of fit indices were not notably different between models: for the 2007 and 2008 models, respectively, RMSEA equaled 0.085 and 0.083; CFI reached 0.836 and 0.831; and SRMR equaled 0.050 and 0.051.

Figure 4.5

Habits of Mind Latent Variable from 2007 and 2008 CIRP Freshman Survey Responses



Academic self-efficacy. Like the Habits of Mind latent variable, Sharkness et al. (2010) also developed the Academic Self-Concept latent construct through their exploratory factor analyses. In this study, I renamed the construct Academic Self-Efficacy and incorporated an additional survey item not contained in the original construct: students' self-rating of their writing ability ("CIRP Construct Technical Report Appendix," 2009). In doing so, I posited that students' self-efficacy in their academics influenced their perception of not only their mathematical ability but also their writing ability. In the table to follow, I outlined the descriptive statistics of the manifest variables included in this measurement model. A comparison of means across cohorts suggests students responded to these survey items in a consistent manner. For all four cohorts, students' self-assessment of their drive to achieve received the highest average rating, and students' perceptions of their overall academic ability received the second highest. While students on average rated themselves higher in these general areas, they were less inclined to rate themselves high in the skill-specific areas of mathematical and writing ability, which exhibited comparatively lower means.

Table 4.22
CIRP Freshman Survey Descriptive Statistics (Academic Self-Efficacy)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
RATE0X01 (*Academic ability*)				
1 = Lowest 10% (%)	0.0	0.2	0.1	0.1
2 = Below average (%)	0.7	0.9	1.0	0.7
3 = Average (%)	30.9	33.5	32.6	29.3
4 = Above average (%)	55.1	52.4	55.1	57.9
5 = Highest 10% (%)	12.7	11.4	10.2	10.4
Missing (%)	0.6	1.6	1.1	1.5
Mean	3.80	3.75	3.75	3.79
SD	0.65	0.67	0.65	0.63
RATE0X07/06 (*Drive to achieve*)				
1 = Lowest 10% (%)	0.1	0.3	0.1	0.3
2 = Below average (%)	1.8	2.2	1.8	1.5

Table 4.22

CIRP Freshman Survey Descriptive Statistics (Academic Self-Efficacy)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
3 = Average (%)	21.5	22.3	24.2	23.0
4 = Above average (%)	44.2	43.5	42.1	44.0
5 = Highest 10% (%)	31.9	30.0	30.4	29.4
Missing (%)	0.6	1.7	1.2	1.8
Mean	4.07	4.03	4.02	4.02
SD	0.78	0.81	0.80	0.79
RATE0X10/09 (*Mathematical ability*)				
1 = Lowest 10% (%)	3.1	3.6	2.4	2.7
2 = Below average (%)	17.0	17.0	16.8	15.3
3 = Average (%)	40.6	41.1	39.1	37.3
4 = Above average (%)	29.3	28.2	31.3	34.0
5 = Highest 10% (%)	9.3	8.3	9.1	9.3
Missing (%)	0.6	1.7	1.3	1.5
Mean	3.25	3.21	3.28	3.32
SD	0.95	0.95	0.93	0.94
RATE0X13 (*Self-confidence - intellectual*)				
1 = Lowest 10% (%)	0.3	0.5	0.8	1.1
2 = Below average (%)	4.5	4.6	6.0	5.6
3 = Average (%)	37.1	36.9	39.7	38.9
4 = Above average (%)	42.2	40.4	38.4	38.7
5 = Highest 10% (%)	15.3	15.9	13.8	13.9
Missing (%)	0.5	1.7	1.3	1.8
Mean	3.68	3.68	3.59	3.60
SD	0.80	0.82	0.83	0.84
RATE0X18 (*Writing ability*)				
1 = Lowest 10% (%)	0.9	1.3	1.1	1.7
2 = Below average (%)	10.5	9.8	13.1	11.2
3 = Average (%)	41.5	44.8	48.1	46.2
4 = Above average (%)	37.1	33.3	29.4	32.4
5 = Highest 10% (%)	9.5	9.2	6.9	6.7
Missing (%)	0.5	1.7	1.4	1.7
Mean	3.44	3.40	3.28	3.32
SD	0.84	0.84	0.82	0.83

The polychoric correlations between these five survey items for the 2007 (N = 2946) and 2008 (N = 1746) datasets are shown below. Across both cohorts, students' perception of their academic ability consistently correlated with all other items regressed onto this latent variable,

exhibiting the highest bivariate correlation with students' rating of their intellectual self-confidence. Interestingly, the bivariate correlation between students' rating of their mathematical ability and writing ability was negative – albeit weak – for both cohorts, suggesting that students tended to perceive their academic abilities falling into one of these two areas, not both. That is, those who were inclined to rate their mathematical prowess high chose a lower rating for their writing skills, and visa versa. Notably, the polychoric correlation between SAT Verbal and SAT Math scores, shown in the following chapter, was significantly stronger and positive, illustrating that these self-perceptions were capturing a quality among students distinct from that measured by these standardized tests.

Table 4.23
Polychoric Correlation Matrix (2007 FTF Cohort Academic Self-Efficacy)

	RATE01	RATE07	RATE10	RATE13	RATE18
RATE01	1.000				
RATE07	0.378	1.000			
RATE10	0.411	0.131	1.000		
RATE13	0.461	0.431	0.217	1.000	
RATE18	0.401	0.255	-0.079	0.360	1.000

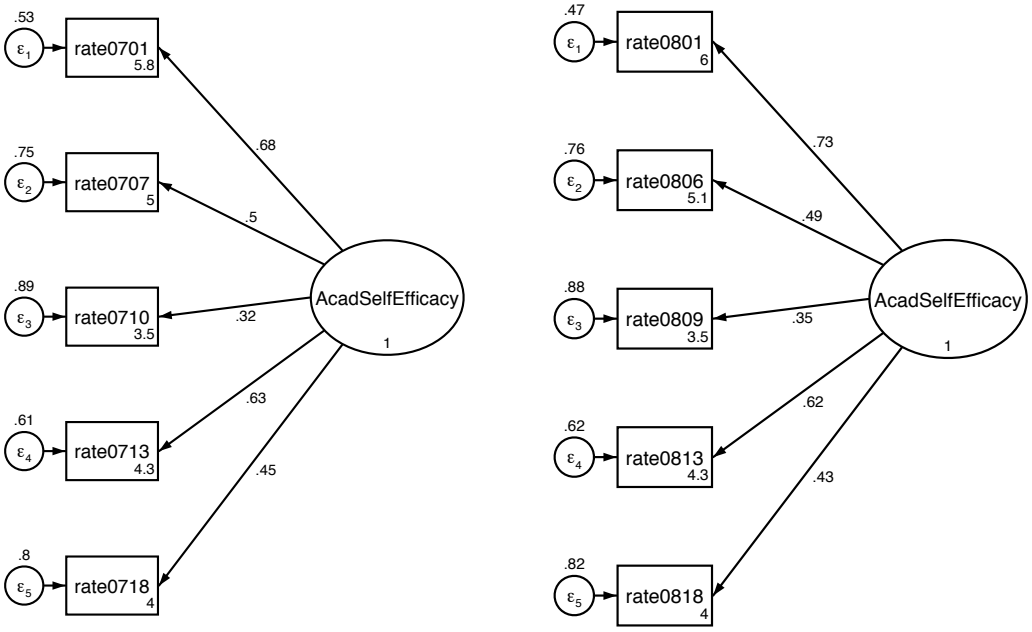
Table 4.24
Polychoric Correlation Matrix (2008 FTF Cohort Academic Self-Efficacy)

	RATE01	RATE06	RATE09	RATE13	RATE18
RATE01	1.000				
RATE06	0.411	1.000			
RATE09	0.412	0.123	1.000		
RATE13	0.500	0.412	0.262	1.000	
RATE18	0.408	0.256	-0.074	0.353	1.000

The factor loadings for this latent variable can be viewed in Figure 4.6 below. The path coefficients exceeded 0.40 for all manifest variables, barring mathematical ability, which exhibited a 0.32 and 0.35 loading for the 2007 and 2008 datasets, respectively. Despite this less

than ideal coefficient, all five indicators loaded onto the Academic Self-Efficacy dimension at a significant $p < 0.001$ level. The goodness of fit indices demonstrated a slightly better representation of the 2008 dataset by this measurement model than the 2007. For the 2007 and 2008 models, respectively, RMSEA equaled 0.162 and 0.154; CFI reached 0.813 and 0.838; and SRMR equaled 0.061 and 0.058.

Figure 4.6
Academic Self-Efficacy Latent Variable from 2007 and 2008 CIRP Freshman Survey Responses



General self-concept. Like the preceding two latent variables, the General Self-Concept latent variable here was informed by the construct development work of Sharkness et al. (2010). However, in their original Social Self-Concept construct, only leadership ability, popularity, public speaking ability, and social self-confidence were included ("CIRP Construct Technical Report Appendix," 2009). In the latent variable under development here, however, I included a number of additional self-rating survey items as well as excluded the "popularity" variable, as it was not captured in the 2007 CIRP survey instrument and could, therefore, not be fitted to the

exploratory dataset. As the items in Table 4.25 below reflect, students were asked to assess not only their self-perceptions with respect to others (e.g., cooperativeness, social self-confidence, and understanding of others), but also their assessment of their relationship with or understanding of themselves (e.g., self-understanding, emotional health, and physical health). Combining these variables into a single latent variable relied on the foundational assumption that these collective externally- and internally-oriented self-ratings stemmed from an individual's underlying general self-concept. The descriptive statistics in Table 4.25 below suggest that students, on average, rated themselves highest on their cooperativeness and their understanding of others across all four cohorts. Conversely, students' perceptions of their public speaking ability exhibited the lowest mean across all years.

Table 4.25
CIRP Freshman Survey Descriptive Statistics (General Self-Concept)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
RATE0X05/04 (*Cooperativeness*)				
1 = Lowest 10% (%)	0.3	0.3	0.3	0.2
2 = Below average (%)	1.4	1.3	2.3	1.0
3 = Average (%)	23.8	24.9	24.8	22.2
4 = Above average (%)	50.1	48.5	46.7	49.5
5 = Highest 10% (%)	23.9	23.4	24.8	25.5
Missing (%)	0.6	1.7	1.2	1.6
Mean	3.97	3.95	3.95	4.01
SD	0.75	0.75	0.78	0.74
RATE0X09/08 (*Leadership ability*)				
1 = Lowest 10% (%)	0.8	0.9	1.2	0.8
2 = Below average (%)	8.9	8.6	9.2	6.7
3 = Average (%)	33.2	34.8	35.6	33.9
4 = Above average (%)	37.6	35.3	36.3	38.0
5 = Highest 10% (%)	18.9	18.7	16.4	19.2
Missing (%)	0.6	1.7	1.3	1.5
Mean	3.65	3.63	3.59	3.69
SD	0.91	0.92	0.91	0.89
RATE0X12 (*Public speaking ability)*				
1 = Lowest 10% (%)	5.0	5.3	5.4	6.1

Table 4.25

CIRP Freshman Survey Descriptive Statistics (General Self-Concept)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
2 = Below average (%)	21.1	20.7	23.0	22.3
3 = Average (%)	39.7	39.2	41.4	39.9
4 = Above average (%)	24.2	23.3	20.7	22.1
5 = Highest 10% (%)	9.4	9.8	7.9	8.0
Missing (%)	0.5	1.7	1.4	1.6
Mean	3.12	3.12	3.03	3.04
SD	1.01	1.02	0.99	1.01
RATE0X14 (*Self-confidence - social*)				
1 = Lowest 10% (%)	0.9	1.1	1.3	1.5
2 = Below average (%)	7.7	8.6	11.1	9.7
3 = Average (%)	35.7	37.1	37.9	40.2
4 = Above average (%)	38.4	34.7	33.0	32.5
5 = Highest 10% (%)	16.6	17.0	15.1	14.4
Missing (%)	0.6	1.7	1.6	1.7
Mean	3.62	3.59	3.50	3.50
SD	0.88	0.91	0.93	0.91
RATE0X15 (*Self-understanding*)				
1 = Lowest 10% (%)	0.3	0.3	0.5	0.7
2 = Below average (%)	3.7	3.5	4.5	3.9
3 = Average (%)	36.5	36.2	39.9	38.6
4 = Above average (%)	42.1	39.2	38.7	37.9
5 = Highest 10% (%)	16.7	18.8	14.8	16.8
Missing (%)	0.7	1.9	1.6	2.1
Mean	3.72	3.74	3.64	3.68
SD	0.79	0.82	0.81	0.83
RATE0X17 (*Understanding of others*)				
1 = Lowest 10% (%)	0.2	0.3	0.3	0.1
2 = Below average (%)	1.9	1.5	2.3	1.5
3 = Average (%)	27.1	28.5	29.2	27.9
4 = Above average (%)	49.5	47.4	47.5	47.4
5 = Highest 10% (%)	20.9	20.6	19.3	21.2
Missing (%)	0.4	1.7	1.4	2.0
Mean	3.90	3.88	3.84	3.90
SD	0.75	0.76	0.77	0.75
RATE0X08/07 (*Emotional health*)				
1 = Lowest 10% (%)	0.6	0.9	0.9	1.0
2 = Below average (%)	6.5	6.6	6.0	6.7
3 = Average (%)	39.6	39.1	44.1	39.0
4 = Above average (%)	35.6	33.6	30.8	32.0
5 = Highest 10% (%)	17.2	18.0	16.8	19.3
Missing (%)	0.6	1.9	1.4	2.0

Table 4.25

CIRP Freshman Survey Descriptive Statistics (General Self-Concept)

	2005 N=2353	2006 N=5191	2007 N=3011	2008 N=1793
Mean	3.63	3.62	3.57	3.63
SD	0.87	0.89	0.87	0.91
RATE0X11/10 (*Physical health*)				
1 = Lowest 10% (%)	0.4	0.6	0.6	0.7
2 = Below average (%)	6.9	6.7	7.4	6.7
3 = Average (%)	39.9	41.7	44.4	42.5
4 = Above average (%)	36.4	32.7	31.7	32.9
5 = Highest 10% (%)	15.9	16.4	14.3	15.6
Missing (%)	0.6	1.8	1.5	1.6
Mean	3.61	3.59	3.53	3.57
SD	0.85	0.87	0.85	0.86

The polychoric correlations between these eight survey items are displayed in Tables 4.26 and 4.27 below for the 2007 (N = 2917) and 2008 (N = 1735) FTF cohorts, respectively. For both cohorts, students' ratings on their social self-confidence and self-understanding exhibited the highest correlations across as many variables as any of the other survey items. The single strongest bivariate correlation occurred between these two variables among the 2007 FTF with ρ = 0.612, whereas the greatest bivariate correlation within the 2008 dataset was between leadership ability and public speaking ability with ρ = 0.583.

Table 4.26

Polychoric Correlation Matrix (2007 FTF Cohort General Self-Concept)

	RATE05	RATE09	RATE12	RATE14	RATE15	RATE17	RATE08	RATE11
RATE05	1.000							
RATE09	0.339	1.000						
RATE12	0.251	0.596	1.000					
RATE14	0.305	0.572	0.568	1.000				
RATE15	0.325	0.392	0.345	0.612	1.000			
RATE17	0.457	0.339	0.256	0.369	0.507	1.000		
RATE08	0.306	0.352	0.197	0.452	0.494	0.272	1.000	
RATE11	0.218	0.287	0.233	0.372	0.326	0.214	0.427	1.000

Table 4.27

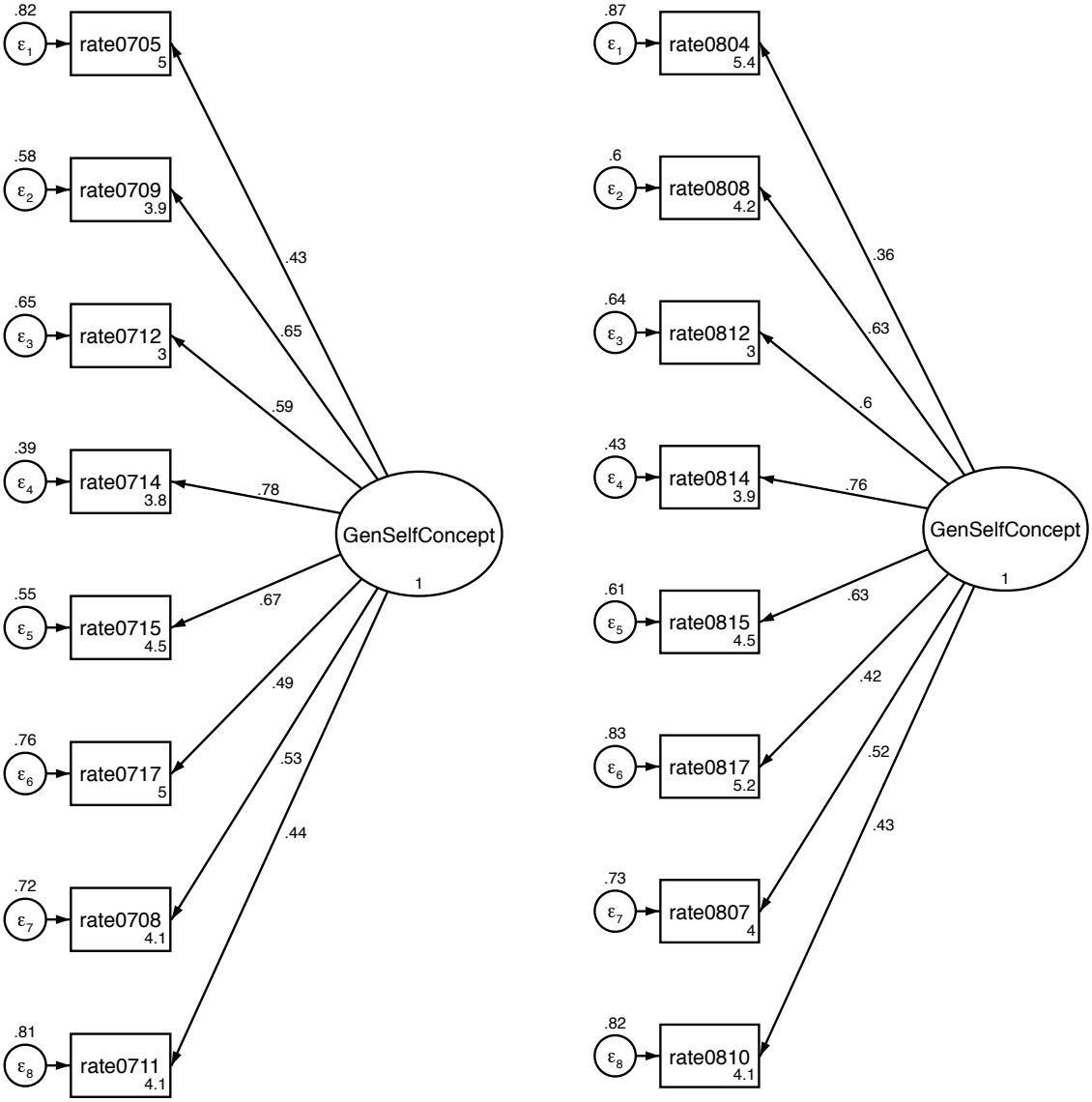
Polychoric Correlation Matrix (2008 FTF Cohort General Self-Concept)

	RATE04	RATE08	RATE12	RATE14	RATE15	RATE17	RATE07	RATE10
RATE04	1.000							
RATE08	0.297	1.000						
RATE12	0.198	0.583	1.000					
RATE14	0.253	0.528	0.555	1.000				
RATE15	0.268	0.353	0.333	0.559	1.000			
RATE17	0.393	0.292	0.195	0.309	0.459	1.000		
RATE07	0.239	0.339	0.244	0.434	0.462	0.209	1.000	
RATE10	0.227	0.283	0.210	0.358	0.317	0.161	0.398	1.000

Figure 4.7 to follow displays the factor loadings for the General Self-Concept latent variable fitted against the 2007 and 2008 datasets, respectively. All the factor loadings exceeded 0.40 for both cohorts, barring the path coefficient to the cooperativeness manifest variable in the 2008 cohort, which exhibited a loading of 0.36. Irrespective of this relatively small loading, the standardized path coefficients were all significant at the $p < 0.001$ level. The goodness of fit indices approximately mirrored those for the preceding student self-rating latent variables: the 2007 and 2008 models, respectively, showed a RMSEA equal to 0.129 and 0.116; a CFI of 0.841 and 0.847; and a SRMR of 0.060 and 0.057.

Figure 4.7

General Self-Concept Latent Variable from 2007 and 2008 CIRP Freshman Survey Responses



Chapter Five: Findings

This chapter begins with an exploration of a number of variable interrelationships between and among the predictor and outcome variables presented above. Through an analysis of correlations and regressions, I gained an understanding of the ways these variables interact as well as determined the extent to which the latent constructs measured substantively different phenomena (Crocker & Algina, 2008). This stage in the analysis also informed the selection of variables included in the full structural models. That is, some of the variables explored above provided context to the dataset under investigation here and illuminated trends in response patterns across years; through an in-depth analysis of all variables of interest I also concluded that the 2008 FTF cohort was representative of the three preceding cohorts, allowing me to feel confident in drawing conclusions from the 2008 dataset. However, if deeper analysis uncovered that a variable – in relation to other variables – appeared not to be a viable candidate for inclusion in the models, then it was removed in an effort to achieve as high a level of parsimony as possible. In structural equation modeling (SEM), achievement of parsimony remains of paramount consideration (Keith, 2015; Raykov & Marcoulides, 2006). Yet, as articulated below, the process that I undertook in making these decisions was governed by the conceptual justifiability of excluding variables of interest, not simply based on goodness of fit considerations. In this way, the integrity of the theoretical underpinnings of the models was preserved.

Variable Interrelationships: Predictors & Outcomes

To begin this stage of analysis, I first created composite scores for those latent variables whose indicators were measured on a single scale. For the socioeconomic status (SES) latent variable (which regressed onto indicators of income and parental education that did not share

the same scale), I calculated a ZSES composite variable utilizing the indicators' standardized scores. This allowed me to input crude scores for the unobserved variables into a polychoric correlation matrix and compare them against a number of observed predictors and outcomes. At this juncture and onwards, I utilized only the dataset for the 2008 FTF, as CSULB provided me outcome metrics for only this cohort. In the matrix shown in Table 5.1 below, a story of interrelationships begins to emerge, although the correlations shown here do not account for attenuation due to measurement error (N = 1551). Of note, I did not include student group characteristics (e.g., sex, race, or major) in this matrix, as my between-group analyses will feature in a number of crosstabs later in this chapter as well as in my fitting of the full structural models to follow. As in the polychoric matrices above, I employed a similar color schema to differentiate between correlation values; in this matrix, however, I colored negative values (i.e., those below zero) in blue to further highlight them. Following a close review of the matrix included in Table 5.1, I then selected a number of bivariate relationships for further statistical analysis using SEM Builder to account for attenuation not accommodated here.

Table 5.1

Polychoric Correlation Matrix (2008 FTF Cohort Predictor and Outcome Variable Analysis)

	FNCON	HSGPA	SATV	SATM	EXPCT	CNTXT	CNSL	ZSES	HABIT	ACAD	GENSC	GPAF09	UNTF09	GRAD
FNCON	1.00													
HSGPA	-0.02	1.00												
SATV	-0.12	0.16	1.00											
SATM	-0.19	0.17	0.58	1.00										
EXPCT	-0.20	0.23	0.17	0.18	1.00									
CNTXT	-0.27	0.11	0.29	0.29	0.08	1.00								
CNSL	0.11	-0.07	-0.25	-0.22	-0.02	-0.21	1.00							
ZSES	-0.33	0.09	0.37	0.35	0.20	0.50	-0.22	1.00						
HABIT	-0.02	0.14	0.14	0.00	0.27	0.03	0.08	0.08	1.00					
ACAD	-0.13	0.33	0.26	0.29	0.35	0.11	0.00	0.14	0.38	1.00				
GENSC	-0.11	0.08	0.04	0.04	0.28	0.12	0.03	0.15	0.38	0.58	1.00			
GPAF09	-0.08	0.41	0.27	0.25	0.10	0.20	-0.12	0.20	0.06	0.13	-0.03	1.00		
UNTF09	-0.11	0.13	0.10	0.15	0.09	0.09	-0.09	0.13	0.01	0.05	0.03	0.46	1.00	
GRAD	-0.14	0.24	0.11	0.15	0.05	0.13	-0.04	0.15	0.00	0.03	-0.02	0.57	0.50	1.00

Notes: FNCON = financial concern; HSGPA = high school GPA; SATV = SAT verbal score; SATM = SAT math score; EXPCT = performance expectation; CNTXT = context; CNSL = counseling influences; ZSES = standardized socioeconomic status; HABIT = habits of mind; ACAD = academic self-efficacy; GENSC = general self-concept; GPAF09 = first-year GPA by Fall 2009; UNTF09 = units earned in Fall 2009; GRAD = graduation status.

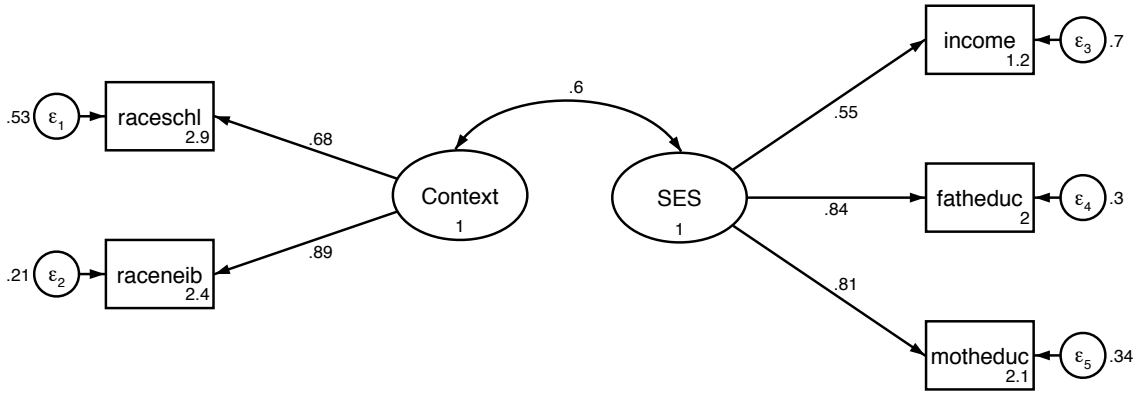
A review of Table 5.1 above brings to light a number of noteworthy relationships. For example, the Financial Concern (FNCON) observed variable correlated negatively with all other variables excluding the Counseling (CNSL) latent variable, which itself was negatively correlated with almost all other variables under consideration. This pattern of relation suggests that those freshman Cooperative Institutional Research Program (CIRP) respondents who indicated a higher level of financial concern in entering college tended to score lower on measures of pre-college contextual affordances, academic performance, self-efficacy and self-concept, and later postsecondary outcomes. The standardized composite score ZSES complements the story implied by these correlations: those students coming from contexts of higher SES tended to exhibit lower levels of financial concern entering college, stronger pre-college performance on the SAT standardized test, and a greater likelihood of coming from high schools with more white students; there are also small but positive correlations for these students with postsecondary

outcome measures, such as first-year grade point average (GPA) and eventual graduation from the University. Interestingly, these students were less likely to rate school- and private-based counseling factors as important to their decision to attend CSULB, which suggests they may be gathering college-going input from other sources.

In the models to follow, the SES latent variable pre-dates students' level of financial concern as well as their expectations and self-ratings entering college, as it measures phenomena that chronologically occurred earlier (i.e., parents' earnings the prior year and their already attained levels of education). Conversely, this gauge of SES could be viewed as contemporaneous with measures of students' high school context and the influence of counseling resources on their college decision-making – both of which also pre-date students' college entry. Keeping this ordering of variables in mind, I ran the following analyses using the measurement models for Context, SES, and Counseling and the Financial Concern observed variable to investigate the statistical significance of these relationships, while accommodating for attenuation. Figure 5.1 below displays an even stronger correlation between the Context and SES latent variables than in the matrix above: 0.60 (N = 1502). While not accounting for possible common causes, this correlation was significant at the $p < 0.001$ level and suggested that the degree of whiteness of a high school's student body was significantly and positively related to the SES of its students.

Figure 5.1

Correlation Between Context and SES Latent Variables from 2008 CIRP Freshman Survey Responses

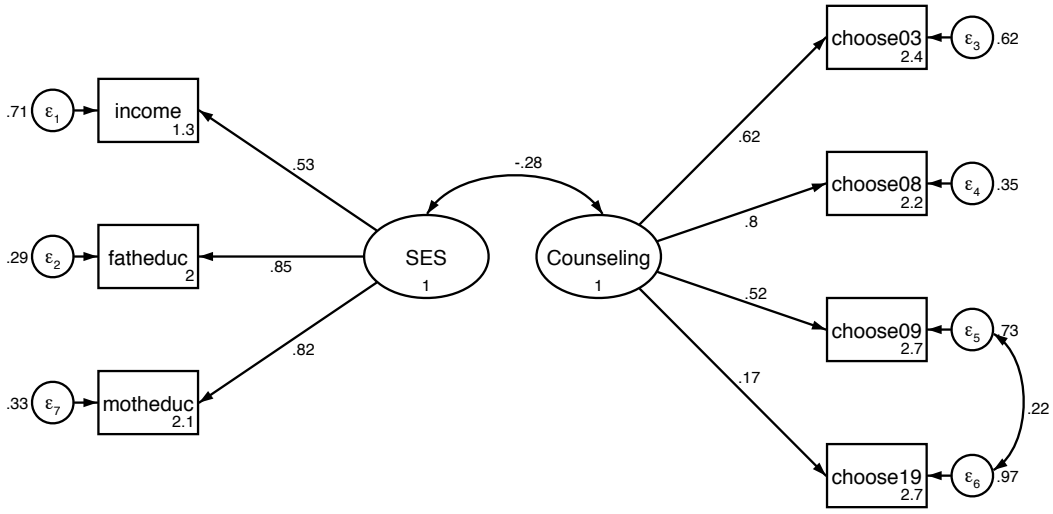


An exploration of the relationship between the SES and Counseling latent variables revealed a negative association. In Figure 5.2 below, the -0.28 correlation was also significant at the $p < 0.001$ level ($N = 1498$). Here, I correlated the error terms for CHOOSE09 ('private college counselor advised me') and CHOOSE 19 ('I was admitted through an early action/decision program') as prior research has shown that students' access to private college counseling functions as a strong predictor of their taking advantage of early action/decision admissions options (Park & Eagan, 2011). By correlating these error terms, I posit that student responses to these two survey items within this measurement model were influenced by a joint factor not salient for the other two counseling resources (i.e., teachers and public school counselors). The correlation between these two latent variables was unaffected by the addition of this error term correlation; however, the likelihood ratio test comparing the two nested Counseling measurement models resulted in a statistically significant improvement in chi-squared. Additionally, the 0.22 error term correlation was found to be significant at $p < 0.001$, supporting the conceptual argument that these two counseling influences were related. In all, the negative correlation observed here suggested that students of lower SES tended to rate school- and

private-based counseling resources as more important to their decision to attend CSULB than their more affluent peers.

Figure 5.2

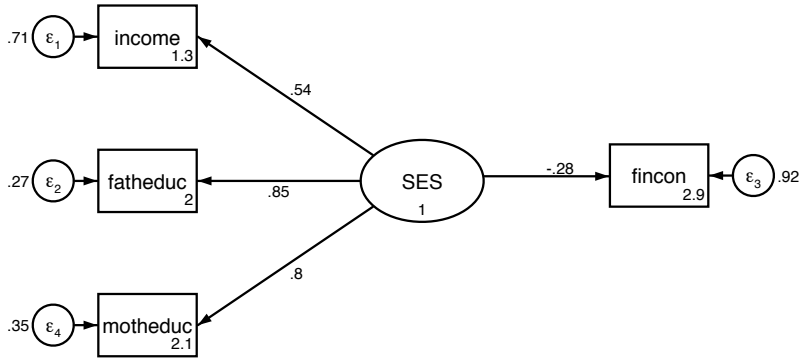
Correlation Between SES and Counseling Latent Variables from 2008 CIRP Freshman Survey Responses



Taken together, these relationships suggest that those students entering CSULB from either *completely non-White* or *completely White* high schools may have experienced less exposure to diversity in terms of both race and SES during their high school education. In the former context, those who successfully enrolled at a four-year university, such as the respondents of the CIRP survey administered at CSULB, found counseling resources to be of more importance in their college-going decision-making than students from predominantly White and higher socioeconomic high school contexts. Furthermore, those students who themselves were of lower SES, irrespective of their high school context, tended to demonstrate higher levels of financial concern, as corroborated by the regression shown in Figure 5.3 below. While not controlling for other factors, the regression coefficient of -0.28 was significant at the $p < 0.001$ level ($N = 1577$) and suggested that SES did predict, in part, students' level of financial concern entering college.

Figure 5.3

Regression of Financial Concern onto SES Latent Variable from 2008 CIRP Freshman Survey Responses



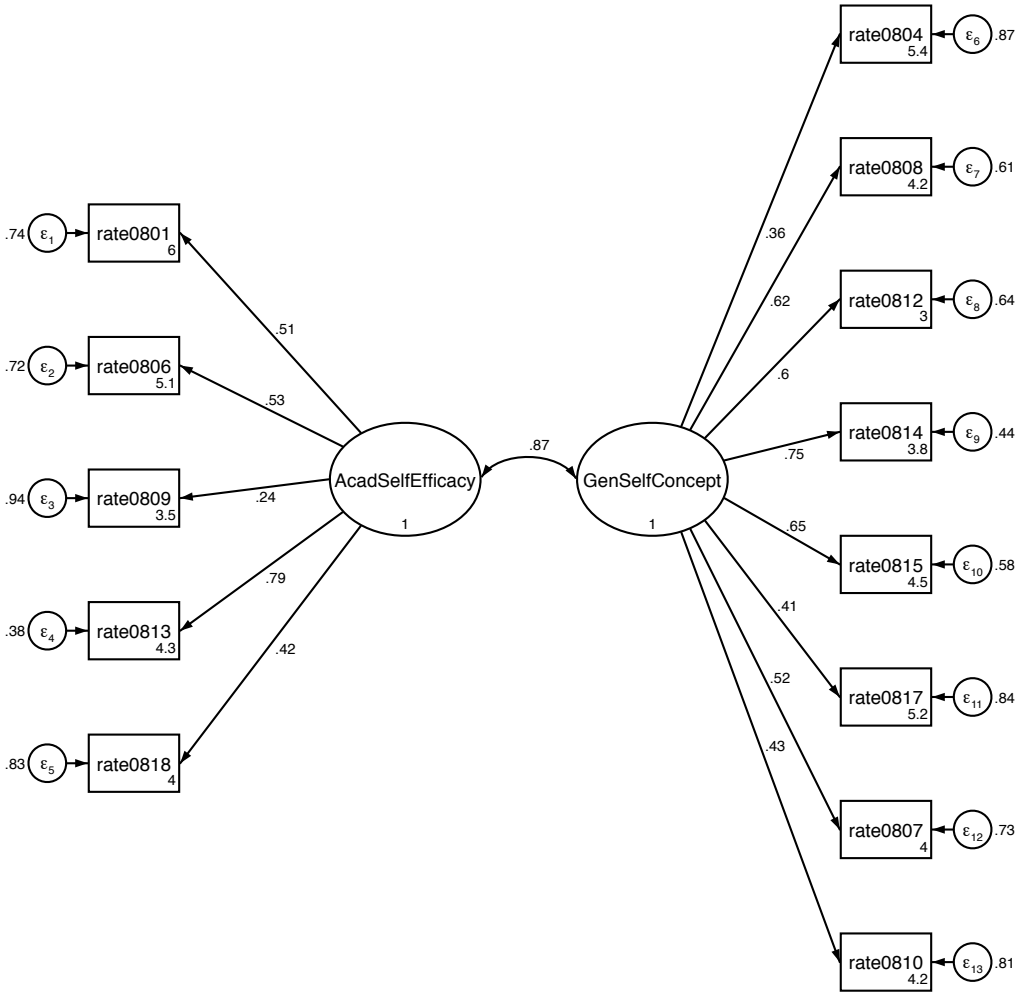
In the structural models, I chose only to include the Context and SES latent variables, as they captured a number of critical variables of students' school and family contexts (i.e., racial composition, household earnings, and parental education). While the Counseling latent variable showed significant relationships with these contextual affordances, it appeared to measure, at least in part, the same phenomena already captured by the other two variables (i.e., social and financial capital). Furthermore, the negative correlations exhibited by the Counseling variable with the other predictor variables seemed somewhat spurious. I could not comfortably draw the conclusion, for example, that students' ratings of importance of counseling resources in their college decision-making negatively influenced their academic or standardized test performance. Instead, this relationship appeared more attributable to a shared common cause, such as SES.

Other noteworthy relationships included those between students' self-ratings on the latent variables Habits of Mind, Academic Self-Efficacy, and General Self-Concept and their relationships with high school GPA. Firstly, there were comparatively robust correlations between these three latent variables, with a particularly strong relationship between Academic Self-Efficacy and General Self-Concept, whose indicators were all measured on the same survey item scale (i.e., 1 = *Lowest 10 percent* and 5 = *Highest 10 percent*) and appeared in the same

section of the CIRP survey instrument. In fact, when comparing the measurement models of these latent constructs, the correlation was even more substantial than shown in the matrix (see Figure 5.4 below). With a correlation of 0.87 significant at $p < 0.001$ ($N = 1722$), one could argue that these scales may not measure substantively different dimensions of students' perceptions of themselves. For this reason, I decided to exclude the General Self-Concept latent variable from my full structural models. In doing so, I prioritized the academic self-efficacy dimension of students' self-ratings, reduced potential redundancy from inclusion of both measures in the model, and achieved greater parsimony.

Figure 5.4

Correlation Between Academic Self-Efficacy and General Self-Concept Latent Variables from 2008 CIRP Freshman Survey Responses



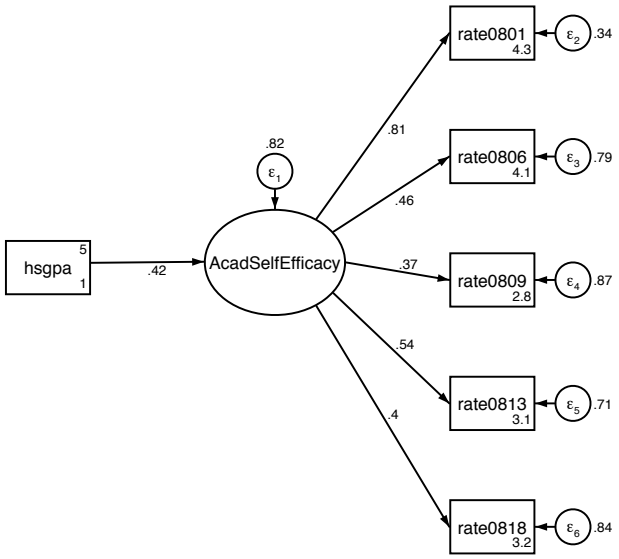
An analysis of the relationships between students' self-ratings and their academic performance in high school also proved fruitful. For example, in assessing their habits of mind on the CIRP survey, students were asked to reflect on their study-related behaviors during the previous year (prior to their high school graduation). In this way, such habits could be conceived as pre-dating respondents' overall high school GPA, which would be determined at the time of graduation. Following this temporal logic and regressing students' average grade in high school onto the Habits of Mind latent variable produced the same 0.14 path coefficient as listed in the matrix above. While small, the regression was significant at $p < 0.001$ ($N = 1695$). This relationship suggests that the higher the frequency in which students engaged in adaptive study behaviors during their senior year in high school the higher their overall academic performance, as measured by high school grades.

Despite this significant relationship, I did not include the Habits of Mind latent variable in the full structural models. Its relationship with both students' high school GPA and their subsequent Academic Self-Efficacy appeared to measure a shared underlying phenomenon: students' positive interaction with and reinforcement from their educational experiences. Indeed, the influence of this culminating average high school GPA on students' self-perceptions of their academic ability entering college was positive. Shown in Figure 5.5 below, a regression of students' Academic Self-Efficacy onto their average earned grade in high school revealed a robust relationship. While not accounting for other influential factors or common causes, the regression coefficient equaled 0.42 and was significant at the $p < 0.001$ level ($N = 1737$). In this way, an argument could be made that these three variables interacted within a feedback loop: habits of mind influenced academic performance; performance subsequently impacted

academic self-efficacy; and this sense of efficacy – positively correlated with habits of mind – could have also fostered further engagement in adaptive study behaviors, leading to continued reinforcement vis-à-vis strong grades (and so on). Irrespective of the possible recursive nature of these variables, I initially included Habits of Mind in my structural models, with both the HSGPA and Academic Self-Efficacy variables regressing onto it, but the estimation would not converge. This latent variable was, therefore, ultimately excluded from the structural models.

Figure 5.5

Regression of Academic Self-Efficacy Latent Variable onto HSGPA from 2008 CIRP Freshman Survey Responses



Taken together, a story of influence begins to unfold: students who reported higher frequency in engaging in study- and inquiry-related habits of mind tended to graduate high school with higher grades on average. Moreover, these grades – coupled with students' performance on standardized tests – seemed to be a source, at least in part, of students' perceptions of their academic capability at the entry point into college as well as a catalyst for higher expectations for their future performance at the University (the polychoric matrix above shows positive bivariate correlations between all of these variables). Also of note, the relationship between students' reported average earned grade in high school and their GPA at

the close of their third semester at the University (GPAF09) was positive and substantial (listed at 0.41 in the matrix). This first-year GPA variable and its associated covariate, earned units in Fall 2009 (UNTF09), showed strong relationships with students' ultimate graduation, represented by the dichotomous variable GRAD in the matrix. It would seem, therefore, that the GPAF09 and UNTF09 variables were logical candidates for inclusion in the model as intermediary outcomes, bridging the chronological divide between variables measured during – or soon after – high school and college graduation multiple years later. Again, in the interest of eliminating redundancy and achieving greater parsimony, I did not include the first-year units variable in the structural model and, instead, utilized it in a multiple regression analysis to follow. As units earned in the third semester was a direct function of students' GPAs, I still maintained conceptual integrity by employing the GPAF09 observed variable as my intermediary outcome.

Variable Interrelationships: Student Groups

Prior to fitting the structural models, I conducted a number of analyses to explore the student groups under investigation here (i.e., sex, race, and major) and to flesh out their interrelationships with key graduation outcomes. Of particular interest in this study were the dynamics of college readiness across majors, as I sought to determine whether or not predictors of postsecondary success were equally salient for all majors. Thoroughly answering this question necessitated the delineation of entering freshmen pursuing majors within science, technology, engineering, and math (STEM) fields versus Non-STEM fields as well as those who entered the University as "Undecided." Of additional interest was the comparison of freshmen who persisted in their original field of study versus those who made a change into another field, whether voluntarily or by University mandate (e.g., for academic deficiency reasons or failure to meet

major impaction criteria). The analyses below demonstrate students' graduation and major change trajectories by sex (or gender) and race (or ethnicity).

In Table 5.2 below, the data reveal that the female CIRP respondents graduated at higher rates than their male counterparts and, among the graduates of both genders, the percentage of females who culminated within five years or fewer was also greater than males, 71.2% versus 66.7%, respectively. This discrepancy in time-to-degree may be attributable, in part, to the nature of their fields of study, however. Significantly fewer females than males graduated within the STEM fields, whose strict sequencing of coursework and rigorous curriculum may contribute to delayed progress to degree.

Table 5.2
Fall 2008 FTF Cohort CIRP Freshman Survey Descriptive Statistics & Institutional Research and Assessment Statistics (Graduation Outcomes by Sex/Gender)

Sex/Gender (per CIRP)	Graduated from CSULB		Time to Degree	Major at Graduation	
	No	Yes	≤ 5 yrs.	NonSTEM	STEM
Males (%)	33.4	66.6	66.7	46.6	53.4
Females (%)	25.8	74.2	71.2	68.2	31.8

Table 5.3 below shows the ways these outcomes play out by race/ethnicity. With respect to those CIRP respondents who graduated from CSULB, there were the greatest percentages of graduates among the White/Caucasian and Asian American/Asian student groups, each topping 75%. Conversely, the African American/Black students graduated at the lowest rate of all groups at 58.6%. The time-to-degree statistics also favored the White students: over 80% of White students who graduated from CSULB did so in less than or equal to five years, while just over 60% of African American and Mexican American/Chicano graduates completed their degrees within the same timeframe (the remaining graduates took up to seven years to culminate). Asian

students also experienced longer time-to-degree in comparison to their White counterparts; however, this trend may be partly explained by the comparatively greater percentage of Asian students graduating within the STEM fields. However, the same rationale could not explain the delayed time-to-degree for the African and Mexican American populations, whose percentage of STEM graduates was more comparable to Whites. Indeed, at 28% of graduates in the STEM fields, Mexican Americans trailed their White peers by about 10% in terms of graduates within these majors.

Table 5.3
Fall 2008 FTF Cohort CIRP Freshman Survey Descriptive Statistics & Institutional Research and Assessment Statistics (Graduation Outcomes by Race/Ethnicity)

Race/Ethnicity (per CIRP)	Graduated from CSULB		Time to Degree	Major at Graduation	
	No	Yes	≤ 5 yrs.	NonSTEM	STEM
RACE1 - White/Caucasian (%)	24.4	75.6	80.1	62.1	37.9
RACE2 - African American/Black (%)	41.4	58.6	62.1	60.3	39.7
RACE3 - American Indian/Alaska Native (%)	33.3	66.7	73.1	57.7	42.3
RACE4 - Asian American/Asian (%)	23.6	76.4	66.8	49.0	51.0
RACE5 - Native Hawaiian/Pacific Islander (%)	35.6	64.4	66.2	58.5	41.5
RACE6 - Mexican American/Chicano (%)	33.7	66.3	61.2	72.0	28.0
RACE7 - Puerto Rican (%)	35.7	64.3	77.8	88.9	11.1
RACE8 - Other Latino (%)	34.8	65.2	59.1	69.3	30.7
RACE9 - Other (%)	28.0	72.0	79.1	52.2	47.8

Taken together, some noteworthy trends emerge. Among the CIRP respondents of the Fall 2008 FTF cohort, the University graduated more of its female than male students. It also saw more of its White students graduate in a timely manner than any other race/ethnicity represented on the survey, and Asian students also culminated at strong, albeit slower, rates. Students of other underrepresented populations graduated from the University at lower rates and, among those who did graduate, their time-to-degree was longer; this pattern was also true for males in comparison to their female peers. Parceling out students' major change patterns by

race/ethnicity could explain these disparities, in part. For example, in Table 5.4 below, the percentage of Asian American/Asian students (i.e., R4) who began their undergraduate careers intending to pursue a major within a STEM field and graduated within the same or another STEM discipline reached nearly 45%, the highest among all racial/ethnic groups. There was a similarly high persistence rates in the STEM fields among males, exceeding 46%. On the contrary, among the Mexican American/Chicano population (i.e., R6) there were almost equal percentages of students who persisted in a STEM discipline as those who ultimately transferred into a Non-STEM route, 23.7% to 22.1%, respectively. This pattern of major redirection was also exhibited among females, with over 20% transferring out of the STEM fields compared to 25.5% persisting in STEM. While these comparatively higher rates of major changes could explain graduation delays for the Mexican/Chicano population, it does not hold true for female students at large, rendering the Chicana/Latina experience difficult to interpret.

Table 5.4
Fall 2008 FTF Cohort CIRP Freshman Survey Descriptive Statistics & Institutional Research and Assessment Statistics (Major Changes by Sex/Gender and Race/Ethnicity)

	M	F	R1	R2	R3	R4	R5	R6	R7	R8	R9
NonSTEM (%)	27.1	41.3	40.2	32.7	36.0	29.2	28.6	41.4	62.5	43.4	29.2
NonSTEM to STEM (%)	4.6	4.1	5.6	3.8	12.0	5.2	0.0	3.4	0.0	2.4	1.5
STEM to NonSTEM (%)	15.3	20.2	16.4	15.4	16.0	17.5	23.8	22.1	12.5	19.3	18.5
STEM (%)	46.3	25.5	27.9	36.5	28.0	44.3	39.7	23.7	12.5	27.7	40.0
Undec to NonSTEM (%)	4.6	6.6	6.1	11.5	8.0	2.4	6.3	8.4	12.5	4.8	6.2
Undec to STEM (%)	2.0	2.3	3.7	0.0	0.0	1.4	1.6	0.9	0.0	2.4	4.6

In an effort to make statistical meaning out of these patterns, I ran two exploratory regressions. The first was a logistic regression, utilizing the dichotomous outcome variable Grad Status (i.e., 0 = *No*, 1 = *Yes*). I regressed onto this outcome variable four predictors: Sex (i.e., 0 = *Male* and 1 = *Female*); Race1 (i.e., 0 = *Non-White* and 1 = *White*); Major Fresh Agg (i.e.,

aggregated major at the time of college entry, 1 = *Non-STEM*, 2 = *STEM*, and 3 = *Undecided*); and Units Fall 09 (i.e., units earned in Fall 2009). In doing so, I accommodated for students' demographic characteristics, their field of study as incoming freshmen, and their initial degree progress during their third term at the University in investigating their likelihood of eventual graduation. As Table 5.5 below reveals, both sex and race were predictive of students' graduation at the $p < 0.01$ and $p < 0.05$ alpha levels, respectively, demonstrating that being female or White was positively related to graduation controlling for all other variables in the regression (N = 1662). In this and all other tables to follow, those p-values designated with a single asterisk represent significant test statistics at the 0.05 alpha level, while a double asterisk indicates significance at $p < 0.01$. Furthermore, students' entering majors were not statistically significant in forecasting the likelihood of graduation, but their earned units during the Fall 2009 semester strongly predicted culmination in seven years.

Table 5.5
Logistic Regression Output (2008 FTF Cohort Graduation Status)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
GradStatus <-						
Sex (Female)	0.397	0.131	3.03	**0.002	0.140	0.654
Race1 (White)	0.288	0.132	2.17	*0.030	0.028	0.547
MajorFreshAgg (STEM)	-0.225	0.137	-1.64	0.100	-0.493	0.043
MajorFreshAgg (Undecided)	0.062	0.267	0.23	0.816	-0.461	0.585
UnitsFall09	0.217	0.014	15.78	**0.000	0.190	0.243

Next, I ran a Poisson regression, utilizing Semesters to Graduation as my count dependent variable and regressing onto it Sex, Race1, Units Fall 09, and Major Change (i.e., whether or not the students' changed their field of study, as calculated by comparing their probable major as indicated on the CIRP survey and their conferred degree, 0 = *Yes* and 1 = *No*). Of note, this analysis was restricted to the population of students who successfully graduated

from CSULB within 14 semesters (i.e., seven years). Table 5.6 shows the Poisson regression output (N = 1218). All four independent variables exhibited a negative influence on time-to-degree (i.e., decreased the number of semesters needed to graduate). Overall, being female led to faster degree completion, controlling for the other variables in the regression, as did self-identifying as White. More units completed during students' third term predicted speedier graduation, while not changing one's major (i.e., remaining in either the Non-STEM or STEM fields) lowered time-to-degree. However, not all path coefficients were significant at the $p < 0.05$ level. The influence of students' sex and major change behavior were not significant when accounting for the other variables in the model. Conversely, the other predictor variables, race and units, exhibited significant influence on time-to-degree.

Table 5.6
Poisson Regression Output (2008 FTF Cohort Semesters to Graduation)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
SemtoGrad <-						
Sex (Female)	-0.025	0.019	-1.29	0.197	-0.063	0.013
Race1 (White)	-0.056	0.019	-3.02	**0.002	-0.093	-0.020
UnitsFall09	-0.011	0.003	-3.83	**0.000	-0.017	-0.005
MajorChange (No)	-0.008	0.020	-0.39	0.695	-0.046	0.031

Synthesizing the results from both regressions, it appears race (i.e., self-identifying as White) and early signs of unit accrual were significant predictors of graduation and time-to-degree. To gain a more robust understanding of the phenomena explored in this first section of the chapter, I developed and fitted two structural models. Creating models that accommodated for the complex interrelationships between a number of salient predictor and outcomes variables allowed me to tell a more comprehensive narrative of students' college-going trajectories. The next subsection explores these models and a number of implications they pose.

The Structural Models

In this section, I present the structural models fitted against the 2008 FTF cohort dataset. I also discuss the ways the graduation-outcome model behaved across different student groups (i.e., by sex, race, and major). It should be noted that before fitting the model, I compared the latent variables across the student groups under investigation here to test for group invariance. However, the two-indicator Context latent variable was not fitted as its degrees of freedom would not produce a meaningful chi-squared. The student groups were represented by the Sex, Race1, and Major Fresh Agg variables, coded into the following categories: 0 = *Male* and 1 = *Female* for Sex; 0 = *Non-White* and 1 = *White* for Race1; 1 = *Non-STEM*, 2 = *STEM*, and 3 = *Undecided* for Major Fresh Agg. These three groups represented self-identified classifications, as captured on the CIRP survey.

Utilizing the group comparison functionality in Stata's SEM Builder program, I compared each latent variable by first allowing the parameters to estimate freely across groups and then by imposing equality constraints on the measurement coefficients. In both estimations, the latent variable measurement intercepts were constrained. As Acock (2013) explains, constraining the measurement intercepts "forces the intercepts to be equal, and thereby any difference in means of the indicators is reflected in the means of the latent variables" (p. 232). In this way, within each group comparison, the reference group had a fixed mean of zero, while the other group(s) had a different mean. As reflected in Table 5.7 below, the likelihood-ratio test did not result in a significant change in chi-squared for either the Sex or Major groups; however, for both latent variables (i.e., SES and Academic Self-Efficacy), there was a significant change in chi-squared between the unconstrained and equal loadings models for Race.

Table 5.7

Test of Latent Variable Group Invariance (Fall 2008 FTF Cohort)

Latent Variable Models	N	Chi-squared (df)	Chi-squared (df) diff	P-value
SES				
Unconstrained (Sex)	1577	3.92 (2)	2.40 (2)	0.301
Equal Loadings (Sex)		6.32 (4)		
Unconstrained (Race1)	1583	15.94 (2)	71.35 (2)	**0.000
Equal Loadings (Race1)		87.29 (4)		
Unconstrained (Freshman Major)	1528	3.22 (4)	3.40 (4)	0.493
Equal Loadings (Freshman Major)		6.62 (8)		
Academic Self-Efficacy				
Unconstrained (Sex)	1738	374.71 (14)	8.59 (4)	0.072
Equal Loadings (Sex)		383.30 (18)		
Unconstrained (Race1)	1746	246.95 (14)	21.99 (4)	**0.000
Equal Loadings (Race1)		268.94 (18)		
Unconstrained (Freshman Major)	1680	342.08 (23)	13.34 (8)	0.101
Equal Loadings (Freshman Major)		355.42 (31)		

To further explore the source of these significant changes in chi-squared for the Race1 group, I ran a post-estimation test for group invariance of the measurement parameters. This test revealed that the loadings for the income and mother's education indicators in the SES model as well as the academic ability and drive to achieve indicators in the Academic Self-Efficacy model were the sources of significant difference between White and non-White students. Despite these results, I favored the full structural model in which all the measurement coefficients were equal. In all, there was no statistically significant difference between the Sex and Major groups in the meaning of these latent variables and the difference in meaning for the Race1 group could be attributed to one or two loadings for each measurement model. However, some caution should be taken in interpreting the results of the fitted model between White and Non-White students, as the SES and Academic Self-Efficacy latent variables exhibited somewhat different meanings for these two groups.

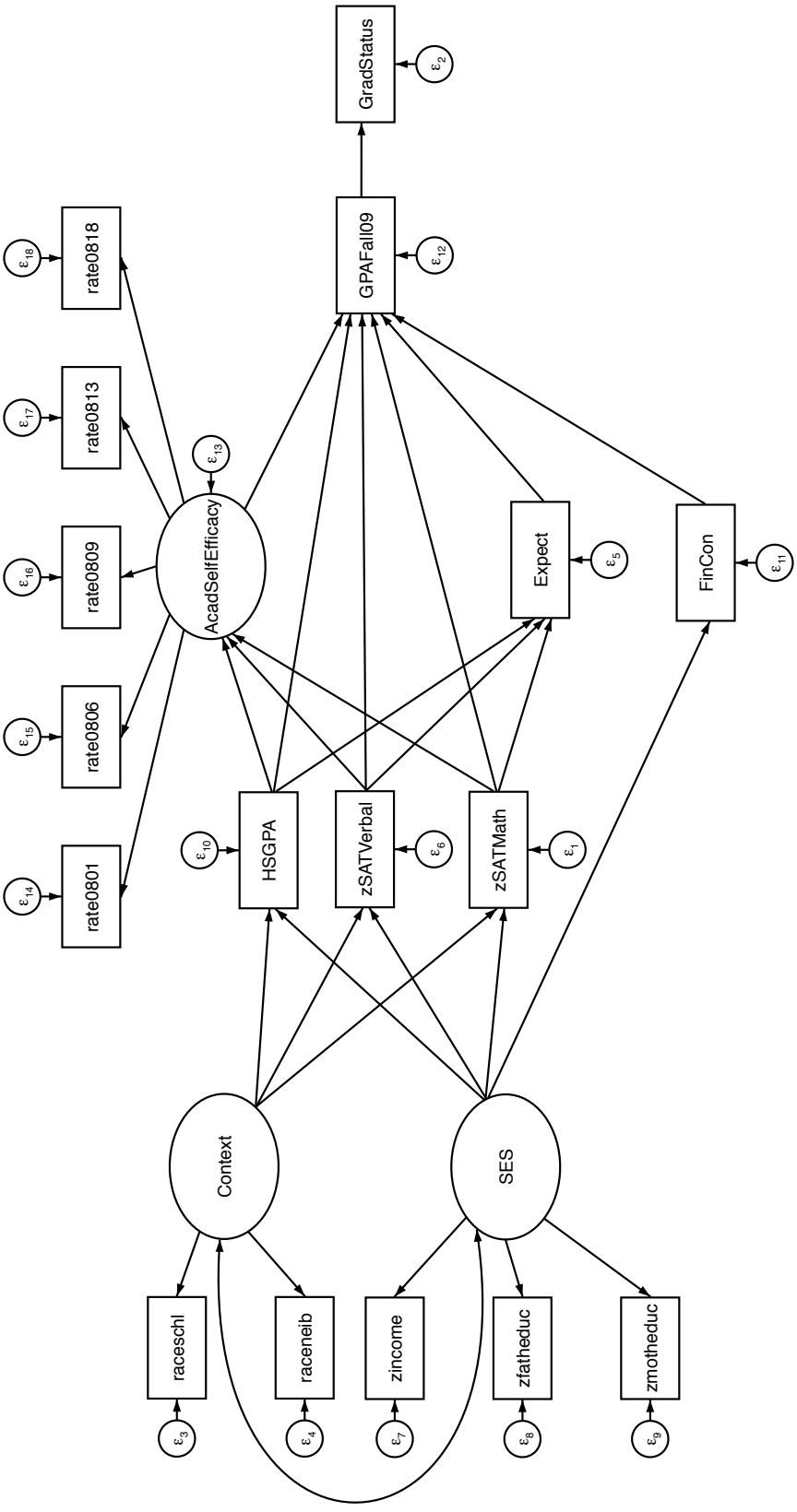
Graduation Outcome Structural Model

The full structural model is shown in Figure 5.6 below. I first fitted this model against the entire Fall 2008 FTF cohort (N = 1356). For this and all other structural model estimations, maximum likelihood was utilized, which resulted in a number of observations with missing values being excluded. Following Figure 5.6, Table 5.8 lists the details of the unstandardized parameter coefficients and their respective p-values for the structural model. In this first model the Grad Status dependent variable represented a dichotomous outcome, measuring whether or not students graduated from the University within seven years (i.e., 0 = *No* and 1 = *Yes*). In order to accommodate for the dichotomous nature of this outcome variable (as well as the Major Change outcome variable in the model to follow), I utilized Stata's GSEM functionality, whose unstandardized output can be viewed in Tables 5.8 and 5.10. However, because GSEM does not allow for goodness of fit post-estimation commands or multiple-group analyses, I utilized Stata's SEM functionality for these estimations, which treated the Grad Status outcome variable as continuous. It should be noted that a comparison of estimations between the models in which the outcome variable was specified as dichotomous versus continuous did not result in any changes to the direction or significance of any of the parameter coefficients.

This model answered my first research question and the fundamental query driving this study: What contexts, dispositions, and habits of incoming first-time freshmen comprise college readiness as demonstrated by students' postsecondary outcomes? Furthermore, fitting this model against different student groups (i.e., by sex, race, and freshman major), I addressed the second research question undergirding the study: Does the impact of these contexts, dispositions, and habits on students' postsecondary outcomes vary by student group or major?

Figure 5.6

Graduation Outcome Structural Model (Fall 2008 FTF Cohort)



The goodness of fit statistics were the following: RMSEA equaled 0.103; CFI reached 0.759; and SRMR landed within the ideal range of 0.05-0.08 at 0.072. Unfortunately, none of these indices reflected a particularly strong fit to the observed data. I did not utilize modification indices to improve the fit, however, as the model represented a proposed theory of interrelationships that I did not want to adjust solely for optimal fit considerations. As the statistics in Table 5.8 reveal, a number of factors were predictive of students' postsecondary success, as measured by graduation from the University within seven years.

Table 5.8
Graduation Outcome Structural Model (Fall 2008 FTF Cohort; N = 1356)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
HSGPA <-						
Context	0.201	0.081	2.48	*0.013	0.042	0.360
SES	0.083	0.063	1.32	0.187	-0.040	0.206
zSATVerbal <-						
Context	0.176	0.071	2.49	*0.013	0.037	0.314
SES	0.447	0.056	7.93	**0.000	0.336	0.557
zSATMath <-						
Context	0.213	0.072	2.95	**0.003	0.071	0.354
SES	0.408	0.057	7.12	**0.000	0.296	0.520
AcadSelfEfficacy <-						
zSATMath	0.098	0.018	5.42	**0.000	0.063	0.134
zSATVerbal	0.122	0.018	6.71	**0.000	0.086	0.157
HSGPA	0.165	0.013	13.10	**0.000	0.140	0.189
Expect <-						
zSATMath	0.053	0.018	2.98	**0.003	0.018	0.088
zSATVerbal	0.029	0.018	1.62	0.106	-0.006	0.064
HSGPA	0.070	0.013	5.58	**0.000	0.045	0.094
FinCon <-						
SES	-0.235	0.022	-10.75	**0.000	-0.277	-0.192
GPAFall09 <-						
zSATMath	0.081	0.022	3.66	**0.000	0.038	0.125
Expect	-0.010	0.034	-0.28	0.776	-0.076	0.057
zSATVerbal	0.108	0.023	4.80	**0.000	0.064	0.152
HSGPA	0.236	0.017	13.81	**0.000	0.203	0.270
FinCon	-0.037	0.029	-1.25	0.211	-0.094	0.021
AcadSelfEfficacy	-0.083	0.050	-1.67	0.094	-0.180	0.014
GradStatus <-						
GPAFall09	1.702	0.115	14.79	**0.000	1.476	1.927

Table 5.8

Graduation Outcome Structural Model (Fall 2008 FTF Cohort; N = 1356)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
cov(Context, SES)	0.351	0.025	13.78	**0.000	0.301	0.401

Following the narrative implied by the model, the racial composition of students' high schools and neighborhoods impacted their reported high school GPAs as well as their performance on both the Verbal and Math sections of the SAT. That is, as the "Whiteness" of students' school and community contexts increased, so too did their academic and test performance. Similarly, students' SES positively influenced their standardized test scores, but did not significantly impact their high school GPAs. Interestingly, when I fitted the model against the Sex and Race1 variables, these relationships took different shape (tables of output statistics for both these group estimations can be found in Appendix C).

For example, for female respondents, the degree of Whiteness of their school and neighborhood contexts positively influenced their reported high school GPAs and SAT scores at a statistically significant level. For male respondents, on the other hand, the Context latent variable did not significantly influence any of these academic performance measures. Students' SES remained positively and significantly influential for SAT Verbal and Math scores for both males and females, but the SES latent variable did not pose implications for the high school GPAs of either sex. Across the Non-White and White groups, the degree of Whiteness of students' contexts as well as their SES significantly influenced SAT Verbal and Math scores. These relationships were all positive barring the path coefficient from Context to the standardized test variables for White students, which were negative, suggesting that White students attending CSULB from predominantly White high schools and neighborhoods tended to have lower

standardized test scores than their White peers coming from less White contexts. A similarly negative and significant relationship was found between Context and high school GPA among White respondents, whereas racial context did not significantly influence reported high school GPA for Non-White students. Of note, students' SES was not predictive of reported high school GPA for Non-White students, and yet it was positively and significantly influential for White students. Taken as a whole, contextual affordances, such as the racial composition of students' learning and living environments as well as their family's SES, appeared to impact academic preparedness variables like high school GPA and standardized test scores, but these relationships varied in significance and directionality by sex and race. Of note, students' SES also significantly influenced their self-reported level of financial concern upon entry into the University. This relationship remained significant across all student groups.

In turn, these measures of academic and standardized test performance appeared to positively impact students' self-reported levels of Academic Self-Efficacy as well as their expectations to perform well at the collegiate level upon entry to the University. Barring the path from SAT Verbal scores to students' performance expectations, all other coefficients between these variables were statistically significant. Investigating these relationships by sex and race revealed Academic Self-Efficacy ratings for males and females as well as Non-White and White students were positively and significantly influenced by these pre-college academic attainment metrics (i.e., both GPA and test scores). With respect to students' projections of future performance in college, high school GPA positively impacted expectations for males and females as well as Non-White and White students. However, standardized test scores were generally not significant in students' reported expectations. The exception to this trend was SAT Math scores,

which positively and significantly influenced performance expectations for females and Non-White students, and SAT Verbal scores were also significantly predictive of expectations for Non-White students. Taken together, these findings revealed that academic and test performance metrics influenced students' self-ratings of their academic ability, and these relationships remained constant across sex and race. Furthermore, students' high school GPAs affected their future orientation towards college performance across all groups, whereas the ways students' standardized test scores informed expectations varied by sex and race. Interestingly, these self-assessments appeared to have little bearing on students' actual performance in college.

An inventory of the impact of all these factors on students' cumulative GPA by the close of the third term at the University (GPAFall09) revealed that only the academic preparedness factors (i.e., high school GPA and SAT scores) predicted students' performance during their first semesters in college. Their Academic Self-Efficacy, performance expectations, and level of financial concern seemed largely irrelevant in predicting their collegiate performance. Furthermore, the GPAFall09 variable was a strong indicator of students' eventual graduation from the University. Unpacking these trends by sex, the data tell a slightly different story. For males, neither the SAT Math nor the SAT Verbal scores were predictive of their GPAs by Fall 2009, while these standardized test scores were predictive for their female peers. However, high school GPA predicted college GPA for both groups. Measures of Academic Self-Efficacy, performance expectations, and level of financial concern were not significant predictors of college performance for either sex. Looking at the data by race demonstrated that high school GPA and standardized test performance significantly predicted college GPA for both Non-Whites and Whites, excluding one path coefficient: SAT Math for White students. The areas of financial

concern, performance expectations, and Academic Self-Efficacy were not predictive of college GPA for either Non-White or White students, barring one interesting significant relationship: Academic Self-Efficacy negatively and significantly predicted college GPA for White students, suggesting those White students who rated themselves high on measures of academic ability tended to perform worse during their first three terms at the University. Of note, the Fall 2009 GPA metric was predictive of graduation from the University across all student groups.

This last set of findings for this structural model suggest that more "affective" areas of efficacy and performance expectations were not nearly as robust predictors of postsecondary success (i.e., college GPA and graduation from the University) as the academic preparedness metrics in the model. These academic achievement variables influenced students' self-perceptions and future orientations, in part, but the residuals of these variables suggest that perceptions and orientations were also influenced by other factors not included in the model. Ultimately, these self-ratings did not significantly affect students' college performance, barring a noteworthy negative relationship between Academic Self-Efficacy and college GPA for White students in this cohort.

Graduation Outcome Structural Model by Major

Fitting this structural model against the Major Fresh Agg variable unearthed a number of interesting findings shown in Table 5.9 below (N = 1324). It should be noted that the results for the Undecided students, designated by a "U" in the table, must be interpreted with caution, as only 132 students self-identified as "Undecided" on the CIRP survey.

Table 5.9

Graduation Outcome Structural Model by Major (Fall 2008 FTF Cohort; N = 1324)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
HSGPA <-						
Context (N)	0.290	0.124	2.34	*0.019	0.047	0.533
Context (S)	0.201	0.114	1.76	0.078	-0.022	0.424
Context (U)	-0.379	0.448	-0.84	0.398	-1.257	0.500
SES (N)	0.034	0.101	0.34	0.734	-0.164	0.232
SES (S)	0.065	0.088	0.74	0.460	-0.107	0.236
SES (U)	0.544	0.290	1.87	0.061	-0.025	1.113
zSATVerbal <-						
Context (N)	0.107	0.108	0.99	0.321	-0.104	0.318
Context (S)	0.212	0.100	2.12	*0.034	0.016	0.407
Context (U)	0.371	0.518	0.71	0.475	-0.645	1.386
SES (N)	0.637	0.096	6.64	**0.000	0.449	0.825
SES (S)	0.355	0.077	4.61	**0.000	0.204	0.506
SES (U)	0.303	0.302	1.00	0.316	-0.289	0.895
zSATMath <-						
Context (N)	0.078	0.107	0.73	0.467	-0.132	0.287
Context (S)	0.274	0.104	2.63	**0.009	0.070	0.478
Context (U)	0.637	0.531	1.20	0.231	-0.404	1.678
SES (N)	0.628	0.095	6.64	**0.000	0.443	0.814
SES (S)	0.335	0.081	4.15	**0.000	0.177	0.493
SES (U)	0.100	0.304	0.33	0.743	-0.497	0.697
AcadSelfEfficacy <-						
zSATMath (N)	0.102	0.028	3.64	**0.000	0.047	0.157
zSATMath (S)	0.082	0.024	3.36	**0.001	0.034	0.130
zSATMath (U)	0.102	0.080	1.28	0.201	-0.054	0.258
zSATVerbal (N)	0.143	0.028	5.19	**0.000	0.089	0.197
zSATVerbal (S)	0.121	0.025	4.76	**0.000	0.071	0.170
zSATVerbal (U)	0.084	0.077	1.10	0.272	-0.066	0.234
HSGPA (N)	0.156	0.013	12.16	**0.000	0.131	0.181
HSGPA (S)	0.167	0.013	13.09	**0.000	0.142	0.192
HSGPA (U)	0.140	0.016	8.92	**0.000	0.110	0.171
Expect <-						
zSATMath (N)	0.087	0.028	3.05	**0.002	0.031	0.142
zSATMath (S)	0.025	0.024	1.05	0.292	-0.022	0.073
zSATMath (U)	0.070	0.089	0.78	0.433	-0.104	0.243
zSATVerbal (N)	-0.024	0.028	-0.86	0.390	-0.078	0.031
zSATVerbal (S)	0.066	0.025	2.61	**0.009	0.017	0.116
zSATVerbal (U)	0.095	0.083	1.14	0.255	-0.068	0.258
HSGPA (N)	0.046	0.019	2.45	*0.014	0.009	0.083
HSGPA (S)	0.077	0.018	4.40	**0.000	0.043	0.112
HSGPA (U)	0.121	0.053	2.30	*0.021	0.018	0.225

Table 5.9

Graduation Outcome Structural Model by Major (Fall 2008 FTF Cohort; N = 1324)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
FinCon <-						
SES (N)	-0.265	0.037	-7.08	**0.000	-0.339	-0.192
SES (S)	-0.229	0.029	-7.98	**0.000	-0.285	-0.173
SES (U)	-0.160	0.076	-2.11	*0.035	-0.308	-0.011
GPAFall09 <-						
zSATMath (N)	0.112	0.037	3.03	**0.002	0.040	0.185
zSATMath (S)	0.083	0.030	2.73	**0.006	0.024	0.143
zSATMath (U)	0.126	0.076	1.64	0.100	-0.024	0.275
Expect (N)	-0.051	0.058	-0.87	0.383	-0.164	0.063
Expect (S)	0.001	0.047	0.01	0.989	-0.092	0.094
Expect (U)	0.139	0.090	1.55	0.121	-0.037	0.315
zSATVerbal (N)	0.110	0.037	2.95	**0.003	0.037	0.184
zSATVerbal (S)	0.096	0.032	2.97	**0.003	0.033	0.159
zSATVerbal (U)	-0.039	0.071	-0.55	0.579	-0.177	0.099
HSGPA (N)	0.238	0.027	8.75	**0.000	0.184	0.291
HSGPA (S)	0.247	0.025	10.03	**0.000	0.198	0.295
HSGPA (U)	0.177	0.048	3.71	**0.000	0.084	0.270
FinCon (N)	-0.091	0.046	-1.97	*0.049	-0.181	0.000
FinCon (S)	-0.006	0.042	-0.14	0.886	-0.088	0.076
FinCon (U)	-0.012	0.087	-0.14	0.892	-0.181	0.158
AcadSelfEfficacy (N)	-0.105	0.090	-1.17	0.241	-0.281	0.071
AcadSelfEfficacy (S)	-0.062	0.068	-0.91	0.360	-0.194	0.071
AcadSelfEfficacy (U)	-0.026	0.134	-0.20	0.845	-0.290	0.237
GradStatus <-						
GPAFall09 (N)	0.268	0.023	11.63	**0.000	0.223	0.314
GPAFall09 (S)	0.301	0.020	15.37	**0.000	0.263	0.339
GPAFall09 (U)	0.343	0.067	5.08	**0.000	0.211	0.475
cov(Context, SES) (N)	0.301	0.036	8.45	**0.000	0.231	0.371
cov(Context, SES) (S)	0.369	0.033	11.30	**0.000	0.305	0.433
cov(Context, SES) (U)	0.418	0.087	4.81	**0.000	0.248	0.588

An exploration of the contextual affordances in the model revealed some differences between Non-Stem (N) and Stem (S) students. For example, the racial composition of students' school and neighborhood contexts significantly positively influenced the SAT Scores only among entering STEM students, while SES exerted a significant impact on these standardized test scores among both Non-STEM and STEM freshmen. The SES latent variable also influenced students'

level of financial concern entering college among all major groups, with students coming from higher socioeconomic echelons indicating less financial concern upon college entry.

Furthermore, the Academic Self-Efficacy ratings among Non-STEM and STEM students was significantly influenced by test scores on both the SAT Verbal and Math sections as well as high school GPA. Interestingly, high school GPA also influenced students' performance expectations across all major groups, but the effect of SAT scores varied by major in an almost contradictory pattern: SAT Math scores significantly impacted performance expectations among Non-STEM students, while SAT Verbal scores influenced expectations among STEM students. The fact that SAT scores on both sections were predictive of students' college GPAs by their third term across Non-STEM and STEM fields makes these findings around performance expectations even more fascinating. To elaborate, among entering STEM students SAT Math performance was not statistically influential in determining their performance expectation in college, and yet it was a strong predictor of their GPA by Fall 2009; the same applies to Non-STEM students in relation to their SAT Verbal scores. This suggests a disconnect between the level of emphasis STEM and Non-STEM students place on their math and verbal aptitude (as measured by the SAT), respectively, in calibrating their expectations of doing well at the University, even though both sections of the SAT significantly predicted their eventual college performance.

As with the student groups explored above, neither the "affective" variables of Academic Self-Efficacy and performance expectations nor the measure of financial concern were significant in predicting students' postsecondary GPA, except for financial concern among Non-STEM students, which exerted a significant negative effect. This latter finding bears more exploration to determine the source of saliency of financial concerns among this major group. The

significance of high school GPA in predicting college GPA by Fall 2009 and, in turn, the significance of the GPAFall09 variable on students' ultimate graduation remained a salient pattern across all major groups. In all, it appears that major groups shared many predictors of postsecondary success in common. On the other hand, there were at least two differences between major groups that warrant further exploration: (1) the influences of contextual affordances on academic preparedness metrics and (2) the ways these metrics informed student performance expectations.

Major Change Outcome Structural Model

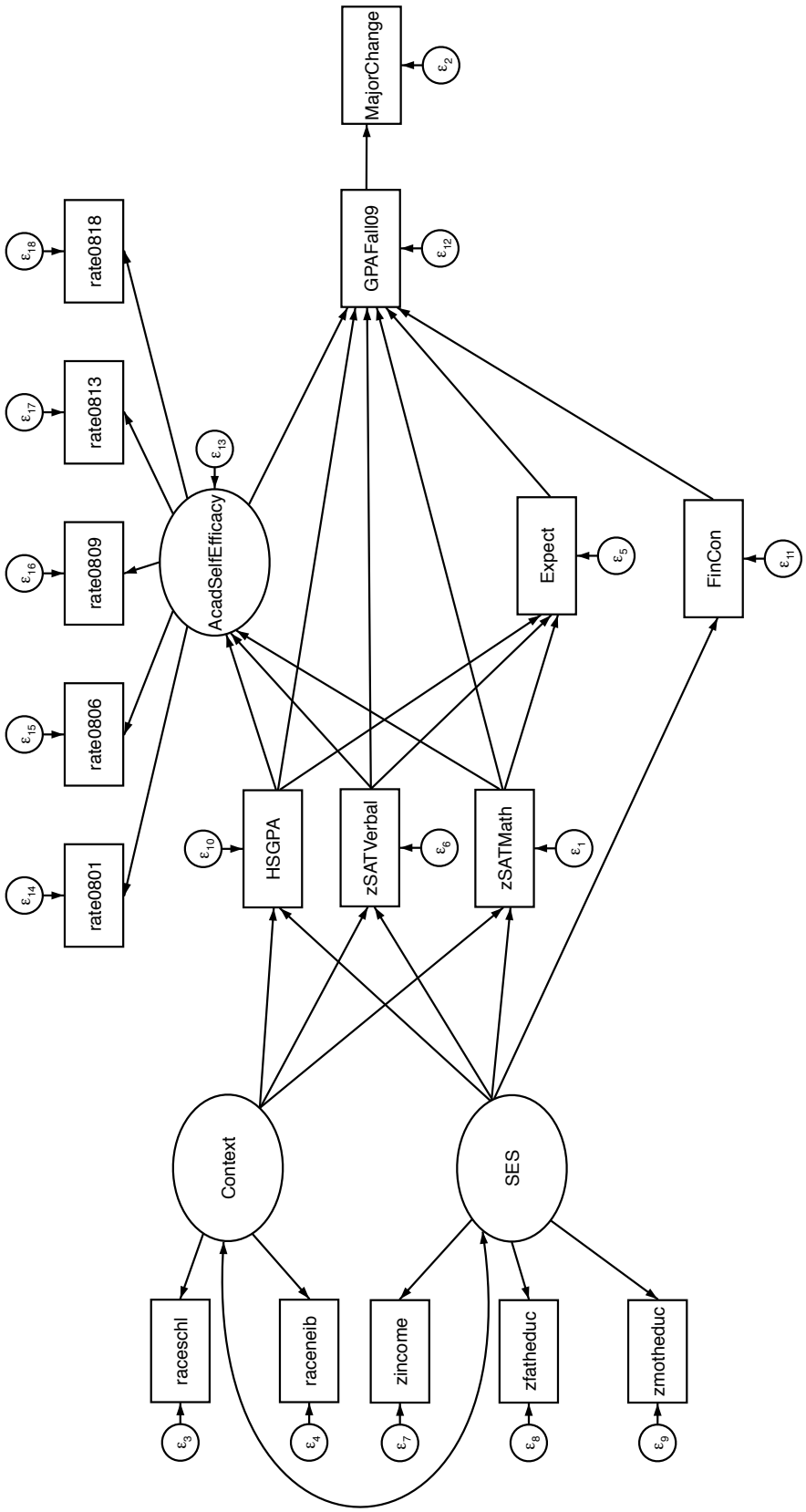
To round out this discussion of major-specific college readiness, I fitted one final model against a dichotomous outcome variable, Major Change, that measured whether or not students graduated the University within seven years in their original field of study (i.e., 0 = *Yes,* a major change was made, or 1 = *No,* a major change was not made). In this context, a major change constituted moving out of a STEM field into a Non-STEM field, or visa versa. It did not account for more nuanced major changes within the same global field of study (e.g., from Anthropology to English, both Non-STEM fields, or from Nursing to Health Science, both STEM fields). Furthermore, this model looked only at students who successfully graduated, as the major change variable relied on a comparison between students' probable major as indicated on the CIRP survey instrument and the field of study of their awarded degree. In this way, the model in Figure 5.7 below answered another fundamental question: What contexts, dispositions, and habits predict students' graduation within seven years in their original field of study?

The goodness of fit statistics were the following (N = 981): RMSEA equaled 0.098; CFI reached 0.767; and SRMR landed within the ideal range of 0.05-0.08 at 0.073. Not unlike the

preceding model, none of these indices reflected a particularly strong fit to the observed data. As before, however, I did not utilize modification indices to improve the fit, as I wanted to retain the theoretical integrity of the model and refrain from making adjustments simply for optimal fit considerations.

Figure 5.7

Major Change Outcome Structural Model (Fall 2008 FTF Cohort)



The statistics in Table 5.10 below present a similar narrative as those in the graduation outcome model explored above.

Table 5.10
Major Change Outcome Structural Model (Fall 2008 FTF Cohort; N = 981)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
HSGPA <-						
Context	0.197	0.100	1.96	*0.050	0.000	0.393
SES	0.070	0.073	0.97	0.334	-0.072	0.213
zSATVerbal <-						
Context	0.200	0.085	2.36	*0.018	0.034	0.366
SES	0.381	0.063	6.09	**0.000	0.258	0.504
zSATMath <-						
Context	0.249	0.086	2.91	**0.004	0.081	0.417
SES	0.352	0.063	5.57	**0.000	0.228	0.476
AcadSelfEfficacy <-						
zSATMath	0.106	0.021	5.01	**0.000	0.064	0.147
zSATVerbal	0.117	0.021	5.58	**0.000	0.076	0.159
HSGPA	0.176	0.015	11.92	**0.000	0.147	0.205
Expect <-						
zSATMath	0.032	0.020	1.55	0.121	-0.008	0.071
zSATVerbal	0.035	0.020	1.73	0.084	-0.005	0.075
HSGPA	0.075	0.014	5.20	**0.000	0.047	0.103
FinCon <-						
SES	-0.227	0.025	-8.98	**0.000	-0.276	-0.177
GPAFall09 <-						
zSATMath	0.061	0.018	3.38	**0.001	0.025	0.096
Expect	-0.017	0.028	-0.59	0.555	-0.072	0.039
zSATVerbal	0.103	0.018	5.74	**0.000	0.068	0.138
HSGPA	0.179	0.014	12.76	**0.000	0.151	0.206
FinCon	0.030	0.024	1.25	0.211	-0.017	0.076
AcadSelfEfficacy	-0.028	0.039	-0.71	0.478	-0.105	0.049
MajorChange <-						
GPAFall09	0.677	0.138	4.92	**0.000	0.407	0.947
cov(Context, SES)	0.326	0.029	11.21	**0.000	0.269	0.383

The interrelationships between the pre-college contextual affordance variables and students' academic performance metrics were all statistically significant, excluding the path coefficient between the SES latent variable and students' high school GPA. In this model, students' SES remained a strong predictor of their level of financial concern entering college. As

before, students' academic and test performance metrics were significant contributors to students' ratings of Academic Self-Efficacy, while high school GPA appeared to be the only significant influential factor for students' performance expectations. In the end, the factors most predictive of students' GPA during their first three terms were their SAT scores and their high school GPA, while their ultimate graduation within their original field of study was significantly related to this first-year GPA variable measured earlier in their college careers.

Summary of Findings

In closing, the key findings of this study frame the discussion that follows in the concluding chapter. I have highlighted in bulleted form below a summary of this study's findings:

- Overall, among the 2008 FTF CIRP respondents at CSULB, contextual affordances within students' pre-college environments (i.e., their communities, schools, and families) exerted influence on their academic and standardized test performance in high school. Conversely stated, measures of academic preparedness entering the University were sensitive to the racial composition of students' high school contexts as well as their SES.
- These contextual affordances significantly correlated with the degree to which students' relied on school- and private-based counseling resources in their decision to attend CSULB. For instance, students of higher SES rated school- and private-based counseling resources as less important in their decision-making process compared to their less affluent peers.
- SES also influenced the level of financial concern with which students began their undergraduate careers at the University. However, students' level of financial concern upon entry did not pose significant ramifications for their first-year performance in

college. Of note, while financial concern was not a significant predictor of first-year GPA in this study, prior research utilizing this CIRP survey item has shown that students' self-reported level of financial concern can impact their sense of success in managing their academic environment during this critical college transition period (Hurtado et al., 2007).

- In addition to considerations of context, the frequency with which students engaged in productive habits of mind during their senior year was positively associated with their high school performance, as measured by students' self-reported average grades earned in high school.
- In turn, traditional academic preparedness metrics impacted students' formation of their academic self-efficacy as well as their expectations for performance in college. While academic self-efficacy ratings and performance expectations were relatively high for this incoming cohort, these factors were not significant predictors of students' eventual postsecondary performance and culmination. Instead, measures of academic preparedness appeared to be the most salient. However, a model that better accommodates for the possibly recursive nature of habits of mind, academic self-efficacy, performance expectations, and GPA may more effectively capture the complex interplay of these variables and highlight the role each of these variables plays in students' postsecondary success. Furthermore, measures of students' self-concept, drawn from the CIRP survey, have been shown to positively impact their sense of belonging and academic adjustment during their first year in college (Hurtado et al., 2007), suggesting a possible mediating effect of self-concept and efficacy on students' postsecondary outcomes not accommodated in the present models.

- Furthermore, an investigation of these interrelationships across student groups (i.e., sex, race, and major) revealed both commonality and divergence, but further analysis should be conducted to parcel out the ways college readiness takes shape across student groups. For example, looking at this – or a similar model – for Chicana/Latina females in the STEM disciplines might better capture these college readiness phenomena at the nexus of sex, race, and major.

Chapter Six: Conclusion

A number of conclusions can be drawn from the findings presented in this study, including insights and recommendations that stem from the conceptual and methodological limitations I encountered in conducting this research. In this chapter, I present these emergent themes as well as address implications for CSULB specifically and the broader K-16 educational continuum. I also posit a number of suggestions for future research that could deepen our understanding of college readiness as it pertains to students' success at the postsecondary level.

Implications of the Findings

The findings from this study support the literature in numerous respects. Firstly, the building and fitting of these models confirmed the complexity of studying college readiness. Arnold et al. (2012) rightly contend that efforts to investigate students' college readiness should adopt an ecological approach in which models of readiness incorporate diverse student- and environment-specific factors: "the role of student individual characteristics and personal agency; the characteristics of multiple, interacting levels of context; the effects of chronological and historical time; and, above all, the processes through which all these elements effect change in students" (p. 8). Arguably, the models presented here did not perfectly achieve this goal. However, the employment of structural equation modeling (SEM) in this study of students' longitudinal postsecondary data offered a conceptual and statistical means of mapping out and studying the multi-faceted college readiness phenomenon. These models also validated the notion that students' academic preparedness and, in turn, their self-perceptions and performance expectations upon college entry are indeed sensitive to their pre-college contexts (i.e., the racial composition of their high schools and neighborhoods as well as their family's

socioeconomic status, SES). In this way, we see that "individual" metrics of academic achievement and test performance – along with the academic self-concept they engender – are partly the by-product of students' interactions with their environments. The value of these SEM models and more refined models that could emerge from future research lies in their accommodation of the interaction between these individual and contextual variables along a time continuum. Through the utilization of SEM, these variables can also be measured by multiple indicators, so latent traits and constructs are brought to the forefront of college readiness research.

Secondly, findings from this study point towards fertile ground in researching students' college-going trajectories in ways that study the impacts of college access factors on eventual college success. For example, the statistically significant correlations between the racial composition of students' pre-college contexts, their SES, and the degree to which they found public- and private-based counseling resources important to their college decision-making exposed a noteworthy trend: in this sample of 2008 first-time freshmen (FTF), students of lower SES tended to find themselves in predominantly non-White environments, and they tended to rely more on counseling resources in navigating their college-going decision-making. Furthermore, the total effects of the pre-college Context and SES latent variables specified in this study on students' first-year grade point averages (GPAs), their eventual graduation, and their graduation within their original field of study were statistically significant. In light of these findings, research on the impact of students' high school college-going cultures, counseling resources, and other forms of social capital on their postsecondary enrollment could be extended to investigate the long-term impacts of these cultures, resources, and capital on their

performance and experiences in college. In their qualitative study, Martinez and Deil-Amen (2015) advanced this work, demonstrating that high school college-going culture impacted students' college transitional experiences beyond postsecondary enrollment. Comparably, Arbona and Nora (2007) found pre-college variables, such as parental education and peer aspiration to attend a four-year college, were statistically significant in predicting students' eventual degree attainment. Through quantitative means, this study showed similar measurable impacts of college access factors both on students' initial college transition (as measured by their GPAs by Fall 2009) as well as their long-term outcomes (as measured by graduation).

Building on these insights, this study also found students' academic self-efficacy and performance expectations were not significant predictors of any of the postsecondary outcomes of interest. The incongruence found here between students' belief in their ability to achieve at the collegiate level and their lived experiences in college has been well-documented in K-16 literature as well as in research investigating students' transitional experiences from high school to college (Karp, 2015; Kirst, 2008; Martinez & Deil-Amen, 2015; Venezia & Jaeger, 2013; Venezia & Kirst, 2005). Furthermore, the analysis of major change trajectories in Chapter Four reveals that females and underrepresented student groups, such as students of the Chicano/Latino population at CSULB, may be more at risk of redirection out of their intended major pathways than their male and White or Asian peers. Research aimed at studying the long-term postsecondary impacts of high school college-going cultures, counseling resources, and social capital could also benefit from looking at the ways these sources of information and agency influence students' self-perceptions of their academic ability and performance expectations; an analysis of these phenomena by sex/gender and race/ethnicity may also prove fruitful. Such

research could unearth areas of potential disjuncture between college expectation and performance, which could in turn inform counseling programing – at both the K-12 and higher education levels – designed to better orient and prepare students to meet their educational and occupational goals. Culturally relevant and major-centric programming tailored to the needs of specific student populations might render counseling resources even more helpful in advancing equity in postsecondary outcomes.

As stated above, we see from the findings herein that students' expectations of their likely college performance were not predictive of ultimate success. Among many possible explanations, this phenomenon could also point towards a paucity of college knowledge (i.e., students lack the requisite knowledge of the college experience to accurately calibrate their expected performance). Past studies that explore access to college-going information in high school tend to limit the scope of information under investigation to the "canon" of facts most associated with the college application process: comparing colleges, undertaking the application, and securing financial aid. However, given the complexities of achieving college success, the facets of college knowledge most salient to high school students in preparing for, transitioning into, and eventually navigating college likely extend well beyond the circumscribed information generally associated with the college access literature. Some of these influential facets may relate to familiarizing students with university norms and accompanying adaptive behaviors, such as engaging in classroom discussions, building faculty rapport, and utilizing campus resources, among many others.

Furthermore, a distinction between static information and instrumental knowledge may also contribute to the extant body of research around college knowledge and readiness. For

example, while students may have access to information, they may lack the competencies and supports to translate disparate facts into a cohesive body of knowledge that – coupled with an understanding of their interests and skills – can be effectively leveraged in making judicious college- and career-related decisions. More refined research directed towards capturing the ways students not only access but also process and utilize information could prove helpful in clarifying the distinction between college-going information use and instrumental knowledge, as well as their respective roles in orienting students towards a more granular understanding of the college-going experience both before and during their undergraduate careers.

Defining & Measuring College Readiness & Success

In addition to the implications for future research in the areas highlighted above, the methodological challenges in building this study's models illuminate additional research considerations, including the need to identify appropriate metrics for effectively studying college readiness. Within a broad context, calls to graduate high school students "college and career ready" often conflate the two concepts. However, the knowledge, abilities, and tools required to navigate the university setting through graduation may vary from the requisite skillsets needed to perform tasks as a credentialed professional within a specific industry or field. Indeed, borrowing from the conception of the layers of organizational culture presented by Schein (2010), institutions operate within a multi-dimensional space:

> These levels range from the very tangible overt manifestations that you can see and feel to the deeply embedded, unconscious, basic assumptions that I am defining as the essence of culture. In between these layers are various espoused beliefs, values, norms, and rules of behavior that members of the culture use as a way of depicting the culture to themselves and others. (Schein, 2010, p. 23)

Students' ability to navigate the educational experience in college, therefore, requires not only academic preparedness to tackle the rigors of the curriculum, but the tools to traverse a multiple-year journey within a context governed by its own unique value system. These underlying governing forces may vary between institutions of higher education and even between schools or fields of study within one university. Teasing out the cultural underpinnings of higher education institutions and their respective schools/majors would contribute to a more robust conversation around the ways readiness for college and career both overlap and diverge. Considerations of readiness by major provide fodder for deepening our understanding of students' college and career preparation needs, as fields of study within universities represent an intersection between higher education and industry cultures.

As this study revealed, college readiness takes shape differently between student groups and majors. Although the structural models under investigation here did not accommodate for the cultural and organizational context in which students pursued their degrees, such accommodations in researching college readiness are warranted. Research that looks not only at student-specific characteristics and pre-college contextual factors, but also at major-specific variables that gauge departmental cultures at the university level might illuminate the ways collegiate and departmental environments influence students' college-going trajectories and success. Indeed, existing research points toward the saliency of these contextual factors in promoting or hindering degree attainment among underrepresented populations, specifically within the STEM fields (Espinosa, 2011; Hurtado et al, 2007; Hurtado et al., 2011). Such research might augment the kind of quantitative modeling provided by SEM with qualitative or ethnographic research methodologies to examine the cultural spaces in which students pursue

their respective fields of study both before and during college. Furthermore, research that remains attuned to the intersectionality of students' identities can help inform the creation of institutional and departmental structures that support – rather than threaten – the multi-dimensionality of the student body (Armstrong & Jovanovic, 2016; Gonzales et al., 2002).

In developing future research aimed at examining college readiness, another area of conceptual and practical ambiguity should be addressed. In conceiving this study, it became evident that the definition of college readiness in extant literature often suffers from circularity. Arnold et al. (2012) conceived of college readiness as "an umbrella term that refers to the multidimensional set of skills, traits, habits, and knowledge that students need to enter college with the capacity to succeed once they are enrolled" (p. 2). This definition advances our thinking about readiness as it refines the concept of "predictors of readiness" with "predictors of success." Ultimately, this study sought to measure indicators of success (i.e., graduation and graduation within a students' originally intended field), which in turn implied a level of readiness for college. While a seemingly inconsequential distinction, the point has broader policy and research implications, as it effectively replaces the objective of college *readiness* (or access) with college *completion* (or success).

With this distinction comes the need to develop more robust instruments to measure the multi-dimensionality of predictors of postsecondary success. The Cooperative Institutional Research Program (CIRP) instrument employed in this study afforded the investigation of a number of such predictors: pre-college contextual affordances, academic preparedness measures, self-ratings of habits and efficacy, and other metrics not included here. However, additional salient metrics, like questions that assess students' college knowledge, were not

directly measured by the CIRP survey. This limitation prevented my exploring this dimension in this study, even though the prior literature recognizes college knowledge as a critical domain of students' ability to succeed in college ('Beyond College Eligibility,' 2014). Moreover, in addition to developing robust measures of the skills, habits, and knowledge that predict students' eventual success in college, a broader array of success metrics might also add dimension to this area of research.

In a sense, postsecondary success lies at the root of the research question: in order to define and measure readiness, we must first examine how we define and measure success. In many ways, the success metrics utilized in this study lacked breadth, as I relied solely on the metrics of graduation and graduation within a students' originally intended field of study. These metrics did not accommodate for other experiences that could augment students' undergraduate careers (e.g., study abroad, engagement in research, fostering faculty relationships, and many more postsecondary outcomes that warrant examination). A student could graduate with none of these experiences on their vitae, but still be categorized as "successful" in this study's models. Even with this limitation, graduating students remains the primary goal of institutions of higher education. If a student gains a robust social experience at college, but does not graduate is he/she ultimately successful? With this primary goal in mind, recently passed accountability legislation at the state and federal levels aims to hold both K-12 and higher education institutions accountable for their students' outcomes (*A Test of Leadership*, 2006; Assembly Bill 94, 2013; "ESEA Reauthorization," 2011; "Every Student Succeeds Act," 2015; Legislative Analyst's Office, 2013; "President's Plan to Make College More Affordable," 2013; Senate Bill 195, 2013; Senate Bill 1458, 2012). As evident by the performance

measures outlined in two recently signed California laws, Assembly Bill 94 and Senate Bill 195, the dominant method for evaluating an institution will follow the trend of relying on the most available data, often in the form of context-free numbers (Carey, 2007). While I discussed accountability throughout this study, I would like to unpack the concept here, as policy of this nature poses implications not only for the core mission and operation of these institutions, but for the ways they develop and employ metrics of student success in their data-driven decision-making.

The notion of accountability relies on an institution's purpose and the actions it takes to better fulfill this purpose by meaningfully responding to gathered information (Carey, 2007). This notion provides an ideal framework for analyzing accountability in education because it ties action to purpose. To hold an institution "accountable" to its constituents, therefore, we must first define the purpose of that institution. While the purposes of higher education are often debated, Bowen (1977) provided a helpful catalogue of widely accepted goals that are still relevant to universities today; this catalogue compiles 1,500 goal statements from extensive historical and contemporary literature, including writings on the purpose of education by Aristotle himself. These goals encompass cultivating in students cognitive learning, emotional and moral development, practical competence, and direct satisfaction and enjoyment from college education. These timeless goals, however, coexist with current demands for human capital, workforce training, and economic development (Altbach, Gumport, & Johnstone, 2001). Thus, as other interrelated institutions (e.g., family, religion, popular culture) and public expectations evolve, tension grows between the social imperatives of higher education and its economic, even consumerist, functions (Altbach et al., 2001).

This duality of purpose makes the creation of accountability systems and the success metrics that accompany them a challenge as institutions strive to measure their performance in social and economic terms. It stands to reason that in order for performance metrics to be most effective they must measure an institution's attainment of all of its goals, taking action in areas where the institution has fallen short of its stated outcomes. However, recent accountability legislation in California relies on performance metrics that appear to hold institutions of higher education accountable for only some of its goals, namely those that are most easily assessed by measurable data (like those employed in this study). These performance measurements rely on the assumption that effective and efficient use of available resources can best be determined by timely graduation among freshman entrants, transfer students, and low-income students. These measures of postsecondary success make no mention of specific education-related goals characteristic of a social institution, such as the "cultivation of citizenship, the preservation of cultural heritage(s), and the formation of individual character and critical habits of mind" (Altbach et al., 2001, p. 87). If performance follows what gets measured (Lohmann, 2004), then California higher education institutions may adapt their practices to legislative demands that neglect to account for their social obligations.

As future research advances our understanding of the ways we can best prepare our students to succeed in college, considerations of the broader social and political ramifications of this work should not be neglected. Developing robust, multi-faceted definitions and metrics of postsecondary success impacts many constituencies: the policymakers who craft legislation that seek to hold educators accountable for their students' outcomes to and through college; the K-12 and higher education stakeholders who work towards meeting these accountability demands;

and the students whom we deem "ready" for college in all the ways this critical word could and should be interpreted.

Study Limitations

In reflecting on the methodical approach of this study, a number of limitations surface that dovetail with these broader considerations. Firstly, the CIRP Freshman Survey offered a plethora of variables to consider in this study of students' college readiness. However, this instrument did not measure all the factors that could contribute to postsecondary success and, in some instances, it did not operationalize indicators of college readiness in ways that are supported by the research. For example, the development of an instrument specifically intended to measure such constructs as social capital or college knowledge may have been better suited for this investigation – rather than relying on proxy measures of these constructs culled from an existing instrument not designed with this research aim in mind. Moreover, having access to more robust measures of postsecondary success, beyond first-year GPA and graduation, would have enabled the development of models that encompassed the spectrum of college-going outcomes indicative of a purpose-driven higher education institution.

The models presented in this study attributed students' contexts, habits, and dispositions at the onset of their undergraduate careers to their eventual graduation. Only two intermediary outcomes were employed in this research (i.e., students earned units in Fall 2009 and their cumulative GPAs by Fall 2009). This approach posed challenges to drawing confident conclusions that the predictors in the model encapsulate the most critical variables at play in students' graduation. In reality, many years constitute the timeline between students' college entry and departure that may contribute to their ultimate culmination. These influences could be more

salient and immediately present in the college environment (e.g., like the major-specific cultural factors addressed above, among many others). To address this limitation, I recommend CSULB, and other institutions of higher education engaged in this research, create mechanisms for continued measurement of students' progress both academically and developmentally throughout their undergraduate careers.

These metrics could assess students' incremental progress and, in doing so, reframe success as existing along a continuum, rather than a definitive end-point. Capturing data at key touch points would also allow administrators to benchmark students' transformation, answering questions like the following: Do our students engage in habits of mind with the same frequency as they reported as incoming freshmen? Has their sense of academic self-efficacy changed since their enrollment? CSULB, and other universities, could develop a survey instrument that (1) utilizes variables of interest included on the CIRP survey, (2) incorporates measures of campus and departmental contexts and climate, and (3) captures data around student engagement, among other possible success metrics. At CSULB, this University-specific instrument could be administered during students' Mandatory Freshman Advising sessions held their first fall term; the same instrument could then be administered at designated time points throughout students' undergraduate tenures. Coupling this instrument with academic progress data captured by the Office of Institutional Research and Assessment would create an infrastructure for data collection and analysis, allowing for the development of panel models that look at longitudinal datasets for the same students over time. These models would enable University administrators to draw conclusions about readiness that are more full-bodied and context-sensitive than those that were drawn in the present study.

And lastly, as described by Teddlie and Tashakkori (2006) in their typology of research designs, I adopted a monomethod, monostrand design. While this methodology allowed me to conduct the study within my given time constraints, these quantitative data alone could not provide the kind of nuanced understanding of college readiness made possible by a mixed method approach. Indeed, the addition of a qualitative component could have afforded me the opportunity to conduct in-depth interviews or focus groups with students, University faculty, and advising staff. These forums could have provided insight into University- and department-specific cultures as well as students' college-going trajectories and experiences that can, at best, be inferred by a purely quantitative analysis of data.

Implications for Policy & Practice

In addition to the reflections and recommendations explored above, a number of other insights born from this research could inform CSULB specifically – and other higher education institutions generally – in their efforts to support other cohorts of FTF towards graduation. For instance, information captured through a burgeoning data infrastructure that measures students' habits, dispositions, and engagement could be routinely and systematically shared with academic advisors across all campus units. The indicators measured by a well developed college readiness instrument could provide meaningful dimension to technology-based advising tools, like the eAdvising tools already employed at CSULB. For example, if student expectations do not align with postsecondary outcomes, then how might advisors utilize these insights to more effectively orient students towards reflecting on the challenges they might encounter at the University but do not necessarily expect? In fact, findings from an Action Research study I conducted at CSULB during the 2013-2014 academic year revealed that lead advisors at the

institution were grappling with difficult student reactions to their input (Iler, 2014). As Table 6.1 below indicates, a number of findings surfaced during one of the project's focus groups.

Table 6.1
Action Research Focus Group Findings

Lead advisors struggle when advising upset and irate students as they work on the "frontlines" in delivering difficult news, and they, therefore, need a safe space to vent as well as institutional support.	
Sub-finding 1	Advisors cited the challenge of functioning as both policy police and student advocates.
Sub-finding 2	Advisors highlighted the mix messaging students receive from different faculty and administrators.
Sub-finding 3	Advisors admitted to feeling overworked and burned-out.

While none of my focus group protocol questions directly touched on these themes, they played a significant role in our dialogue. In fact, I left the session feeling that the openness of the advisors to share their stress and, in some moments, their distress was perhaps the most meaningful outcome of the conversation. For example, one participant expressed the following:

> In the past, you did not have to monitor students like this. It was pretty much you just stayed in Engineering until you flunked out of the University. And, now it's like, "No. We're going to prevent you from flunking out!" – which is great. But now it's kind of like, "She crushed my dream. I'm going to law school with a 2.1, or I'm going to UCLA with a 2.1."

Another participant offered this perspective: "The fact is, we can't just do it by email. We can't send those little emails saying, 'Sorry this is not a good fit.' We have to be eye-to-eye contact with these students, Kleenex box to Kleenex." As addressed in Chapter Two, technology-based advising tools have a critical and evolving place in the academic counseling space. However, counselors at the K-12 level and academic advisors, like those participants in my Action Research project, find themselves in a challenging position: they are both student advocates as

well as institutional agents rooted within structures that are governed by their own agendas. Equipping these educators with technology-based tools, actionable data, and the professional development support to make meaning of it could aid them in navigating their role in light of broader accountability demands and immediate student needs.

Additionally, as long as conceptual ambiguity around college and career readiness persists, then K-12 administrators, counselors, and teachers – who are charged with meeting their districts' articulated readiness goals – might find themselves advancing certain knowledge, abilities, and tools that are not well-aligned with the college- and major-specific realities students will face at the postsecondary level. A final report, prepared for the California Department of Education by the Educational Policy Improvement Center (EPIC), recommends a system of college and career preparedness indicators at the high school level that could aid K-12 educators in meeting new Academic Performance Index (API) standards put forth by the passage of Senate Bill 1458. The metrics proposed in this report include the following: college admissions exams (SAT/ACT); advanced coursework (AP/IB); innovative measures (metacognitive assessments; performance assessments; California State Seal of Biliteracy); course-taking behavior (A-G subject requirements; career technical education, CTE, course pathways; integrated course pathways); career preparedness assessments (ACT's WorkKeys; assessments from the National Occupational Competency Testing Institute; the Armed Services Vocational Aptitude Battery; and industry certifications) (Conley, Beach, Thier, Lench, & Chadwick, 2014). Conley et al. (2014) contend, "combining or triangulating information from metacognitive and performance assessments with information from content tests and grade point averages could lead to a more complete picture of student preparedness" (p. 21).

By developing multiple-metric systems at the K-12 and higher education levels around students' readiness to access and succeed in college, researchers and policymakers can substantively impact the college-going experiences of students, while equipping their family members and educators with the knowledge and tools to support them in attaining their postsecondary and career goals. Multi-faceted approaches to studying college readiness, like the employment of SEM in the present study, offer one promising means of advancing our understanding of this complex phenomenon. Future research that incorporates multiple group analyses and contextual factors could deepen conversations around the most efficacious way of preparing students of all demographics and majors for their college pathways.

Appendices

Appendix A: Constructs & Survey items

Demographic Characteristics	
Survey Item #	Item Question
1	Your sex:
2	How old will you be on December 31 of this year?
3	Is English your native language?
4	In what year did you graduate from high school?
16	Citizenship status:
25	Current religious preference:
35	Are you:
32	How would you characterize your political views?
37	Indicate your probable field of study.

Family Background	
Survey Item #	Item Question
23	What is your best estimate of your parents' total income last year? Consider income from all sources before taxes.
29	What is the highest level of formal education obtained by your parents?
31	Your mother's occupation
31	Your father's occupation

Contextual Influences - Financial Support	
Survey Item #	Item Question
22	Expense Coverage: Family resources
22	Expense Coverage: My own resources
22	Expense Coverage: Aid which need not be repaid
22	Expense Coverage: Aid which must be repaid
22	Expense Coverage: Other than above
24	Do you have any concern about your ability to finance your college education?
34	Time Spent: Working (for pay)
36	Decision Reason: I was offered financial assistance
36	Decision Reason: The cost of attending this college
36	Decision Reason: Not offered aid by first choice
36	Decision Reason: Could not afford first choice
39	Chance Action: Get a job to help pay for college expenses
39	Chance Action: Work full-time while attending college

High School & Community Context	
Survey Item #	Item Question
9	From what kind of high school did you graduate?
20	How would you describe the racial composition of the high school you last attended and the neighborhood where you grew up?

Perceived Social Support & Help-Seeking Behaviors	
Survey Item #	Item Question
26	Activity Engagement: Asked a teacher for advice after class
34	Time Spent: Talking with teachers outside of class
36	Decision Reason: My parents wanted me to come here
36	Decision Reason: My relatives wanted me to come here
36	Decision Reason: My teacher advised me
36	Decision Reason: High school counselor advised me
36	Decision Reason: Private college counselor advised me
36	Decision Reason: I was admitted through an Early Action or Early Decision program
39	Chance Action: Seek personal counseling

College Exposure, Preference & Choice	
Survey Item #	Item Question
13	To how many colleges other than this one did you apply for admission this year?
14	Were you accepted by your first choice college?
15	Is this college your:
36	Choose to Attend Construct: This college has a very good academic reputation
36	Choose to Attend Construct: This college's graduates gain admission to top graduate/professional schools
36	Choose to Attend Construct: This college's graduates get good jobs
36	Decision Reason: This college has a good reputation for its social activities
36	Decision Reason: Rankings in national magazines
36	Decision Reason: Information from a website
36	Decision Reason: The athletic department recruited me
36	Decision Reason: A visit to the campus

Institutional & Goal Commitment	
Survey Item #	Item Question
39	Chance Action: Change major field
39	Chance Action: Change career choice
39	Chance Action: Transfer to another college before graduating
39	Chance Action: Be satisfied with your college

High School Academic Preparation & Performance	
Survey Item #	Item Question
7	What was your average grade in high school?
8	What were your scores on the SAT I and/or ACT?
10	Prior to this term, have you ever taken courses for credit at this institution?
11	Prior course-taking for credit or not for credit at other institutions

Academic Self-Efficacy	
Survey Item #	Item Question
27	Academic Self-Concept Construct: Academic ability
27	Academic Self-Concept Construct: Drive to achieve
27	Academic Self-Concept Construct: Mathematical ability
27	Academic Self-Concept Construct: Self-confidence (intellectual)
27	Self-rating: Artistic ability
27	Self-rating: Computer skills
27	Self-rating: Writing ability
39	Chance Action: Make at least a "B" average
39	Chance Action: Need extra time to complete your degree requirements

General Self-Concept	
Survey Item #	Item Question
27	Social Self-Concept Construct: Leadership ability
27	Social Self-Concept Construct: Popularity
27	Social Self-Concept Construct: Public speaking ability
27	Social Self-Concept Construct: Self-confidence (social)
27	Self-rating: Cooperativeness
27	Self-rating: Creativity
27	Self-rating: Self-understanding
27	Self-rating: Spirituality
27	Self-rating: Understanding of others
28	Pluralistic Orientation Construct: Ability to see the world from someone else's perspective
28	Pluralistic Orientation Construct: Tolerance of others with different beliefs
28	Pluralistic Orientation Construct: Openness to having my own views challenged
28	Pluralistic Orientation Construct: Ability to discuss and negotiate controversial issues
28	Pluralistic Orientation Construct: Ability to work cooperatively with diverse people

Achievement Motivation & Academic-Related Skills	
Survey Item #	Item Question
26	Activity Engagement: Tutored another student
26	Activity Engagement: Studied with other students
26	Activity Engagement: Used the Internet (For research or homework)
30	How often did you: Take notes during class
34	Time Spent: Reading for pleasure
34	Time Spent: Studying/homework
34	Time Spent: Exercise or Sports
30	Habits of Mind Construct: Ask questions in class
30	Habits of Mind Construct: Support your opinions with a logical argument
30	Habits of Mind Construct: Seek solutions to problems and explain them to others
30	Habits of Mind Construct: Revise your papers to improve your writing
30	Habits of Mind Construct: Evaluate the quality or reliability of information you received
30	Habits of Mind Construct: Take a risk because you feel you have more to gain
30	Habits of Mind Construct: Seek alternative solutions to a problem
30	Habits of Mind Construct: Look up scientific research articles and resources
30	Habits of Mind Construct: Explore topics on your own, even though it was not required for a class
30	Habits of Mind Construct: Accept mistakes as part of the learning process
30	Habits of Mind Construct: Seek feedback on your academic work

Academic, Career & Personal Goals	
Survey Item #	Item Question
19	What is the highest academic degree that you intend to obtain?
31	Your probable career occupation
38	Goal Construct: Keeping up to date with political affairs
38	Goal Construct: Participating in a community action program
38	Goal Construct: Influencing social values
38	Goal Construct: Becoming a community leader
38	Goal Construct: Helping others who are in difficulty
38	Goal Construct: Helping to promote racial understanding
38	Goal: Becoming accomplished in one of the performing arts
38	Goal: Becoming an authority in my field
38	Goal: Obtaining recognition from my colleagues for contributions to my special field
38	Goal: Influencing the political structure
38	Goal: Being very well off financially
38	Goal: Making a theoretical contribution to science
38	Goal: Writing original works
38	Goal: Creating artistic works
38	Goal: Becoming successful in a business of my own
38	Goal: Becoming involved in programs to clean up the environment
38	Goal: Developing a meaningful philosophy of life

	38	Goal: Improving my understanding of other countries and cultures
	38	Goal: Adopting "green" practices to protect the environment

"At Risk" Behaviors and Well-being Self-Ratings	
Survey Item #	Item Question
26	Activity Engagement: Was bored in class
26	Activity Engagement: Came late to class
26	Activity Engagement: Smoked cigarettes
26	Activity Engagement: Drank beer
26	Activity Engagement: Drank wine or liquor
26	Activity Engagement: Felt overwhelmed by all I had to do
26	Activity Engagement: Felt depressed
27	Self-rating: Emotional health
27	Self-rating: Physical health
34	Time Spent: Partying
34	Time Spent: Watching TV
34	Time Spent: Playing video/computer games

Social Involvement	
Survey Item #	Item Question
5	Are you enrolled (or enrolling) as a:
12	Where do you plan to live during the fall term?
34	Time Spent: Student clubs/groups
39	Future Act Construct: Socialize with someone of another racial/ethnic group
39	Future Act Construct: Participate in a study abroad program
39	Future Act Construct: Participate in volunteer or community service work
39	Future Act Construct: Participate in student government
39	Future Act Construct: Participate in student clubs/groups
39	Chance Action: Join a social fraternity or sorority
39	Chance Action: Play varsity/intercollegiate athletics
39	Chance Action: Communicate regularly with your professors
39	Chance Action: Discuss course content with students outside of class
39	Chance Action: Work on a professor's research project

Appendix B: CIRP & CSULB Major Alignment

Table A.1

Fall 2008 FTF Cohort CIRP Freshman Survey Descriptive Statistics & Institutional Research and Assessment Statistics (Major Changes; C = CIRP Respondents and G = Graduates)

CIRP Survey Major Category	N (C)	N (G)	Associated CSULB Plan(s)	Agg. Cat.
1 = Art, fine and applied	94	58	ART (BA & BF)	1
2 = English (language & literature)	24	41	ENGL (BA)	1
3 = History	21	17	HIST (BA)	1
4 = Journalism	34	31	JOUR (BA)	1
5 = Language and Literature (except English)	6	24	C/LT (BA); LING (BA); RGR (BA)	1
6 = Music	29	16	MUS (BA & BM)	1
7 = Philosophy	3	3	PHIL (BA)	1
9 = Theater or Drama	28	17	THEA (BA)	1
11 = Other Arts and Humanities	70	34	DANC (BF); FEA (BA); R/ST (BA)	1
29 = Elementary Education	65	56	L/ST (BA)	1
52 = Family & Consumer Sciences	13	90	FCS (BA & BS)	1
58 = Therapy (occupational, physical, speech)	28	12	CD (BA)	1
60 = Anthropology	4	6	ANTH (BA)	1
61 = Economics	3	13	ECON (BA)	1
62 = Ethnic Studies	2	15	A/ST (BA); AMST (BA); CHLS (BA)	1
63 = Geography	1	9	GEOG (BA)	1
64 = Political Science (govt., intl. relations)	31	43	I/ST (BA); POSC (BA)	1
65 = Psychology	106	65	PSY (BA)	1
67 = Social Work	16	16	SW (BA)	1
68 = Sociology	13	33	SOC (BA)	1
70 = Other Social Science	3	39	HDEV (BA); W/ST (BA)	1
73 = Drafting or Design	19	20	DESN (BA, BS, & BF)	1
78 = Communications	24	94	COMM (BA)	1
82 = Law Enforcement	31	33	CRIM (BS)	1
12 = Biology (general)	163	61	BIOL (BS)	2
15 = Environmental Science	9	11	ESP (BA & BS)	2
20 = Accounting	43	33	ACCT (BS)	2
21 = Business Admin. (general)	51	7	IS (BS)	2
22 = Finance	48	38	FIN (BS)	2
24 = Marketing	58	31	MKTG (BS)	2
25 = Management	63	38	MGMT (BS)	2
36 = Civil Engineering	30	14	CE (BS)	2
37 = Chemical Engineering	7	7	CHE (BS)	2
38 = Computer Engineering	40	14	CECS (BS)	2
39 = Electrical or Electronic Engineering	17	9	EE (BS)	2
41 = Mechanical Engineering	51	28	MAE (BS)	2
42 = Other Engineering	12	13	ET (BS)	2
45 = Chemistry	10	11	CHEM (BS)	2
47 = Marine Science (incl. Oceanography)	4	3	GEOL (BS)	2
48 = Mathematics	16	9	MATH (BS)	2
49 = Physics	3	1	PHYS (BS)	2
50 = Other Physical Science	7	None	Non Applicable	2
56 = Nursing	177	28	NURS (BS)	2
59 = Other (Health) Professional	48	64	HCA (BS); HSC (BS)	2
81 = Kinesiology	50	77	KPE (BA & BS); REC (BA)	2
85 = Undecided	132	None		3

Appendix C: Graduation Outcome Structural Models by Sex & Race

Table A.2

Graduation Outcome Structural Model by Sex (Fall 2008 FTF Cohort; N = 1352)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
HSGPA <-						
Context (M)	0.186	0.139	1.33	0.182	-0.087	0.459
Context (F)	0.206	0.100	2.07	*0.039	0.011	0.402
SES (M)	0.152	0.106	1.44	0.151	-0.056	0.360
SES (F)	0.065	0.078	0.83	0.406	-0.088	0.217
zSATVerbal <-						
Context (M)	0.197	0.135	1.46	0.145	-0.068	0.463
Context (F)	0.186	0.082	2.26	*0.024	0.025	0.347
SES (M)	0.485	0.104	4.68	**0.000	0.282	0.688
SES (F)	0.406	0.066	6.19	**0.000	0.277	0.534
zSATMath <-						
Context (M)	0.178	0.130	1.37	0.171	-0.077	0.433
Context (F)	0.253	0.084	3.02	**0.003	0.089	0.418
SES (M)	0.429	0.099	4.32	**0.000	0.234	0.624
SES (F)	0.359	0.067	5.40	**0.000	0.229	0.490
AcadSelfEfficacy <-						
zSATMath (M)	0.100	0.031	3.23	**0.001	0.039	0.161
zSATMath (F)	0.069	0.022	3.07	**0.002	0.025	0.112
zSATVerbal (M)	0.082	0.029	2.83	**0.005	0.025	0.139
zSATVerbal (F)	0.150	0.023	6.67	**0.000	0.106	0.194
HSGPA (M)	0.183	0.014	13.52	**0.000	0.156	0.209
HSGPA (F)	0.161	0.013	12.77	**0.000	0.136	0.185
Expect <-						
zSATMath (M)	0.044	0.030	1.48	0.139	-0.014	0.103
zSATMath (F)	0.051	0.023	2.20	*0.028	0.006	0.097
zSATVerbal (M)	0.013	0.028	0.47	0.640	-0.042	0.068
zSATVerbal (F)	0.042	0.024	1.78	0.075	-0.004	0.088
HSGPA (M)	0.074	0.022	3.41	**0.001	0.031	0.116
HSGPA (F)	0.069	0.016	4.40	**0.000	0.038	0.099
FinCon <-						
SES (M)	-0.229	0.036	-6.43	**0.000	-0.298	-0.159
SES (F)	-0.226	0.027	-8.43	**0.000	-0.278	-0.173
GPAFall09 <-						
zSATMath (M)	0.057	0.039	1.48	0.139	-0.019	0.133
zSATMath (F)	0.122	0.028	4.42	**0.000	0.068	0.176
Expect (M)	-0.023	0.061	-0.38	0.705	-0.142	0.096
Expect (F)	-0.013	0.040	-0.33	0.744	-0.092	0.066
zSATVerbal (M)	0.038	0.036	1.05	0.294	-0.033	0.108
zSATVerbal (F)	0.145	0.029	5.01	**0.000	0.088	0.202
HSGPA (M)	0.243	0.030	7.99	**0.000	0.183	0.303
HSGPA (F)	0.216	0.021	10.26	**0.000	0.175	0.257

Table A.2

Graduation Outcome Structural Model by Sex (Fall 2008 FTF Cohort; N = 1352)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
FinCon (M)	-0.100	0.051	-1.95	0.051	-0.200	0.001
FinCon (F)	-0.021	0.035	-0.59	0.557	-0.090	0.049
AcadSelfEfficacy (M)	0.018	0.091	0.20	0.845	-0.161	0.197
AcadSelfEfficacy (F)	-0.117	0.062	-1.88	0.060	-0.239	0.005
GradStatus <-						
GPAFall09 (M)	0.347	0.024	14.35	**0.000	0.300	0.394
GPAFall09 (F)	0.256	0.018	14.15	**0.000	0.220	0.291
cov(Context, SES) (M)	0.366	0.038	9.58	**0.000	0.291	0.441
cov(Context, SES) (F)	0.341	0.029	11.61	**0.000	0.284	0.399

Table A.3

Graduation Outcome Structural Model by Race (Fall 2008 FTF Cohort; N = 1356)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf.	Interval]
HSGPA <-						
Context (N)	0.095	0.120	0.79	0.431	-0.141	0.331
Context (W)	-0.610	0.262	-2.33	*0.020	-1.123	-0.097
SES (N)	0.047	0.075	0.62	0.535	-0.100	0.194
SES (W)	1.907	0.557	3.42	**0.001	0.816	2.999
zSATVerbal <-						
Context (N)	0.207	0.105	1.97	*0.049	0.001	0.413
Context (W)	-1.380	0.383	-3.60	**0.000	-2.131	-0.629
SES (N)	0.338	0.064	5.28	**0.000	0.213	0.464
SES (W)	3.634	0.797	4.56	**0.000	2.072	5.196
zSATMath <-						
Context (N)	0.324	0.110	2.95	**0.003	0.109	0.539
Context (W)	-1.539	0.473	-3.25	**0.001	-2.467	-0.612
SES (N)	0.290	0.067	4.35	**0.000	0.159	0.420
SES (W)	4.322	1.080	4.00	**0.000	2.205	6.440
AcadSelfEfficacy <-						
zSATMath (N)	0.057	0.018	3.17	**0.002	0.022	0.091
zSATMath (W)	0.088	0.021	4.19	**0.000	0.047	0.129
zSATVerbal (N)	0.068	0.017	3.91	**0.000	0.034	0.102
zSATVerbal (W)	0.107	0.020	5.41	**0.000	0.068	0.146
HSGPA (N)	0.113	0.012	9.32	**0.000	0.089	0.137
HSGPA (W)	0.114	0.012	9.56	**0.000	0.091	0.138
Expect <-						
zSATMath (N)	0.048	0.024	1.99	*0.047	0.001	0.095
zSATMath (W)	0.043	0.026	1.65	0.098	-0.008	0.095
zSATVerbal (N)	0.051	0.025	2.04	*0.042	0.002	0.101
zSATVerbal (W)	-0.023	0.026	-0.87	0.385	-0.075	0.029
HSGPA (N)	0.049	0.017	2.89	**0.004	0.016	0.082
HSGPA (W)	0.106	0.019	5.68	**0.000	0.069	0.142

Table A.3

Graduation Outcome Structural Model by Race (Fall 2008 FTF Cohort; N = 1356)

	Coef.	OIM Std. Err.	z	P>|z|	[95% Conf. Interval]	
FinCon <-						
SES (N)	-0.185	0.027	-6.78	**0.000	-0.238	-0.132
SES (W)	-0.659	0.166	-3.97	**0.000	-0.983	-0.334
GPAFall09 <-						
zSATMath (N)	0.108	0.028	3.86	**0.000	0.053	0.163
zSATMath (W)	0.035	0.037	0.95	0.343	-0.037	0.107
Expect (N)	-0.008	0.042	-0.18	0.856	-0.090	0.075
Expect (W)	-0.036	0.058	-0.62	0.538	-0.149	0.078
zSATVerbal (N)	0.089	0.029	3.04	**0.002	0.032	0.147
zSATVerbal (W)	0.132	0.038	3.47	**0.001	0.057	0.207
HSGPA (N)	0.198	0.021	9.34	**0.000	0.156	0.239
HSGPA (W)	0.312	0.029	10.67	**0.000	0.255	0.370
FinCon (N)	-0.045	0.040	-1.11	0.268	-0.123	0.034
FinCon (W)	-0.028	0.044	-0.63	0.527	-0.113	0.058
AcadSelfEfficacy (N)	-0.042	0.087	-0.48	0.631	-0.213	0.129
AcadSelfEfficacy (W)	-0.263	0.125	-2.10	*0.036	-0.509	-0.017
GradStatus <-						
GPAFall09 (N)	0.319	0.020	16.32	**0.000	0.280	0.357
GPAFall09 (W)	0.257	0.022	11.77	**0.000	0.215	0.300
cov(Context, SES) (N)	0.249	0.025	10.16	**0.000	0.201	0.297
cov(Context, SES) (W)	0.071	0.013	5.32	**0.000	0.045	0.097

References

Acock, A.C. (2013). Discovering structural equation modeling using Stata (Rev. ed.). College Station, TX: Stata Press.

Akos, P., Lambie, G. W., Milsom, A., & Gilbert, K. (2007). Early adolescents' aspirations and academic tracking: An exploratory investigation. Professional School Counseling, 11(1), 57-64. Retrieved from http://www.jstor.org/stable/42732739

Allen, J., & Robbins, S. (2010). Effects of interest-major congruence, motivation, and academic performance on timely degree attainment. Journal of Counseling Psychology, 57(1), 23-35. doi:10.1037/a0017267

Altbach, P. G., Gumport, P. J., & Johnstone, D. B. (2001). In defense of American higher education. Baltimore, MD: Johns Hopkins University Press.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin, 103(3), 411-423.

Annenberg Institute for School Reform, Brown University; John W. Gardner Center for Youth and their Communities, Stanford University; & University of Chicago Consortium on Chicago School Research. (2014). Beyond college eligibility: A new framework for promoting college readiness. College readiness indicator systems resource series. Seattle, WA: Bill & Melinda Gates Foundation.

Arbona, C., & Nora, A. (2007). The influence of academic and environmental factors on Hispanic college degree attainment. The Review of Higher Education, 30(3), 247-269. doi:10.1353/rhe.2007.0001

Armstrong, M. A., & Jovanovic, J. (2016). The intersectional matrix: Rethinking institutional

change for URM women in STEM. Journal of Diversity in Higher Education. doi:10.1037/dhe0000021

Arnold, K. D., Lu, E. C., & Armstrong, K. J. (2012). The case for a comprehensive model of college readiness. The Ecology of College Readiness. doi:10.1002/aehe.20005

Bastedo, M. N., & Jaquette, O. (2011). Running in place: Low-income students and the dynamics of higher education stratification. Educational Evaluation and Policy Analysis, 33(3), 318-339. doi:10.3102/0162373711406718

Bell, A. D., Rowan-Kenyon, H. T., & Perna, L. W. (2009). College knowledge of 9th and 11th grade students: Variation by school and state context. Journal of Higher Education, 80(6), 663-685. doi:10.1353/jhe.0.0074

Blackhurst, A. E., & Auger, R. W. (2008). Precursors to the gender gap in college enrollment: Children's aspirations and expectations for their futures. Professional School Counseling, 11(3), 149-158. Retrieved from http://www.jstor.org/stable/42732818

Bowen, H. R. (1977). Investment in learning: The individual and social value of American higher education (1st ed.). San Francisco, CA: Jossey-Bass Publishers.

Brown, S. D., Tramayne, S., Hoxha, D., Telander, K., Fan, X., & Lent, R. W. (2008). Social cognitive predictors of college students' academic performance and persistence: A meta-analytic path analysis. Journal of Vocational Behavior, 72, 298-308. doi:10.1016/j.jvb.2007.09.003

Cabrera, A. F., & La Nasa, S. M. (2000). Understanding the college-choice process. New Directions for Institutional Research, 2000(107), 5–22. doi:10.1002/ir.10701

California Department of Education. (2012-2013). 12th grade graduates completing all courses

required for U.C. and/or C.S.U. entrance all students. Retrieved from http://dq.cde.ca.gov/dataquest/stgradnum.asp?cChoice=StGrdEth&cYear=2012-13&cLevel=State&cTopic=Graduates&myTimeFrame=S&submit1=Submit

California Department of Education. (2012-2013). Pupil services staff by type. Retrieved from http://dq.cde.ca.gov/dataquest/PuplSvs1.asp?cYear=2012-13&cChoice=PupilSvcs

California Department of Education. (2012-2013). Statewide enrollment by ethnicity. Retrieved from http://dq.cde.ca.gov/dataquest/EnrollEthState.asp?Level=State&TheYear=2012-13&cChoice=EnrollEth1&p=2

California Postsecondary Education: State Goals, California Senate Bill 195. (2013).

California State University, Long Beach, Office of Institutional Research and Assessment. (2015). 11-year enrollment trend report, fall 2003 to fall 2014. Retrieved from http://daf.csulb.edu/offices/univ_svcs/institutionalresearch/enrollment_trends.html

California State University, Long Beach, Office of Institutional Research and Assessment. (2015). Admission trend (headcounts), fall 2003 to fall 2014. Retrieved from http://daf.csulb.edu/offices/univ_svcs/institutionalresearch/admissions.html

Camara, W. (2013). Defining and measuring college and career readiness: A validation framework. Educational Measurement: Issues and Practice, 32(4), 16-27.

Carey, K. (2007). Truth without action: The myth of higher-education accountability. Change, 39(5), 24–29. doi:10.3200/CHNG.39.5.24-29

Carnevale, A. P., & Rose, S. J. (2003). Socioeconomic status, race/ethnicity, and selective college admissions. A Century Foundation paper. Retrieved from http://eric.ed.gov/?id=ED482419

Carnevale, A. P., Smith, N., & Strohl, J. (2010). Help wanted: Projections of jobs and education requirements through 2018. Georgetown University Center on Education and the Workforce. Retrieved from https://cew.georgetown.edu/report/help-wanted/

Cerna, O. S., Perez, P. A., & Saenz, V. (2009). Examining the precollege attributes and values of Latina/o bachelor's degree attainers. Journal of Hispanic Higher Education, 8(2), 130-157. doi:10.1177/1538192708330239

Chapman, D. W. (1981). A model of student college choice. The Journal of Higher Education, 52(5), 490–505. doi:10.2307/1981837

Common Core State Standards Initiative. (2015). Development process. Retrieved from http://www.corestandards.org/about-the-standards/development-process/

Conley, D. T., Beach, P., Thier, M., Lench, S. C., & Chadwick, K. L. (2014). Measures for a college and career indicator: Final report. Educational Policy Improvement Center. Retrieved from http://www.epiconline.org/measures-for-a-college-and-career-indicator-final-report/

Corwin, Z. B., Venegas, K. M., Oliverez, P. M., & Colyar, J. E. (2004). School counsel: How appropriate guidance affects educational equity. Urban Education, 39(4), 442-457. doi:10.1177/0042085904265107

Crede, M., & Kuncel, N. R. (2008). Study habits, skills, and attitudes: The third pillar supporting collegiate academic performance. Perspectives on Psychological Science, 3(6), 425-453. Retrieved from http://www.jstor.org/stable/40212266

Crocker, L., & Algina J. (2008). Introduction to classical and modern test theory. Mason, OH: Cengage Learning.

Danziger, S., & Ratner, D. (2010). Labor market outcomes and the transition to adulthood. The Future of Children, 20(1), 133-158. Retrieved from http://www.jstor.org/stable/27795063

Dawson, K., & Heinecke, W. (2004). Conditions, processes and consequences of technology use: A case study. Technology, Pedagogy and Education, 13(1), 61–81. doi:10.1080/14759390400200173

DeAngelo, L., Franke, R., Hurtado, S., Pryor, J. H., & Tran, S. (2011). Completing college: Assessing graduation rates at four-year institutions. Los Angeles: Higher Education Research Institute, UCLA. Retrieved from http://heri.ucla.edu/DARCU/CompletingCollege2011.pdf

Dika, S. L., & Singh, K. (2002). Applications of social capital in educational literature: A critical synthesis. Review of Educational Research, 72(1), 31-60. Retrieved from http://www.jstor.org/stable/3516073

Domina, T., & Ruzek, E. (2012). Paving the way: K-16 partnerships for higher education diversity and high school reform. Educational Policy, 26(2), 243-267. doi:10.1177/0895904810386586

Education Finance: Higher Education, California Assembly Bill 94. (2013).

Engberg, M., & Wolniak, G. (2010). Examining the effects of high school contexts on postsecondary enrollment. Research in Higher Education, 51(2), 132-153. doi:10.1007/s11162-009-9150-y

Espinosa, L. L. (2011). Pipelines and pathways: Women of color in undergraduate STEM majors and the college experiences that contribute to persistence. Harvard Educational Review, 81(2), 209-240.

Fallon, M. V. (1997). The school counselor's role in first generation students' college plans. School Counselor, 44(5), 384-394.

Gonzales, P. M., Blanton, H., & Williams, K. J. (2002). The effects of stereotype threat and double-minority status on the test performance of Latino women. Personality and Social Psychology Bulletin, 28(5), 659-670.

Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. Journal of Counseling Psychology, 28(6), 545-579. doi:10.1037/0022-0167.28.6.545

Hall, G. E. (2010). Technology's Achilles heel: Achieving high-quality implementation. Journal of Research on Technology in Education, 42(3), 231–253. Retrieved from http://eric.ed.gov/?id=EJ882505

Haskins, R. (2011). Education and economic mobility. The Pew Charitable Trusts. Retrieved from http://www.pewtrusts.org

Hill, L. D. (2008). School strategies and the "college-linking" process: Reconsidering the effects of high schools on college enrollment. Sociology of Education, 81(1), 53-76. Retrieved from http://www.jstor.org/stable/20452723

Holland, J., Reynolds, T., & Weller, S. (2007). Transitions, networks and communities: The significance of social capital in the lives of children and young people. Journal of Youth Studies, 10(1), 97-116. doi:10.1080/13676260600881474

Hossler, D., & Gallagher, K. S. (1987). Studying student college choice: A three-phase model and the implications for policymakers. College and University, 62(3), 207–221. Retrieved from

http://search.proquest.com/eric/docview/63271955/AF56FCEFCA624C86PQ/27?accountid=14512

Hossler, D., & Maple, S. (1993). Being undecided about postsecondary education. The Review of Higher Education, 16(3), 285-307. Retrieved from http://search.proquest.com/eric/docview/1308044454/fulltext/AF56FCEFCA624C86PQ/13?accountid=14512

Howard, T.C. (2010). Why race and culture matters in schools: Closing the achievement gap in America's classrooms. New York, NY: Teachers College Press.

Hurtado, S., Eagan, M. K., Tran, M. C., Newman, C. B., Chang, M. J., & Velasco, P. (2011). "We do science here": Underrepresented students' interactions with faculty in different college contexts. Journal of Social Issues, 67(3), 553-579.

Hurtado, S., Han, J. C., Sáenz, V. B., Espinosa, L. L., Cabrera, N. L., & Cerna, O. S. (2007). Predicting transition and adjustment to college: Biomedical and behavioral science aspirants' and minority students' first year of college. Research in Higher Education, 48(7), 841-887. Retrieved from http://www.jstor.org/stable/25704531

Iler, T. M. (2014). Assessing academic advisors' professional development needs. (Unpublished action research project). University of California, Los Angeles, Los Angeles.

Jarsky, K. M., McDonough, P. M., & Nunez, A. M. (2009). Establishing a college culture in secondary schools through P-20 collaboration: A case study. Journal of Hispanic Higher Education, 8(4), 357-373. doi:10.1177/1538192709347846

Karp, M. M. (2015). Dual enrollment, structural reform, and the completion agenda. New Directions for Community Colleges, 169, 103-111. doi:10.1002/cc.20137

Karp, M. M., & Fletcher, J. (2014). Adopting new technologies for student success, a readiness

framework. Community College Research Center. Retrieved from http://ccrc.tc.columbia.edu/publications/adopting-new-technologies-for-student-success.html

Keith, T. Z. (2015). Multiple regression and beyond: An introduction to multiple regression and structural equation modeling (2nd ed.). New York, NY: Routledge.

Kirst, M. W. (2008). Secondary schools and colleges must work together. Thought and Action, 111-122.

Komarraju, M., Ramsey, A., & Rinella, V. (2013). Cognitive and non-cognitive predictors of college readiness and performance: Role of academic discipline. Learning and Individual Differences, 24, 103-109. doi:10.1016/j.lindif.2012.12.007

Legislative Analyst's Office. (December 2013). An overview of the local control funding formula. Retrieved from http://www.lao.ca.gov/reports/2013/edu/lcff/lcff-072913.pdf

Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. Journal of Vocational Behavior, 45(1), 79-122. doi:10.1006/jvbe.1994.1027

Lent, R. W., Brown, S. D., & Hackett, G. (2000). Contextual supports and barriers to career choice: A social cognitive analysis. Journal of Counseling Psychology, 47(1), 36-49. doi:10.1037/0022-0167.47.1.36

Liu, A. (2011). The admission industrial complex: Examining the entrepreneurial impact on college access. Journal of College Admission. Retrieved from www.nacacnet.org

Lohmann, S. (2004). Can't the university be more like business? Economics of Governance, 5(1), 245-263. doi:10.1007/s1010100300662

Lomax, R. G. (1983). A guide to multiple-sample structural equation modeling. Behavior Research

Methods & Instrumentation, 15(6), 580-584.

Martinez, G. F., & Deil-Amen, R. (2015). College for all Latinos? The role of high school messages in facing college challenges. Teachers College Record, 117, 1-50.

Maruyama, G. (2012). Assessing college readiness: Should we be satisfied with ACT or other threshold scores? Educational Researcher, 41(7), 252-261. doi:10.3102/0013189X12455095

Matthews, D. (2012). A stronger nation through higher education: How and why Americans must achieve a big goal for college attainment. A special report from Lumina Foundation. Lumina Foundation for Education. Retrieved from https://www.luminafoundation.org

Mau, W. C. (1995). Educational planning and academic achievement of middle school students: A racial and cultural comparison. Journal of Counseling & Development, 73(5), 518-526. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=9508041195&site=ehost-live

McDonough, P. M. (1994). Buying and selling higher education: The social construction of the college applicant. Journal of Higher Education, 65, 427-446. doi:10.2307/2943854

McDonough, P. M., Yamasaki, E., & Korn, J. S. (1997). Access, equity, and the privatization of college counseling. The Review of Higher Education, 20(3), 297-317. doi:10.1353/rhe.1997.0004

Moore, C., & Shulock, N. (2010). Divided we fail: Improving completion and closing racial gaps in California's community colleges. Sacramento: Institute for Higher Education Leadership &

Policy, CSUS. Retrieved from http://www.csus.edu/calst/affiliations/institute_for_higher_ed.html

Moreira, P., Dias, P., Vaz, F. M., & Vaz, J. M. (2013). Predictors of academic performance and school engagement: Integrating persistence, motivation and study skills perspectives using person-centered and variable-centered approaches. Learning and Individual Differences, 24, 117-125. doi:10.1016/j.lindif.2012.10.016

Office of the Press Secretary. Fact sheet on the President's plan to make college more affordable: A better bargain for the middle class. (2013, August 22). Retrieved from https://www.whitehouse.gov/the-press-office/2013/08/22/fact-sheet-president-s-plan-make-college-more-affordable-better-bargain-

Park, J. J., & Eagan, M. K. (2011). Who goes early?: A multi-level analysis of enrolling via early action and early decision admissions. Teachers College Record, 113(11), 2345-2373.

Perna, L. W. (2006). Studying college choice: A proposed conceptual model. In J.C. Smart (Ed.), Higher education: Handbook of theory and research (Vol. 21, pp. 99-157). Dordrecht, NL: Springer.

Perna, L. W., Li, C., Anderson, R., Thomas, S. L., Rowan-Kenyon, H. T., & Bell, A. (2008). The role of college counseling in shaping college opportunity: Variations across high schools. The Review of Higher Education, 31(2), 131-159. Retrieved from http://muse.jhu.edu/journals/review_of_higher_education/v031/31.2perna.html

Peterson, G. W., Long, K. L., & Billups, A. (1999). The effect of three career interventions on educational choices of eighth grade students. Professional School Counseling, 3(1), 34-42. Retrieved from http://www.jstor.org/stable/42732024

Plank, S. B., & Jordan, W. J. (2001). Effects of information, guidance, and actions on postsecondary destinations: A study of talent loss. American Educational Research Journal, 38(4), 947-979. Retrieved from http://www.jstor.org/stable/3202508

Porter, A. C., & Polikoff, M. S. (2012). Measuring academic readiness for college. Educational Policy, 26(3), 394-417. doi:10.1177/0895904811400410

Porter, S. R., & Umbach, P. D. (2006). College major choice: An analysis of person-environment fit. Research in Higher Education, 47(4), 429-449. Retrieved from http://www.jstor.org/stable/40197411

Radcliffe, R., & Stephens, L. C. (2008). Preservice teachers are creating a college culture for at-risk middle school students. RMLE Online: Research in Middle Level Education, 32(4), 1-15. Retrieved from http://eric.ed.gov/?id=EJ827008

Raykov, T., & Marcoulides, G. A. (2006). A first course in structural equation modeling (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc., Publishers.

Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. Psychological Bulletin, 130(2), 261-288. doi:10.1037/0033-2909.130.2.261

Roderick, M., Coca, V., & Nagaoka, J. (2011). Potholes on the road to college: High school effects in shaping urban students' participation in college application, four-year college enrollment, and college match. Sociology of Education, 84(3), 178-211. doi:10.1177/0038040711411280

Rosenbaum, J. E., Miller S. R., & Krei, M. S. (1996). Gatekeeping in an era of more open gates:

High school counselors' views of their influence on students' college plans. American Journal of Education, 104(4), 257-279. Retrieved from http://www.jstor.org/stable/1085432

Scarborough, J. L., & Culbreth, J. R. (2008). Examining discrepancies between actual and preferred practice of school counselors. Journal of Counseling & Development, 86(4), 446–459. doi:10.1002/j.1556-6678.2008.tb00533.x

Schaefer, M. B., & Rivera, L. M. (2012). College and career readiness in the middle grades. Middle Grades Research Journal, 7(3), 51-66. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=82956519&site=ehost-live

Schein, E. H. (2010). Organizational culture and leadership (4th ed.). San Francisco, CA: Jossey-Bass Publishers, A Wiley Imprint.

School Accountability: Academic Performance Index: Graduation Rates, California Senate Bill 1458. (2012).

Sharkness, J., DeAngelo, L., & Pryor, J. (January 2010). CIRP construct technical report. Retrieved from http://www.heri.ucla.edu/PDFs/constructs/technicalreport.pdf

Shulock, N., & Koester, J. (2014). Maximizing resources for student success by reducing time- and credits-to-degree. Retrieved from http://www.hcmstrategists.com/maximizingresources/images/Maximizing_Resources_Paper.pdf

Slaughter, S., & Leslie, L. L. (2001). Expanding and elaborating the concept of academic capitalism. Organization, 8(2), 154-161. doi:10.1177/1350508401082003

Smith, M. J. (2009). Right directions, wrong maps: Understanding the involvement of low-SES

African American parents to enlist them as partners in college choice. Education and Urban Society, 41(2), 171–196. doi:10.1177/0013124508324028

Stanton-Salazar, R. D. (2011). A social capital framework for the study of institutional agents and their role in the empowerment of low-status students and youth. Youth & Society, 43(3), 1066-1109. doi:10.1177/0044118X10382877

Straub, E. T. (2009). Understanding technology adoption: Theory and future directions for informal learning. Review of Educational Research, 79(2), 625–649. Retrieved from http://www.jstor.org/stable/40469051

Syed, M., & Chemers, M. M. (2011). Ethnic minorities and women in STEM: Casting a wide net to address a persistent social problem. Journal of Social Issues, 67(3), 435-441.

Teddlie, C., & Tashakkori, A. (2006). A general typology of research designs featuring mixed methods. Research in the Schools, 13(1), 12-28.

Thomas, S. L., & Zhang, L. (2005). Post-baccalaureate wage growth within 4 years of graduation: The effects of college quality and college major. Research in Higher Education, 46(4), 437-459. Retrieved from http://www.jstor.org/stable/40197375

Tierney, W. G. (2009). Applying to college. Qualitative Inquiry, 15(1), 79-95. doi:10.1177/1077800408325329

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. Review of Educational Research, 45(1), 89-125. Retrieved from http://www.jstor.org/stable/1170024

Trice, A. D., & Hughes, M. A. (1995). The origins of children's career aspirations: IV. Testing hypotheses from four theories. Career Development Quarterly, 43(4), 307-323.

Turner, S. L., & Conkel, J. L. (2010). Evaluation of a career development skills intervention with adolescents living in an inner city. Journal of Counseling & Development, 88(4), 457-465. doi:10.1002/j.1556-6678.2010.tb00046.x

Turner, S. L., & Lapan, R. T. (2005). Evaluation of an intervention to increase non-traditional career interests and career-related self-efficacy among middle-school adolescents. Journal of Vocational Behavior, 66(3), 516-531. doi:10.1016/j.jvb.2004.02.005

U.S. Department of Education. College scorecard. Retrieved November 22, 2015, from https://collegescorecard.ed.gov/school/?110583-California-State-University-Long-Beach

U.S. Department of Education. ESEA reauthorization: A blueprint for reform. (2011, May 26). Retrieved from http://www2.ed.gov/policy/elsec/leg/blueprint/index.html

U.S. Department of Education. Every student succeeds act (ESSA). (2015, December 10). Retrieved from http://www.ed.gov/essa?src=rn

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2014). The condition of education 2014.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2013). Digest of education statistics, 2012. Retrieved from http://nces.ed.gov/fastfacts/display.asp?id=98

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2012). Higher education: Gaps in access and persistence study.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics. (2012). Institutional retention and graduation rates for undergraduate students. Retrieved October 5, 2014, from http://nces.ed.gov/fastfacts/display.asp?id=40

U.S. Department of Education, National Center for Education Statistics (2015). Number and percentage distribution of science, technology, engineering, and mathematics (STEM) degrees/certificates conferred by postsecondary institutions, by race/ethnicity, level of degree/certificate, and sex of student: 2008-09 through 2013-14. Retrieved June 3, 2016, from http://nces.ed.gov/programs/digest/d15/tables/dt15_318.45.asp?current=yes

U.S. Department of Education, The Secretary of Education's Commission on the Future of Higher Education. (2006). A test of leadership: Charting the future of U.S. higher education (Contract No. ED-06-C0-0013). Retrieved from http://www2.ed.gov/about/bdscomm/list/hiedfuture/index.html

U.S. Department of Labor, Bureau of Labor Statistics. (2013). Earnings and unemployment rates by educational attainment. Retrieved from http://www.bls.gov/emp/ep_chart_001.htm

University of California, Los Angeles, Higher Education Research Institute. (2009). CIRP construct technical report appendix: 2009 construct parameters. Retrieved from http://www.heri.ucla.edu/PDFs/constructs/Appendix2009.pdf

University of California, Los Angeles, Higher Education Research Institute. (2015). CIRP overview. Retrieved from http://www.heri.ucla.edu/cirpoverview.php

Venegas, K. M. (2006). Internet inequalities: Financial aid, the Internet, and low-income students. American Behavioral Scientist, 49(12), 1652–1669. doi:10.1177/0002764206289147

Venezia, A., & Jaeger, L. (2013). Transitions from high school to college. The Future of Children, 23(1), 117-136. Retrieved from http://www.jstor.org/stable/23409491

Venezia, A., & Kirst, M. W. (2005). Inequitable opportunities: How current education systems and

policies undermine the chances for student persistence and success in college. Educational Policy, 19(2), 283-307. doi:10.1177/0895904804274054

Wahl, K. H., & Blackhurst, A. (2000). Factors affecting the occupational and educational aspirations of children and adolescents. Professional School Counseling, 3(5), 367-374. Retrieved from http://www.jstor.org/stable/42732151

Welton, A. D., & Martinez, M. A. (2014). Coloring the college pathway: A more culturally responsive approach to college readiness and access for students of color in secondary schools. Urban Rev, 46, 197–223. doi:10.1007/s11256-013-0252-7

Zhang, L. (2005a). Advance to graduate education: The effect of college quality and undergraduate majors. The Review of Higher Education, 28(3), 313–338. doi:10.1353/rhe.2005.0030

Zhang, L. (2005b). Do measures of college quality matter? The effect of college quality on graduates' earnings. The Review of Higher Education, 28(4), 571-596. doi:10.1353/rhe.2005.0053