The Relation Among College-going Culture in High Schools, Academic Mindset, and College Success

BY

MEREDITH EMILY WELLMAN
B.A., Miami University, 2008
M.A., University of Illinois at Chicago, 2011

THESIS

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Defense Committee:

Bette L. Bottoms, Chair and Advisor
Susan P. Farruggia
Karina Reyes
Katherine Zinsser
Will Hobart, Chicago Public Schools
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1. INTRODUCTION

A. **Background**

In the United States, the prevailing cultural norm in most communities is that after high school, students attempt a higher education degree. This is evident in President Obama’s position on higher education, which is that “earning a post-secondary degree or credential is no longer just a pathway to opportunity for a talented few; rather, it is a prerequisite for the growing jobs of the new economy” (Whitehouse.gov, 2014, para. 1). Yet the culture of college-going varies widely from high school to high school (Falsey & Heyns, 1984; MacNeil, Prater, & Busch, 2009). Access to college for many students is blocked because students are underprepared both financially and academically (Advisory Committee on Student Financial Assistance, 2006). Furthermore, far too many students who gain access to college drop out after only a short time. The national attrition rate from four-year colleges before the second year is 28%, and the overall dropout rate before graduation is 56% (ACT, 2014). Although many factors influence dropout (Tinto, 1993), it is possible that one factor is a lack of social support in educational contexts during earlier school years that might make it difficult for students to develop and maintain the perception that they can persist until college graduation.

How could high schools and colleges/universities prevent many more students from dropping out of college? The importance of this question is underscored by considering the vast resources such as time, money, and personal and family sacrifices that it takes for students to gain access to college and the significant benefits of a college degree (Zaback, Carlson, & Crellin, 2012). Although some factors such as paying for college might not be within the scope of high school interventions, students’ psychological and academic preparation for college are. Indeed, research has consistently revealed that students from the same high school are more
similar in terms of their academic preparation and resources for educational advancement than students from different high schools (Chiu & Khoo, 2005; Stewart, 2007; Raudenbush & Bryk, 1986). Furthermore, research on high school-level effects has demonstrated that student perceptions of school are important determinants of their success (Farrington et al., 2012; Stewart, 2007).

For example, Chiu and Khoo (2005) sampled fifteen year olds from 41 countries who took part in the Organization for Economic Cooperation and Development’s Programme for International Student Assessment (OECD-PISA) study. Using multilevel modeling, the researchers found that students scored higher in reading and mathematics when their schools had more teachers, enough teaching materials, a higher percentage of certified teachers, and more educated teachers. This study focused on tangible material and educational supports available at the school level.

Researchers have also found that non-material resources are important predictors of student success, such as emotional support that improves students’ perceptions of school. For example, Stewart (2007) found that African American students in high schools with more positive student-reported perceptions of cohesion (i.e., trust, shared expectations, and positive interactions among students, teachers, and administrators) had higher average student grades.

High schools that support students in their pursuit of a college degree are said to have a strong college-going culture (Corwin & Tierney, 2007; Jarsky, McDonough, & Núñez, 2009; Kim & Núñez, 2013; McClafferty, McDonough, & Núñez, 2002). In this dissertation, I unpack the concept of a college-going culture and place it within a theoretical model predicting that students in strong college-going cultures in high school have a greater chance of persisting to earn their college degree. Specifically, I theorize that a college-going culture, including social
support provided in the context of college-related programs, influences students’ perceptions about school, including perceived academic self-efficacy, which in turn is related to college success. That is, perceived self-efficacy, or one’s perceived ability to accomplish a goal, mediates the effects of social support on a range of outcomes (Bandura, 1989, 2004, 2011; Davis & Bottoms, 2002; Plotnikoff, Lippke, Courneya, Birkett, & Sigal, 2008). I will use self-efficacy theory (Bandura, 2011), along with a framework in the educational success literature (Farrington et al., 2012), to explain the associations between social support in school, students’ perceptions of college, and college success outcomes.

Although researchers have examined student, family, high school, community, and social/cultural factors influencing college enrollment (Falsey & Heyns, 1984; Kim & Nunez, 2013; Perna, 2006; Perna & Thomas, 2008), few have associated high school factors with college success beyond college enrollment. This is likely due to three factors that make this research difficult: (a) the high cost of following students over a long period of time, (b) the difficulties in obtaining and linking data from multiple institutions, and (c) the lack of theoretical explanation for why high school-level factors would influence college success indicators such as grades, credits earned, and retention. Some notable exceptions to this gap in the literature are a national study by Bowen, Chingos, and McPherson (2009), work by Sedlacek (1996, 1999, 2011), more recent work by the University of Chicago’s Consortium on Chicago School Research (e.g., Nagaoka et al., 2013), and a body of research on college success in progress at the University of Illinois at Chicago (UIC).

Bowen et al. (2009) found that, controlling for pre-college academic achievement, college degree completion varied by SES, level of parental education, race/ethnicity, and gender. Nagaoka et al. (2013) provided a non-cognitive framework for understanding the connections
between socio-cultural context, academic mindsets, and academic performance. The work at UIC, while still in progress, involves testing a variety of individual, high school, and college factors that may be associated with college success (Farruggia et al., in progress – a, b, c).

My dissertation is part of this larger body of work in progress aimed at understanding the mechanisms by which students are supported by educational systems in obtaining their college degree. It responds to the notable lack of focus by non-cognitive factor scholars on the opportunity that high school leaders and teachers (i.e., the high school system) have to provide a culture wherein students’ perceptions that they can succeed are fortified no matter what racial/ethnic background they come from and how educated or wealthy are their parents (e.g., Dennis, Phinney, & Chuateco, 2005; Sedlacek, 1996, 1999, 2011). My study extends this body of work in important ways by adding new measures of college-going culture within high schools to understand student success in college. First, I review and critique the college-going culture literature and summarize how college-going culture has been defined and measured. Next, I use Social Support Theory and Self-efficacy Theory in discussing the theoretical association between college-going culture and college success. Then, I provide a review of pertinent student, family, and school factors associated with college success, including preliminary findings from the work at UIC that inform my research.

B. College-going Culture

“College-going culture” is high school-level support for going to college (Jarsky et al., 2009). A college-going culture is defined in the college-access literature in both broad and specific terms (Corwin & Tierney, 2007; Jarsky et al., 2009; Kim & Núñez, 2013; McClafferty, McDonough, & Núñez, 2002). Kim and Nuñez (2013) define college-going culture broadly as “norms and behaviors within the school that are conducive to promoting college enrollment” (p.
86). This definition, however, does not consider the possibility that high school culture might influence college success beyond enrollment, and therefore does not encourage high school personnel to focus beyond college access nor appreciate the process of learning that students will need to draw upon once they reach college, where there is less certainty that they will have individualized support.

Corwin and Tierney (2007) provide a more specific framework for understanding college-going culture. They suggest that to develop a college-going culture, schools incorporate the following components: (a) offer challenging programs that will give academic momentum to students, such as advanced placement (AP) classes or an international baccalaureate (IB) curriculum; (b) train staff on how college plans develop (e.g., high expectations and targeted support at key decision moments for college that occur during high school or during the transition to college); (c) post a clear mission statement in each classroom; (d) offer comprehensive college preparation services; and (e) provide coordinated college support, with all counseling, administrative, high school teaching staff, college-level staff, parents, and other stakeholders working in concert with one another. These components also fit within the classification system developed by Gandara and Bial (2001) for describing college support programs. College support programs fit into one or more of the following classification groups: (1) college counseling, (2) academic enrichment, (3) mentoring, (4) parental involvement, (5) personal enrichment, (6) social integration, (7) scholarships. An eighth classification group for support programs that I have added, which was not included in Gandara and Bial (2001), is (8) interactions with teachers who have high academic expectations for students (Bohlmann & Weinstein, 2013; Rosenthal & Jacobson, 1968).
Neither Kim and Nuñez (2013) nor Corwin and Tierney (2007) provide a clear theoretical indication of why students in schools with higher levels of college-going culture might tend to experience greater college access and success, a gap I address next.

C. Social Support Framework

Social support is a person’s perceived or tangible receipt of emotional, informational, appraisal, or instrumental assistance from another person or group (Cohen & Wills, 1985; Ebreo, 1998; House, 1981; Malecki & Demaray, 2003; Sarason, Sarason, & Pierce, 1990). Researchers have measured social support in numerous ways, such as by counting the size of a person’s social network, by eliciting information about specific support behaviors, and/or by asking about general perceptions about whether help would be available were it needed (Cohen & Wills, 1985; Ebreo, 1998; Sarason et al., 1990).

Emotional social support comes from interactions between people that are comforting or that elicit positive feelings (Cohen & Wills, 1985). Emotional support transcends a specific task. For example, a student might seek out a person who is emotionally supportive to discuss a personal issue, because emotional support communicates to a student that the other person cares about him or her as a human being beyond simply caring if he or she gets a good grade or turns in a paper on time. A student might be more likely to discuss his or her struggles and ask for help from someone perceived to be emotionally supportive. Emotional support involves listening and communicating love, care, respect, approval, and acceptance (Cohen & Wills, 1985). When students do not have emotional support, they are at a higher risk of dropping out or doing poorly in school. This is seen in studies of students from first grade (Hamre & Pianta, 2005) to high school (Rothon, Head, Klineberg, & Stansfeld, 2011). Rothon et al. (2011) suggest that
emotional support influences academic success due to an ameliorating effect on psychological distress.

Informational support is information given about a particular topic that a person needs to better understand (Cohen & Wills, 1985). In the context of college readiness, informational support might refer to access to facts about various colleges or content knowledge about academic subjects. For example, a teacher might provide college-level coursework to students or give students pamphlets from a local university to learn about their programs. Without informational support, students might end up in colleges or majors that are not well-suited to their interests (Hegrenes, 2013).

Appraisal social support is feedback from others that is supportive of a goal (House, 1981); a supportive appraisal about college is, for example, a counselor helping a student to evaluate how prepared the student is for a particular college program. A teacher might also offer appraisal support by praising students for their hard work. Adult appraisals of adolescents have been found to influence adolescents’ self-perceptions and achievement (Bouchey & Harter, 2005): Student perceptions of the importance adults placed on their math and science competence, along with perceived support for math and science, predicted students’ own perceptions and achievement in math and science.

Instrumental social support is assistance with very tangible needs such as materials, money, working through a tough math problem together or helping students fill out applications (Malecki & Demaray, 2003). This form of assistance does not necessarily require an emotional commitment to a student, but rather, it requires other resources such as time, a professional network, or power to influence decisions that might affect a student’s chances of success on a particular task such as gaining admission to college. Instrumental support is also associated with
increased school success (DuBois, Holloway, Valentine, & Cooper, 2002; Rhodes & Roffman, 2002).

A critical aspect of my theoretical framework is that support received during one time period (i.e., high school) affects academic perceptions at a later time point (i.e., college). I theorize this association because supportive behaviors engender expectations of support for future circumstances (Norris & Kaniasty, 1996), and perceived support can endure over time (Larose & Boivin, 1998). Perceived support, in turn, is associated with other perceptions such as self-efficacy (Solberg & Villarreal, 1997) and belonging (Roeser, Midgley, & Urdan, 1996). Study findings from outside of the school context also provide support for this theoretical framework. For example, Norris and Kaniasty (1996) found evidence that for a sample of adults who experienced a natural disaster, received support predicted future levels of perceived support and reduced psychological distress. Perceptions of supportive school contexts have been linked to perceived belonging, self-efficacy, task value, and achievement at the college level (Zumbrunn, McKim, Buhs & Hawley, 2014), however, my theoretical framework represents an expansion of this theory to consider prior supportive school contexts (i.e., high school).

Sparse research exists on whether certain forms of social support are more helpful than others, particularly on the subject of students transitioning from high school to college. There is some evidence of a differential influence of emotional support compared with other forms of social support (i.e., instrumental, appraisal, and informational) from a study on middle school students, in which perceived emotional support from teachers was the only social support type that was a predictor of academic competence (Malecki & Demaray, 2003). In another study, emotional support was a significant predictor of job search self-efficacy for recent college graduates, but not instrumental or informational support (Russell, Holmstrom, & Clare, 2015).
Other research, however, points to significant associations between academic outcomes and 
instrumental, informational, and appraisal support (Bouchey & Harter, 2005; DuBois, Holloway, 
Valentine, & Cooper, 2002; Hamre & Pianta, 2005; Hegrenes, 2013; Rhodes & Roffman, 2002; 
Rothon et al., 2011). Emotional support might be a stronger predictor of positive outcomes than 
other forms of social support because it is more general and less task-specific. For example, 
telling students in a sincere way they are capable of doing well in school (i.e., an emotionally 
supportive communication) is more general than helping them fill out college applications (i.e., 
an instrumentally supportive task that has a clear beginning point and end point), and therefore 
might have a stronger influence on outcomes such as positive self-perceptions or academic 
success (Scott & Mallinckrodt, 2005). Further research is needed to examine the conditions 
under which different forms of social support are associated with academic success outcomes for 
students transitioning from high school to college.

Based on this framework for defining social support, I suggest that a college-going 
culture is one that provides multiple forms of social support (e.g., emotional, appraisal, 
informational, and instrumental social support) to students through eight types of college support 
programs (i.e., college counseling, academic enrichment, mentoring, parental involvement, 
personal enrichment, social integration, scholarships, and teacher expectations). In addition, 
although all four forms of social support are likely provided to some degree by college support 
programs in high schools, college support programs differ in the dominant forms of social 
support that they provide. By describing college support programs in terms of social support 
theory, I can test whether certain forms of social support are more likely to lead to better college 
success outcomes than others. This would provide direction for school improvement processes, 
and would add to an understanding of the relevance of social support enacted in schools.
Although researchers have used the term social support to describe college access and readiness programs in high schools (Gullat & Jan, 2003; Stephan & Rosenbaum, 2013), no one has described programs in terms of the specific types of social support they provide as I have done next.

1. **College Counseling**

College counseling includes college and/or financial advising, career advising, assistance with college forms and applications, and/or help for personal issues (Gándara & Bial, 2001), which I categorize as providing informational and instrumental social support (Farmer-Hinton & Adams, 2006). According to McDonough (2005), the 2004 national counselor caseload average was 262 students to every 1 counselor, with some counselors responsible for up to 5,000 students (De La Rosa, 2006). Given this high ratio, it is likely beyond the scope of most school counselors to provide much of the other forms of social support beyond informational and instrumental, a conclusion supported by interviews with counselors (Farmer-Hinton & Adams, 2006).

Instrumental social support is provided when the counselors sit down with students and help them to select, for example, a set of schools to apply to. Informational social support is provided by counselors when they give students college application forms or links to forms, through which students can make informed decisions about college.

2. **Academic Enrichment**

The second type of support programming, academic enrichment, includes summer programs, tutoring, college-based or college-level courses, high school or after-school academic preparatory programs, assessments, and/or achievement test preparation (Gándara & Bial, 2001). I see these types of support programs as providing informational, instrumental, and appraisal social support. Not only does academic enrichment programming provide students with the
intellectual capacity to make decisions about their desired college major and with a record of rigorous academic work (i.e., informational social support), but it also provides students with continuous feedback (i.e., appraisal social support) about their standing in an academic environment in the form of grades, teacher evaluations of their work, and peer feedback on their ability to work with others on academic tasks. Indeed, peer interaction and feedback are associated with student success (Wang & Eccles, 2012) and are more feasible in schools where a greater number (or proportion) of students participate in college-level programs such as AP courses. If a higher percentage of students participate in AP courses, there is a greater likelihood that the overall climate of the school is one with high expectations that students will go to college (Cardichon & Roc, 2013), and that students will have access to peer support (e.g., when several sections of AP English are taught, students can cross-check their learning with students in other sections).

In academic enrichment programs, students are likely to have more one-on-one time for completing tasks with staff (i.e., instrumental social support). In a recent report, researchers advocated for federal expansion of college-level AP courses in high schools, stating that with a greater number of students engaged in rigorous academic work, the high school climate and college outcomes of students are likely to improve, especially if the coursework is delivered in an “engaging and supportive” manner (Cardichon & Roc, 2013, p. 10; The Broad Foundation, 2010). The benefits of exposure to rigorous college-level courses in high school appear to extend to a range of students; Scott, Tolson, and Lee (2010) found that after controlling for ethnicity, gender, class rank, and standardized test scores, students with AP experience earned higher first term college GPAs than students with similar high school academic characteristics without AP credit.
3. **Mentoring**

The third type of support programming is mentoring, with mentors defined here as “an older, more experienced adult and an unrelated, younger protégé - a relationship in which the adult provides ongoing guidance, instruction, and encouragement aimed at developing the competence and character of the protégé” (Eby, Rhodes, & Allen, 2007, p. 10). Mentoring in the context of college programming in high schools can be with peers, university and/or high school staff/faculty, volunteers, or corporate professionals (Gándara & Bial, 2001). According to researchers of youth mentoring, effective mentors provide both emotional and instrumental support (DuBois & Neville, 1997; Grossman & Rhodes, 2002; Karcher & Nakkula, 2010; Smith & Stormont, 2011; Taylor, LoSciuto, & Porcellini, 2005).

Transition coaching is a form of mentoring designed specifically for the time at the end of high school through the end of the first semester or year in college. Researchers have noted that this is a particularly vulnerable period of time when many students drop out (Gall, Evans, & Bellerose, 2000). Transition coaching is an especially important social support intervention for minority students and those without another source of social support for college such as a close friend or parent who graduated from college (Kautz & Zanoni, 2014).

4. **Parental Involvement**

The fourth type of support programming, parental involvement, takes the form of parents’ expectations and interactions at home with their child about college plans, orientations to college-related school programs for parents, parent volunteer positions, parent informational programs, program designer/development positions, and other staff positions for parents (Gándara & Bial, 2001). The effects on student perceptions of this type of parent participation in school programming have not been empirically studied (LeFevre & Shaw, 2012). Parent
involvement is likely to provide supports similar to mentoring: instrumental and emotional social support.

5. **Personal Enrichment**

The fifth type of support programming, personal enrichment, includes leadership opportunities, arts and cultural activities, field trips, and speakers (Gándara & Bial, 2001). Personal enrichment activities, such as listening to a speaker or going to a cultural festival, are a form of informational support.

6. **Social Integration**

The sixth type of support, social integration (Gándara & Bial, 2001), provides emotional and appraisal support. Activities in this category pair students together to work toward a common goal. For example, students might be required to walk together on field trips to teach each other what they are learning. The experience of helping and being helped by their peers in activities gives students an indication of where they stand in their skills and interests. Finding common interests and sharing skills is a valuable opportunity for students to appraise and be appraised.

7. **Scholarships**

The seventh type of support is scholarships, which provide financial (i.e., instrumental) support. Scholarships are further described by Gándara and Bial (2001) as coming from a variety of sources, such as universities, private/corporate sponsors, or federal/state agencies.

8. **Teacher Expectations**

In addition to these programmatic and financial forms of social support for college which largely fall outside of the traditional classroom time, teacher expectations of students also exert a powerful influence on student perceptions of themselves in school (Bohlmann & Weinstein,
Teacher expectations are an eighth type of support provided in high schools that I have added to Gándara and Bial’s (2001) categorization structure. Rosenthal and Jacobson (1968) found that the expectations people have for others can act as a self-fulfilling prophecy. For example, when teachers expect students to do well, students often achieve higher levels of success. Teacher expectations are a form of appraisal social support (Bouchey & Harter, 2005). Indeed, research has found that teacher expectations influence students at both an individual and classroom level, suggesting that aggregating teacher expectations of students is an important consideration for educational research studies examining school culture (Brophy, 1985; Rubie-Davies, 2006).

9. Summary

There is abundant evidence that social support is associated with college success (e.g., Ebreo, 1998; Rayle, Robinson Kurpius, & Arredondo, 2006). High school social support has the capacity to influence college success beyond college enrollment because of its ability to alter student perceptions (Karademas, 2006; Scott & Mallinckrodt, 2005). When adults and peers provide social support to students in the context of school programs, it influences students’ perceptions that they are capable of earning a college degree, that they belong in academic settings, and that it is worth the effort (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012; Flook, Repetti, & Ullman, 2005; Legault, Green-Demers, & Pelletier, 2006). My study tests whether social support fosters these types of perceptions in college students when provision of social support is represented by various types of high school programs promoting college readiness and access. There is no prior research on whether certain types of social support (i.e., emotional, informational, instrumental, or appraisal support) are more critical than other types during high school for future college success; however, one might expect that a form of support that taps into
emotions (i.e., emotional support) would have longer-lasting effects on student outcomes than more task-specific supports (Russell, Holmstrom, & Clare, 2015).

Using social support as an indicator of and way of understanding college-going culture deviates somewhat from the way others have described and measured college-going culture (Avery et al., 2006; Manski & Wise, 1983; Roderick, Coca, & Nagaoka, 2011). Although researchers have historically measured norms at the high school level such as the rate of going to 4-year colleges as an indicator of college-going culture, more recently, Roderick et al. (2011) advanced this work by using three other indicators as well, one of which (i.e., teacher expectations) overlaps with my study. They measured (a) high school rate of students attending 4-year college after graduating, (b) high school average teacher expectations, (c) high school rate of students completing financial aid applications, and (d) high school rate of students completing three or more college applications. My dissertation attempts to understand effects of high school culture on college success beyond college application and enrollment; thus, the indicators of college-going culture in my study reflect social support mechanisms that have potential to boost students’ psychological mindset about staying in school long-term.

D. Psychological Theory on the Effects of Social Support on Academic Mindset

Academic mindsets are perceptions about learning that stimulate school success (Dweck, 2006, 2012; Nagaoka et al., 2013). Dweck (2006) theorized that students can have fixed or growth-oriented mindsets toward learning. Students with a growth-oriented mindset work harder because they believe that hard work leads to new levels of mastery, whereas students with fixed-oriented mindsets believe that no matter how hard they work, they will never advance beyond a basic ability. According to Farrington et al. (2012), academic mindset comprises four student perceptions, one of which is the perception that hard work leads to greater academic success,
which is similar to Dweck’s growth mindset. The other three perceptions described by Farrington et al. are (a) perceived ability to succeed in academic settings (i.e., perceived academic self-efficacy), (b) perceived sense of belonging in an academic setting, and (c) perceived value of academic tasks.

Self-efficacy is defined as people’s interpretations of their ability to influence events that affect their life (Bandura, 1994), and perceived academic self-efficacy is one component of students’ academic mindset. Efficacy mindsets can be altered by supportive or unsupportive social contexts (Bandura, 1994; Davis & Bottoms, 2002, p. 188). For example, Scott and Mallinckrodt (2005) found that withdrawn emotional support from fathers was associated with lower science self-efficacy among women in college. A longitudinal study by Flook, Repetti, and Ullman (2005) documented that social support factors in fourth grade predicted academic self-concept and internalizing in fifth grade and academic performance in sixth grade, while controlling for fourth grade academic performance. This research revealed that as much as a quarter of the variance in academic performance can be explained by social support factors in prior academic years.

Perceived sense of belonging is another component of students’ academic mindset, and is defined as the extent to which a person feels included in his or her academic community (Hurtado & Carter, 1997; Johnson et al., 2007). Sense of belonging for students includes feeling that they deserve to be in academic environments, their opinions/perspectives are valid and appreciated in the classroom setting, and others like them have succeeded (Johnson et al., 2007). Extensive research exists on the influence of social support and sense of belonging on academic success throughout early school years (e.g., Goodenow, 1993; Osterman, 2000), however, a dearth of literature exists on these factors during the transition from high school to college.
Encouragingly, however, there are indications that social support in academic settings can have carryover effects on sense of belonging in later academic settings (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012; Goodenow, 1993). For example, an intervention study by Cook et al. (2012) with middle school students involved providing socially supportive affirmations to students and tracking their sense of belonging and academic achievement over time compared with a non-intervention control group. Students who received a social support intervention had more stable sense of belonging over two years compared with the control group, regardless of academic performance during that time. Although it is not entirely clear from prior research why socially supportive interventions influence sense of belonging over time, it is possible that students recall the sense of belonging they felt in other academic settings when they are in a new place. In essence, when students from socially supportive high schools face tough situations in college, they might go back to that “happy place” in their mind (i.e., back to high school when someone was rooting for them and telling them they are a good student) and still feel as if they belong in a school setting, protecting them from dropping out or giving up on classwork. More research is needed to understand whether and how sense of belonging in a socially supportive school context endures across other school contexts.

A third academic mindset is students’ perceived ability to grow academically through their own efforts (Dweck, 2006; Farrington et al., 2012). When students believe that their intelligence is malleable, they are more likely to work hard at learning. Social support plays an important role in student perceptions of how they learn. Indeed, psychological intervention researchers have shown that when students are given socially supportive messages that their intelligence is malleable and that people tend to do better over time with continued effort, they
tend to stay in school and do better (Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Wilson & Linville, 1985).

The final component of academic mindset is perceived value of academic tasks (Farrington et al., 2012). The perceived value of academic tasks can increase through attainment of a goal, a deeper understanding of the perceived utility of the task, or finding more intrinsic enjoyment in the task. Socially supportive school environments are associated with increases in the perceived value of academic tasks. In essence what this means is that students will work harder for a teacher who places a high value on a task, and students in turn find more enjoyment in a task as they master it and complete it (Legault, Green-Demers, & Pelletier, 2006). This set of interactions between teacher and student, or student and student, can be thought of as reciprocal; as they work together and achieve successes in learning, they each begin to feel that the task has more and more value. Unfortunately, the opposite can also happen. If teachers and students struggle too much to complete a task together, the perception that the task is valuable enough to exert the stress of learning or doing it is diminished.

Socially supportive school environments can influence students’ mindsets and academic success (Zumbrunn, McKim, Buhs & Hawley, 2014). According to Farrington et al. (2012), academic mindset is associated with college success through a number of mediating variables (e.g., academic motivation and academic behaviors). These mediators, although not the focus of the present study, are conceptually important to an understanding of the association between academic mindset and college success. Farrington et al. (2012) hypothesized that many non-cognitive factors influence academic performance. In their model, the school context shapes student perceptions (i.e., academic mindsets), which give rise to motivations for school success, which influence students’ academic behaviors such as study time, which then influence academic
success outcomes such as grades and graduation. In line with this prior research, I focus in my conceptual model on social support as a part of the high school context, which shapes students’ academic mindsets, which are associated with college success.

As described above, recent literature reviews by UChicago’s Consortium on Chicago School Research (e.g., Farrington et al., 2012; Nagaoka et al., 2013) organized student perceptions factors affecting student success from many studies across educational and psychological literature into one explanatory framework. Several of the theoretical pathways identified in the Consortium’s framework were tested in an unpublished study at UIC (e.g., perceived academic self-efficacy predicting college success; Farruggia, Han, Moss, & Bottoms, in progress-a). Self-efficacy during the first term had a significant association with first-term grades and credits earned in college, which in turn was associated with retention to the second year in college. This foundational understanding of the relationship between perceptions and success was applied to the present study, in which I predict mediated pathways between high school social support and college success through perceptions.

In yet another UIC study, a cluster analysis was conducted to assess whether students with specific academic perception profiles could be grouped together, and clusters representing different perception profiles were then used as predictors of college grades and retention to the second year (Farruggia, 2015). The academic perception factors in the study were perceived academic self-efficacy, sense of belonging, and academic motivation. Results were that UIC students clustered into four profiles (i.e., Profile 1: All strong academic perceptions, Profile 2: Self-efficacy-oriented mindset, Profile 3: Sense of belonging-oriented mindset, and Profile 4: All weak academic perceptions). Profiles 1 and 2 had significantly higher first-term college grades and credits earned than Profiles 3 and 4. In addition, Profiles 1 and 3 had significantly higher
retention rates than Profile 2, and Profile 2 had significantly higher retention than Profile 4. The importance of the UIC research is that it (a) illustrates the critical role of student perceptions for college success; (b) highlights differences in type of college success by perception profile; and (c) indicates that students with multiple, strong positive academic perceptions have higher levels of college success than students fitting other perception profiles.

E. Other Factors Linked to College Success (Controls)

Other individual and high school-level control factors influence college success outcomes, and could be correlated with the variables I am centrally interested in, but are not central to my theoretical framework. The individual-level control variables reviewed include high school grade point average (GPA), race/ethnicity, parent income, AP credits earned, and ACT Composite scores. The high school-level control variable reviewed is high school quality.

1. Individual-level Control Factors Associated with College Success

Student and family background factors such as high school grades, AP course credits earned, race/ethnicity, and parent income influence student success, and are important factors to understand, measure, and control for in educational studies (Pritchard & Wilson, 2003; Reason, 2009; Thayer, 2000). In addition to presenting research and theory based on published studies, results of research in progress at UIC will be shared, as the present study examined a subset of the same population of students (Farruggia et al., in progress-b).

Prior academic success is often a good indicator of future academic outcomes (Reason, 2009; Robbins et al., 2004). Two indicators in particular, high school GPA and AP credits earned, stand out as stronger predictors of college success than other such indicators (i.e., ACT scores) after controlling for student and family background factors (Bowen et al., 2009; Farruggia et al., in progress-b; Geiser & Santelices, 2007; Geiser & Studley, 2002; Hezlett et al.,
Earning high grades and AP credits likely requires very similar academic behaviors regardless of whether a student is in high school or college; however, earning high scores on a standardized test such as the ACT or SAT requires specific test-taking skills and endurance under pressure (Beilock & Carr, 2005). Because there is a strong correlation between high school grades and AP credits and college grades and credits earned, I have included them as control factors.

Race/ethnicity is also an important control variable given that its relation with academic mindset and college success (Dever & Kim, 2016; MacPhee, Farro, & Canetto, 2013). In the past, when race/ethnicity was included as a predictor of academic success, many researchers used White students as the control group, as their achievement levels tended to be higher than those of other racial/ethnic groups (Cauce & Gonzalez, 1993). The standards of reporting have begun to change during recent decades, however, as certain groups of Asian American students in the U.S. have tended to outperform White students (Sue & Okazaki, 1990; Tran & Birman, 2010). In Farruggia et al. (in progress-b), Asian American students earned higher grades, were retained at higher levels, and were more likely to graduate compared to Latino and African American students at UIC. European American students earned higher first-term GPAs than Asian American students, however, and there was no significant difference between the two groups in the likelihood of graduating within six years.

There is mixed evidence on whether academic mindset varies by race/ethnicity. When researchers have examined both race/ethnicity and family income in relation to academic mindset, they have found that students from low-income racial/ethnic minority backgrounds experience lower levels of self-efficacy and academic success than other student groups (MacPhee, Farro, & Canetto, 2013). In studies that did not include income in the model, little to
no differences in academic mindset across racial/ethnic groups were identified (Dever & Kim, 2016; Farruggia et al., in progress-a). Students from lower income families tend to attend less competitive colleges, earn lower grades in college, participate in fewer extracurricular activities, study less, and work more (e.g., Farruggia et al., in progress-b; Walpole, 2003). Controlling for parent income along with the other factors described in this section gives us a better understanding of the true effects of the remaining predictors on college success.

2. High School-level Factors associated with College Success

High school quality has also been added as a control variable. High school quality is a general term referring to a range of indicators that a school is a safe learning environment that equips students for college and career (Bowen et al., 2009; Bryk, Sebring, Allensworth, Easton, & Luppescu, 2010). Although college-going culture can be seen as one aspect of high school quality, there are many other aspects of school quality that have been identified, such as the average academic achievement levels of students, the proportion of students who graduate and go on to other successes in college and career, and student behavioral indicators of quality such as positive teacher interaction, attendance and dropout rates (e.g., the Chicago Public School District uses these variables to denote school quality). As high school quality is associated with academic mindset (Ma, 2003; Edwards, 1995) and college success (Legewie & DiPrete, 2012), it is an important control variable in the present study.

I have found no literature with a strong theoretical explanation for the association between high school quality and college success. This gap in the literature, particularly the relation between college-going culture (as an indicator of high school quality) and college success, drives my dissertation research. The present study has extended prior research by incorporating an expanded theoretical framework and additional high school-level factors to
allow for a better understanding of social supports at the high school level that contribute to a college-going culture, students’ academic mindset, and college success.

F. Theoretical Model and Hypotheses

My main hypothesis was that, after controlling for individual and high school background factors (i.e., high school grade point average, AP course credits earned, race/ethnicity, parent income, and high school quality), academic mindset (i.e., perceived self-efficacy and sense of belonging) would mediate the association between social support (i.e., the total number of college readiness and access programs at the high school the student attended, emotional support, instrumental support, informational support, appraisal support, teacher expectations, and the proportion of students in AP courses) and college success (i.e., first-term GPA, credits earned in the first year, and retention to the second year; See Figure 1).

Three pathways were included in this overall hypothesis. First, I predicted that higher levels of social support in high school (i.e., more social support programs, higher teacher expectations, or a greater proportion of students in AP courses) would be associated with higher levels of college success (Figure 1 Path C). I also predicted that social support would be associated with a more positive academic mindset for students in their first year of college (Path A), and that academic mindset would be positively associated with college success (Path B). Finally, I predicted that the mediating effects of academic mindset would partially explain the association between social support and college success (Path C). I predicted partial mediation because I measured only two aspects of academic mindset and there were other mediators not under consideration in the present study (Farrington et al., 2012; Zumbrunn, McKim, Buhs & Hawley, 2014).
To further elaborate on the predictions above, I postulated that the relation of social support with college success would be stronger for emotional social support (see Table 2; i.e., schools with a larger number of the following programs: Postsecondary Partners, UIUC college advising corps, Talent Search, Youth Guidance, City Year, Mikva Challenge, College and Career Coaches, IB Programs, and School Counselors) compared with informational social support (i.e., schools with a larger number of the following programs: GEAR UP, Postsecondary Partners, Ladder Up, Enlace Schools, UPWARD BOUND, UIUC College Advising Corps, Talent Search, Youth Guidance, City Year, Aspira, Mikva Challenge, Network for Teaching Entrepreneurship, College and Career Coaches, College and Career Readiness Suites, AP courses, IB Programs, Selective Enrollment/Gifted Programs, Magnet Programs, Early College STEM Schools/Corporate Sponsors, Career and Technical Education Programs, Dual Credit High Schools, Senior Seminars, and School Counselors), instrumental social support (GEAR UP, Postsecondary Partners, Ladder Up, Enlace Schools, UPWARD BOUND, UIUC College Advising Corps, Talent Search, Youth Guidance, City Year, Aspira, Mikva Challenge, Network for Teaching Entrepreneurship, College and Career Coaches, College and Career Readiness Suites, AP courses, IB Programs, Selective Enrollment/Gifted Programs, Early College STEM Schools/Corporate Sponsors, Career and Technical Education Programs, Dual Credit High Schools, Senior Seminars, and School Counselors), and appraisal social support (GEAR UP, Postsecondary Partners, Enlace Schools, UPWARD BOUND, UIUC College Advising Corps, Talent Search, Youth Guidance, City Year, Aspira, Mikva Challenge, Network for Teaching Entrepreneurship, College and Career Coaches, AP courses, IB Programs, Selective Enrollment/Gifted Programs, Career and Technical Education Programs, Senior Seminars, and
School Counselors), because emotional social support is more general than task-specific (Scott & Mallinckrodt, 2005).
2. METHOD

A. Participants

Participants were 369 students from 30 Chicago Public Schools who entered UIC as first-time, first-year students in the Fall term of the 2013 academic year. There were 44% men and 56% women and the average age was 18 years old (ranging from 16-20 years). The sample was racially/ethnically diverse: Asian American or Pacific Islanders (26%), White/Caucasians (13%), African Americans (7%), Hispanic/Latino (49%), and other (5%). Those who did not report their race/ethnicity (8%) and groups with a small group sample size (i.e., the other category, which included American Indian/Alaskan Natives) were coded as missing for the ethnicity variable, as there were too few for there to be statistical power to detect differences between them and the other groups. Participants came from families with a range of parent income and education levels. Parent incomes ranged from $0 to $213,003 ($M = \$45,796; SD = \$36,742$). Nearly half of participants were from families in which neither parent had a college degree (46%). All were students at UIC who graduated from Chicago Public School District high schools and who had voluntarily taken a survey of their non-cognitive skills, which was administered by Farruggia et al. (in progress-b) during the Fall 2013 semester English classes. Prior to calculating the descriptive statistics reported above, I omitted two students who graduated from high school more than one year prior to attending UIC, under the assumption that their high school experience would be less salient than students who transitioned more directly from high school to college.

High schools included in the sample had school quality ratings between two and five ($M = 3.50, SD = 1.11$). Fourteen of the sampled schools were neighborhood schools, six were charter schools, six were selective enrollment schools, two were magnet schools, one was a
career academy, and one was a small school (cps.edu, 2015). The student enrollment levels ranged from under 400 to over 4,000 students ($M = 1565.57$, $SD = 911.94$; cps.edu, 2015).

**B. Materials**

The data on gender, age, race/ethnicity, prior academic success, parent income, and parent education level were obtained from UIC’s institutional database, which includes the Free Application for Federal Student Aid (FAFSA), other student records (i.e., high school transcripts and admissions records), and UIC’s Entering Student Survey (ESS). Student unique identifiers and high school identification numbers were used to account for the nested structure of the data during analyses.

1. **Demographic Measures**

The demographic variables included student gender, age, and race/ethnicity. The data were obtained from UIC’s institutional database of student information. UIC’s institutional database includes the Free Application for Federal Student Aid (FAFSA), high school transcripts and admissions records, and UIC’s Entering Student Survey (ESS). Student unique identifiers and high school identification numbers were used to account for the nested structure of the data during analyses. Gender was coded male=0 and female=1, age was in years, and race/ethnicity was dummy coded for the four largest racial/ethnic groups. Dummy coded variables were created for African Americans, European Americans, and Latino/as, with Asian Americans as the reference group; Asian American students have the highest levels of student success in this population (Whaley & Noel, 2013).

2. **Prior Academic Success Measures**

Prior academic success was measured using students’ high school grade point average (GPA), AP credits earned, and ACT Composite Scores. These data were also obtained from
UIC’s institutional database of student information. Unweighted high school GPA was on a 0.0 to 4.0 scale, and the sample range was from 2.21 to 4.00 ($M = 3.31$) after GPAs above 4.00 were recoded to be a 4.00. Seventy-two percent of students did not earn AP credits during high school. The AP credits earned variable was logarithmically transformed due to the high skewness and kurtosis, and the sample range was from 0 to 1.70 ($M = .26$). The ACT composite score variable was the average of the English, Mathematics, Reading, and Science test scores rounded to the nearest whole number. ACT composite scores ranged from 15 to 35 ($M = 23.33$). I used the highest score provided if students took a test more than once. ACT data was available for all but one student.

3. Parent Income

I used Free Application for Federal Student Aid (FAFSA) data from the students’ first year at UIC to obtain parent income and education level. The FAFSA parent income variable asked parents to report their combined income from their tax return (in dollars; $Mdn = $33,866.00, $SD = $36,742.68$).

4. Parent Education Level

Parent education was a computed variable indicating whether either of a students’ parents had a college degree. The variable was computed from two FAFSA parent education variables asking about parents’ highest level of education. I recoded the original two FAFSA parent education variables (one for the mother, and one for the father) from four categories to three, representing (a) No High School Degree, (b) High School Degree, or (c) College or Higher Degree. The original categories were (a) Middle School/Junior High Completed, (b) High School Degree, (c) College or beyond, and (d) Other/unknown. Using those two recoded variables, I computed the dichotomous parent education variable ($0 = \text{at least one parent had a college or}$
higher degree and 1 = neither parent had a college or higher degree; \( M = .46, SD = .50 \). The majority of the data came from the FAFSA, but approximately 6% of both the father and mother education data were from the ESS. There were two parent education items asking the highest level of education for both the Mother and Father. These two items were recoded in the same way as the FAFSA data, as explained above. Nine students were missing parent education data after the ESS data were included (2%).

5. Social Support Measures

Four distinct high school-level measures of social support were included as the psychological mechanism explaining college-going culture.

a. Number of college readiness and access programs. For the first measure of social support, I obtained from the Chicago Public Schools Office of College and Career Preparation a dataset containing the names of 25 college readiness and access programs being implemented within at least one high school (See Table 1). I submitted a Scope of Work to CPS’s Office of Research, and was provided with a letter of support from CPS. I was given access to the dataset of CPS programs after the Scope of Work was approved. The number of programs variable was the sum of the number of those programs implemented at each high school, ranging from 1 to 14 (see Figure 2).

b. Types of social support. Table 1 contains descriptions for each of the 25 college readiness and access programs, summarized from information on each program’s website, which was coded for types of social support that each program offered. Specifically, two independent raters use the codebook found in the Appendix to code 20% of the programs in terms of which forms of social support they provide to students.
The percent agreement was 92%, and interrater reliability was sufficient (Kappa = .78; Landis & Koch, 1977; McHugh, 2012). Disagreements were resolved by discussion, and one rater coded the remaining 80% of programs. The results of the coding procedure are presented in Table 2.

I tallied the number of each type of social support program by high school to create four high school-level social support variables. The number of emotional support programs in the schools ranged from 0 to 6 ($M = 3.51$), appraisal support programs ranged from 1 to 12 ($M = 6.43$), instrumental support programs ranged from 1 to 14 ($M = 7.32$), and informational support programs ranged from 1 to 14 ($M = 7.37$).

c. **Teacher expectations.** The third measure of social support was a measure of teacher expectations for postsecondary education for their students. The five items were a part of CPS’ My Voice, My School Survey conducted in 2012. CPS administration asked all teachers to rate these items on a 5-point scale (1 = strongly disagree and 5 = strongly agree): (a) Most of the students in this school are planning to go to college; (b) Teachers expect most students in this school to go to college; (c) Teachers at this school help students plan for college outside of class time; (d) The curriculum at this school is focused on helping students get ready for college; and (e) Teachers in this school feel that it is a part of their job to prepare students to succeed in college. Data were recoded as percentages of parents that agreed or strongly agreed with each statement, which ranged from 0 to 100 percent. Next, an average was computed across the five items. Higher average scores indicated a larger percentage of teachers in the high school who agreed that the teachers in the school had high expectations for students in the area of postsecondary education ($M = 90.39$, $SD = 8.27$).
This data was not available for CPS charter schools (20\% of the total schools in my sample) and I was not able to obtain data from schools having a low response rate (defined as less than 50\% of teachers at a particular school); thus, 102 students from 18 schools had missing data for teacher expectations (25\%). Missing teacher expectations data was imputed using multiple imputation in SPSS.

**d. Proportion of students in AP courses.** The fourth measure of social support was the proportion of students enrolled in AP courses at each school ($M = 23.66, SD = 12.49$). CPS provided the percentage of students in each high school who took AP courses with the exception of charter schools (14\%). Missing data on this variable was imputed using multiple imputation in SPSS.

**6. Academic Mindset Measures**

Two measures of academic mindset, perceived academic self-efficacy and perceived sense of belonging, were measured within a survey of non-cognitive factors that UIC teaching staff administered as a part of a larger research project during Introductory English class time in Fall 2013.

**a. Perceived academic self-efficacy.** Perceived academic self-efficacy was measured using an adapted version of the Course Efficacy Subscale from the College Self-efficacy Scale (Solberg, O’Brien, Villareal, Kennel, & Davis, 1993). This 7-item measure asked students how confident they were that they could complete a particular task on a 3-point scale ranging from 1 (not confident) to 3 (a lot confident) rather than the 10-point scale originally used by Solberg et al. The 3-point scale replaced the 10-point scale to conform to the limitation of using a Scantron sheet. Students were given the following question prompt: “How confident are you that you could complete the following tasks?” for the following seven tasks: (1) researching a term paper,
(2) writing course papers, (3) doing well on exams, (4) taking good class notes, (5) keeping up to date with schoolwork, (6) managing time effectively, and (7) understanding textbooks. Cronbach’s alpha was .79 for this sample ($M = 2.51, SD = .41$). This variable was transformed using SPSS principal axis factoring to obtain regression-based factor scores that were highly correlated with the mean scores but had substantially greater variance and, therefore, better differentiated individuals’ scores from one another.

**b. Perceived sense of belonging.** Sense of belonging was measured using the Overall Sense of Belonging Scale created by Johnson et al. (2007). The 5-item measure asked students to rate how often they agreed with each of five statements on a 4-point scale ($1 = never, 4 = very often$). Items included “I feel a sense of belonging,” “I feel a member of the campus community,” “I feel comfortable on campus,” “I would choose the same college over again,” and “My college is supportive of me.” Cronbach’s alpha was .82 for this sample ($M = 2.76, SD = .66$). This variable was also transformed to obtain regression-based factor scores, as described above.

**7. High School Quality**

To control for high school quality, I included a School Quality Rating by CPS, which is a 5-point composite variable ($5 = highest quality, 1 = lowest quality$) available on the CPS website for all high schools. The composite variable includes 15 school quality measures: school growth percentiles on the ACT for 6 different demographic groups, the proportion of students “on track” to graduate after their freshman year, graduation rate, college enrollment rate, college persistence rate, AP course success, attendance, dropout, My Voice/My School survey rank, and data quality index scores.

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Though it was not included in the multilevel model analysis, general demographic information on the sampled high schools (i.e., type of school and student enrollment levels) was obtained from the Chicago Public Schools website and was included in the sample description (cps.edu, 2016).

8. **Dependent Measures of College Success**

The following were indicators of college student success in this study: First-term freshman grade point average (GPA), retention from the first to second year, and credits earned during the first year. First-term GPAs were the grades earned from all credit-bearing courses in the first term in college, on a 5-point scale (4 = A, 3 = B, 2 = C, 1 = D, and 0 = F; $M = 2.74$, $SD = .91$). Retention reflected whether or not the student persisted into the second year of college (1 = yes and 0 = no; $M = .84$, $SD = .37$), and the credits earned variable was the number of credits that a student earned by completing courses during Fall and Spring terms of their freshman year measured as a continuous variable ($M = 23.41$, $SD = 7.84$). AP course credit was not included in the first year credits earned outcome variable.

C. **Procedure**

The data for this study were compiled from the multiple pre-collected sources described for each variable above, consistent with the approved methods in the UIC Institutional Review Board protocol for the larger parent UIC study (Protocol # 2012-1118).
3. RESULTS

A. Plan of Analysis

Following suggestions made by Scherbaum and Ferreter (2009), I developed two multilevel power scenarios: In scenario one, I omitted schools with fewer than four students ($n=369$), set alpha at .05, assumed that the population effect size would be medium, and assumed an intraclass correlation coefficient of .18 because preliminary analyses yielded ICCs of .12, .18, and .33 ($M = .21$) for the college success outcomes in this dissertation. With the resulting sample sizes of 30 for the high schools (i.e., Level 2 in the multilevel analysis) and an average of 12 students within high schools (i.e., Level 1), power would be approximately .78. Power values of .8 and above are preferable (Scherbaum & Ferreter, 2009). Scenario two was the same except that I omitted schools with fewer than 3 students ($n=384$). With the resulting sample sizes of 35 for level 2 and 11 for level 1, power would be approximately .85. I tested my hypotheses using both scenarios. I report results from scenario one, the more conservative approach, but also footnote the discrepancies arising from scenario two analyses.

1. Multilevel Mediation Model Specification

Causal-steps approaches to test mediation (Baron & Kenny, 1986) have been criticized for having low power to detect mediation, as it does not truly test the indirect effect of x on y (Hayes, 2009). Another popular method for testing mediation, the Sobel Test (Sobel, 1986), assumes that the sampling distribution of the indirect effect is normal, which is not likely to be true in most samples (Hayes, 2009). Therefore, I used the Joint Significance Method to test for mediation (Krull & MacKinnon, 2001; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Mallinckrodt, Abraham, Wei, & Russel, 2006), as done by Henry, Deptula, and Schoeny (2012). The Joint Significance Method is a variant of the causal steps approach but requires only that the
pathway from x to m (Path A in Figure 1 from social support to academic mindset) and the pathway from m to y (Path B in Figure 1 from academic mindset to college success) are both statistically significant. If both paths are significant, we can say there was an indirect effect of social support on college success through academic mindset. By multiplying the two coefficients together (path A coefficient and path B), we can get an estimate of the indirect effect and can provide confidence intervals.

To apply the joint significance method, I clustered UIC students by the high school they attended using the high school identification variable. This allowed me to be able to use multilevel mediation modeling techniques (i.e., Twolevel, Model indirect) within the Mplus software to test for high school-level effects and to estimate the paths in Figure 1. Student-level variables (i.e., perceived academic self-efficacy and sense of belonging, high school GPA, AP credits earned, Composite ACT score, parent income, college first term GPA, college first year credits earned, and college retention to the second year) were the within-level variables, and high school-level variables (i.e., total number of college support programs, number of emotional support programs, number of appraisal support programs, number of instrumental support programs, number of informational support programs, percent of students in AP classes, teacher expectations of post-secondary education for students, and high school quality rating) were the between-level variables. This is commonly referred to as a 2-1-1 multilevel structure (Hayes, 2013), because the independent variables are measured at the high school-level (Level 2) and the mediator and dependent variables are measured at the student-level (Level 1).

Missing values were taken into account using the Mplus default of full information maximum likelihood estimation. Because this estimation procedure is not possible at the high
school-level, multiple imputation in SPSS was used to impute missing values for the teacher expectations measure and percent of students in AP classes.

After preliminary tests of the multilevel model in Mplus using a latent variable structure for the college outcomes, it was determined that there were insufficient high school clusters to incorporate all of the parameters involved in estimating the proposed latent variable outcome model. In response, separate analyses were conducted for each of the three outcome variables to achieve an “over-identified” model (i.e., a statistical model with more “knowns” than “unknowns” to use in parameter estimation; Wang & Wang, 2012). Modeling the two academic mindset variables as a single latent variable also created an under-identified model (i.e., too many parameters to be estimated at once), therefore, I tested the multilevel models separately for each academic mindset variable.

My plan for the social support variables at the high school level was to enter them into models one at a time, and then if possible, to run another model with the significant social support variables entered into the model together to assess their shared ability to predict college success through academic mindset. Given sample size limitations, this second type of model was not tested.

Given sample size limitations, I present the results without the control variables added first, and then where significant predictors were identified, I present the models with the controls included to test the strength of the associations with the control factors accounted for. The student-level control variable means and variances were fixed at zero at the between-level. The final models contained 26 parameters estimated freely when the six control variables were included, and 9 parameters estimated freely when the six control variables were not included.
The model specification decisions above resulted in 42 statistical models (i.e., 3 outcome variables * 2 academic mindset variables * 7 high school social support variables; additional analyses described below were performed to explore possibilities and variations in the analysis). This number does not include the analyses to re-run the models with a larger sample, nor does it include the models that were re-run with control variables.

The frequency and proportion of missing values for each study variable are presented in Table 3. Descriptive statistics (correlations, means, and standard deviations) for all student-level variables are presented in Table 4. Model fit statistics and unstandardized parameter estimates for each analysis are provided in Tables 5 through 16. Unstandardized parameter estimates are reported given the mix of dichotomous and continuous predictors included in the model (Muthén & Muthén, 1998-2012). The unstandardized parameter estimates, or beta coefficients, are similar to correlation coefficient (r) values in that they have a significance level associated with them and can be either positive or negative. They are not scaled the same as correlation coefficients, since for every 1-unit increase in a predictor, the dependent variable will increase by the unstandardized beta coefficient value. If a beta coefficient is .2 and statistically significant, for example, each 1 unit increase in the predictor variable will generate an increase of .2 in the dependent variable.

**B. Intraclass Correlation Results**

I calculated intraclass correlation coefficients (ICC) to better understand the extent of the influence of the high school a student attended on college success outcomes. In determining the ICC, I included only the high school clustering variable and the outcome variable in the equation. The ICC indicates how strongly students in the same high school resembled each other in terms of their outcome. I also computed the design effect (Kish, 1965); Muthén and Satorra
(1995) recommend using multilevel modeling when the design effect is greater than 2. The design effect was calculated by the following equation: $1 + (\text{average cluster size} - 1) \times \text{ICC}$.

All three student college success outcomes clustered by high schools had design effects high enough to warrant multilevel modeling. The ICCs for first-term GPA in college, credits earned during the first year, and retention to the second year were .18, .33, and .12 respectively. The corresponding design effects were 3.07, 4.76, and 2.38.$^3$

C. Mediation Results

1. Results for Mediation of Social Support on College Success through Perceived Academic Self-efficacy

The first path in the model was the direct effect of social support factors on college success (Path C). One social support factor, the proportion of students in AP courses in the high school where the student attended, significantly predicted participants’ first-term GPA (see Models 1 and 2 in Table 5) and credits earned in college (see Models 1 and 2 in Table 9), but not retention to the second year (see Model 1 in Table 13). When control variables were added to the model, however, the effect of the proportion of students in AP courses on first-term GPA was no longer significant, and the effect on credits earned became marginally significant. No other social support variables were significant predictors of college success.

The second path in the model was the direct effect of social support on the first mediator, perceived self-efficacy (Path A). None of the social support variables were significant predictors of self-efficacy (see Models 1 and 2 in Tables 5-15 and Model 1 in Table 16). The third path in the model was the direct effect of the mediator, perceived self-efficacy, on college success (Path B). Perceived academic self-efficacy was a significant predictor of first-term GPA in college and first-year credits earned, but not a significant predictor of retention to the second year (see
Models 1 and 2 in Tables 5-15 and Model 1 in Table 16). The effect of self-efficacy on first-term GPA and first-year credits earned remained significant when control variables were added to the model (see Model 2 in Table 5 and Model 2 in Table 9). The last path in the model was the indirect effect of social support on college success through the mediator, self-efficacy (Path A*B). Perceived academic self-efficacy was not a significant mediator of the relation between any of the social support variables and the college success outcomes (see Models 1 and 2 in Tables 5-15 and Model 1 in Table 16).

According to the SRMR statistic, the model fit was good for the within-level for all of the results presented above, but poor at the between-level; for the RMSEA statistic, the model fit was considered poor for the first-term GPA and first-year credits earned models, but moderate for the retention models. When the control variables were added to the models, the model fit was poor for the between and within-levels based on the RMSEA and SRMR statistics. No differences in effects were observed when the models were conducted again with the sample of 384 students from 35 high schools.

2. Results for Mediation of Social Support on College Success through Perceived Academic Sense of Belonging

Similar to the self-efficacy models, the only social support variable that was a significant predictor of college success outcomes for the first path in the model was the proportion of students in AP courses, which significantly predicted first-term GPA and first-year credits earned but not retention in college (Path C; see Model 3 in Tables 5, 9, and 13). The second path in the model was the direct effect of social support on the mediator, perceived academic sense of belonging (Path A). As with the self-efficacy models, none of the social support variables were significant predictors of perceived academic sense of belonging (see Models 3 and 4 in Tables 5-
15 and Models 2 and 3 in Table 16). The third path in the model was the direct effect of the mediator, perceived academic sense of belonging, on college success (Path B). Perceived academic sense of belonging was not a significant predictor of first-term GPA or first-year credits earned in college, however, it was a significant predictor of retention in college (see Models 3 and 4 in Tables 13-15 and Model 2 in Table 16). The effect of sense of belonging on retention remained significant when control variables were added to the model (see Model 3 in Table 16). The final path was the indirect effect of social support on college success through perceived academic sense of belonging (Path A*B). Perceived academic sense of belonging was not a significant mediator of the effect of social support on college success (see Models 3 and 4 in Tables 5-15 and Models 2 and 3 in Table 16).

The model fit at the within-level was good for all of the results presented above according to the SRMR statistic. The model fit at the between-level was good for the retention models, but poor for the first-term GPA and first-year credits earned models according to the SRMR. The RMSEA statistic indicated good model fit for all of the models except one (see Model 3 in Table 16). When the control variables were added to the models, the model fit was poor for the between and within-levels based on the RMSEA and SRMR statistics. No differences in effects were observed when the models were conducted again with the sample of 384 students from 35 high schools.
4. DISCUSSION

The general idea posed in this study, that we can predict to some extent how students will fare in college by knowing which high school they attended and what programs were available at their high school, is timely, novel, and both practically and theoretically significant. Over half of students who enter college do not graduate (ACT, 2014), and there is very little theoretical understanding of why students who do well enough to graduate from high school go on to drop out of college. Most studies focus on an individual perspective, ignoring the structures in place within school systems that encourage or discourage students from their academic goals. While individual-level data is practical for individual-level intervention, systems-level data is a useful way to support systems-level decisions. This dissertation provides a pathway to understand both individual and system-level predictors of college success. The results are useful to both high school and college/university audiences, who should be working toward pinpointing students who need additional targeted support prior to or during their time in college. In this discussion, I focus on the theoretical significance of this study along with three significant empirical findings.

From reviewing the current literature on college-going culture, it is clear that there is little to no theory and applied research on whether and why the culture of a high school matters for long-term student success in college. Some prior research included the importance of assistance with financial aid forms and other high school supports for students getting into well-matched colleges (e.g., Roderick et al., 2011), which are instrumentally supportive actions that high school administrators can take to advance college-going, but no studies had tackled the psychology behind how a college-going culture builds the academic mindset of students for long-term educational advancement, until now. In the present study, for the first time, I explored the possibility of measuring college-going culture using the number and type of socially
supportive college-related programs in high schools. In the process of applying a social support framework to the college-going culture literature, I learned that social support can explain, in part, why a college-going culture has the potential to support students’ academic mindset (e.g., perceived self-efficacy). Specifically, all of the components of college-going culture identified in past studies could be described as providing various forms of social support, and social support has been found in prior studies to correlate with self-efficacy and sense of belonging.

Higher levels of high school social support were predicted to be associated with higher levels of college success. This was supported by prior findings that social support is a significant predictor of student success (e.g., Rothon, Head, Klineberg, & Stansfeld, 2011), and also college-going culture theory indicating that high school supports promote college success (Jarsky et al., 2009; McClafferty, McDonough, & Núñez, 2002; Kim & Núñez, 2013; Corwin & Tierney, 2007). One finding in my study supported this prediction: The proportion of students in AP courses at the high school-level, one indicator of high school social support, was positively associated with first-term GPA and first-year credits earned. This is an important system-level finding. It is consistent with prior findings of a positive influence of students taking AP courses on their college first-term GPA (e.g., Scott, Tolson, & Lee, 2010). When AP courses are placed within a social support framework as I have done, it is clearer why having more students in each school taking these courses is ideal. Specifically, when there is a peer culture in which students push each other to master difficult concepts, and when teachers are also qualified to explain college-level material, students are more likely to continue on a trajectory of working hard in class and taking more credits to graduate sooner from college. Students feel supported in taking on challenges when those around them are expected to do the same. I conclude that AP course credit is not simply an individual-level factor contributing to academic success; AP course
participation at an aggregated high school-level might be exerting a distinct positive effect on college success because it signals that there is a strong college-going culture. In fact, to explore this possibility, I ran a follow-up exploratory analysis to test whether the direct effect observed in this study of proportion of students in AP courses on GPA and credits earned in college was mediated by the number of AP credits a student earned. There was a significant indirect effect, indicating that students in high schools with higher proportions of students in AP courses had higher first-term GPAs and more credits earned in college due at least in part to their own AP credits earned.

Additional research is needed to examine whether AP course teachers and peers provide different types of academic or social supports to students compared with non-AP course teachers and peers. This would demonstrate with more clarity whether it is social support or some other factor that explains the association between the proportion of students in AP courses and college success. It is possible that schools with a higher proportion of students taking AP courses than other schools might be well-resourced, and have students who are well-resourced attending them. The effect that was observed could, therefore, be due to other factors besides the proportion of students taking AP courses. While resource differences might explain part of the association, there are several reasons to give credence to the observed effect of the proportion of students in AP courses on certain college success outcomes. First, the effect remained marginally significant for the college credits earned outcome (although somewhat diminished in size) even after controlling for high school quality rating and parent income, among other control variables. Second, if resource differences fully explained the association between the proportion in AP courses and college outcomes, then we would expect that the total number of programs would have also been associated with college success, which was not the case. For these reasons,
therefore, it is unlikely that the effect of the proportion of students in AP courses on college success outcomes is solely due to resource differences between schools or students. It is possible that the proportion of students in AP courses is a proxy for the prioritization of academics in the high schools, which would support the theory developed in this study that a college-going culture indicated by social support for academic pursuits provided in high schools promotes college success.

The proportion of students in AP courses was non-significantly associated with retention to the second year of college. The implication of this result is not necessarily that retention is not in some way related to this factor, rather, it is possible that there is an indirect effect through grades and credits earned early in college, both of which were significantly correlated with retention in this study.

I also predicted that more positive academic mindset would be related to higher levels of college success. This was in line with other research on the strong influence of academic mindset on school behaviors and outcomes (Farrington et al., 2012) and the importance of sense of belonging for students’ engagement and adjustment in college (Johnson et al., 2007), which are predictors of retention and academic success (Zepke & Leach, 2010). In my study, the academic mindset factors each predicted different outcomes, illuminating the nuances in how academic mindset influences college success. Whereas perceived academic self-efficacy was a significant predictor of first-term GPA and first-year credits earned in college (and not retention), perceived academic sense of belonging was a significant predictor of retention in college (and not grades or credits earned). These are two important empirical results that warrant follow-up research and discussion in the literature. The implication is that self-efficacy seems to have more influence on daily behaviors and motivation for school, whereas sense of belonging is associated with longer-
term decision-making about issues of career and other life goals. If this is the case, interventions aimed at shaping students’ mindsets about college would need to take into account both students’ confidence in daily tasks as well as how they feel about school belonging in general.

Perceived academic sense of belonging might be a more salient factor when students are deciding at the end of the year whether or not to return than when students are working day-to-day to earn grades and course credits (Good, Rattan, & Dweck, 2012; Strayhorn, 2011; Farruggia et al., in progress-a). This is supported by prior research on sense of belonging in college (Good, Rattan, & Dweck, 2012), as researchers have found evidence that female students’ perceptions about their Mathematics ability (i.e., whether it is innate or learned) influence their sense of belonging and retention motivation in Mathematics fields. Other findings point to a significant association between sense of belonging and grades (Cupito, Stein, & Gonzalez, 2014). This is not consistent with my findings; therefore, more research is needed on the contexts in which sense of belonging exerts an influence on college grades.

Perceived academic self-efficacy, in contrast to perceived academic sense of belonging, might be a more salient factor for the more academic-oriented outcomes of grades and credits earned. This is consistent with prior research on self-efficacy (Richardson, Abraham, & Bond, 2012; Parker, Marsh, Ciarrochi, Marshall, & Abduljabbar, 2014; Farruggia et al., in progress-a). Parker and colleagues found that academic self-efficacy was a strong predictor of achievement but not continuation to post-graduate study, unlike academic self-concept which strongly predicted both achievement and post-graduate study. In conjunction with the present study, these findings point to the notion that some academic mindset factors appear to be more important for short-term outcomes (i.e., self-efficacy), and others appear to be more important for longer term outcomes (i.e., sense of belonging and self-concept).
For the association between academic mindset and college success, it is difficult to understand how self-efficacy could predict grades and credits earned but have no significant direct effect on retention. It could be that other personal factors are more significant than self-efficacy in students’ decisions to drop out or transfer schools, such as financial strain, social interactions with other students, or distance from home. It is also possible that self-efficacy is more strongly predictive of retention in specific courses (e.g., Sawtelle, Brewe, & Kramer, 2012) as opposed to retention in college as a whole. Follow-up interviews with students might be fruitful in clarifying if and how self-efficacy influences their college retention decisions.

Alternatively, follow-up studies using administrative records and survey methods could examine whether self-efficacy measured in the classroom during a college course was predictive of retention and GPA in that course. Given the nuanced findings on the effects of academic mindset on college success found in this study, research is warranted on other academic mindsets such as perceived value of academic tasks and a growth mindset, and how they relate to college success.

A. **Limitations and Future Directions**

A few possible limitations should be noted. The most critical limitation of this study was the lack of detailed information about the quality of the programs. Although I endeavored to understand social support by coding programs according to social support theory, it is important to consider whether or not other distinguishing factors of programs were ignored using this strategy. Not all programs are created equal. It is possible that grouping programs together by social support type ignored differences in quality of support provided by programs. Distinguishing between high quality and low quality programs within each category might reveal stronger associations between type of program and college success. For example, prior program evaluation research has indicated a significant effect of high quality support programs providing
transition coaching on college success (Kautz & Zanoni, 2014). Transition coaches bridge the gap between high school and college, and therefore, they have abundant opportunity to influence academic mindset and behaviors during the first year of college. Unfortunately, the research by Kautz and Zanoni (2014) did not include mediators such as academic mindset to test psychological mechanisms by which the program had a positive effect on college success. Potential new questions related to this work that researchers conducting future studies should ask include how long social support can be expected to have a positive effect on new educational tasks, and how task-specific social support needs to be to build students’ academic mindset for the myriad skills needed in college.

It is also possible that I under- or over-estimated the types of support provided by certain programs. For example, scholarships might provide more than just financial (instrumental) support. Scholarships might also be a form of appraisal support, given that many require students to maintain a certain GPA to continue receiving funds. When students are appraised as being eligible for school-related funding, they might perceive that the funding is affirming of their ability to succeed. An alternative strategy for capturing the types of social support available at the school in future research might be to visit schools and observe programs directly, or to call school or program staff and ask questions about the nature or quality of support provided. In addition, almost all of the programs coded as providing informational support were also coded as providing instrumental support. According to my interpretation of social support theory, informational and instrumental support are often encountered together in program activities in equal measure. For example, when programs were described as having staff dedicated to providing help to students with tasks such as college applications, these tasks were determined to be both informative and instrumental. More specific information about services provided would
help differentiate programs using the current coding system. In spite of these limitations in the way the programs were coded, the general idea that a brief program description can be coded using social support theory in the manner done in this study might have application in other research or school practice contexts to determine what types of supports are provided in a school or district.

In the future, researchers attempting to test the associations proposed in this study should consider selecting indicators of college success that are more directly applicable to the types of social support provided by programs. The hypothesis that emotional support is a predictor of college success might have been more relevant to college success outcomes such as emotional adjustment in college, which could have a profound impact on likelihood of graduating. In future studies, researchers could build upon the present study by testing moderators of the effect of high school-level emotional support on college success, such as psychological distress and adjustment in college (Solberg & Villarreal, 1997). In contrast, high school instrumental support might be more strongly predictive of the number of college acceptance letters or amount of scholarship money received than grades, credits earned, and retention in college. The finding in the present study that the proportion of students in AP courses was associated with college grades and credits earned is a testament to the importance of matching academic-related support factors at the high school-level with academic outcomes in college.

Other indicators of high school-level social support were not significant predictors of college success (i.e., the four types of social support, total number of social support programs, and teacher expectations did not predict any of the college success outcomes). Post-hoc analyses of the data revealed a likely reason why these factors were non-significant predictors of college success. Specifically, several of the support programs included in my study were targeted toward
boosting the achievement of struggling students from low-income or minority backgrounds (e.g., OneGoal, Umoja). The inclusion of these programs in the “total number of programs” variable skews the meaning of the variable, such that a higher number of programs indicates that a high school has a high need for supporting struggling students, not necessarily that the school is considered well-resourced or has well-resourced students attending. Schools with more favorable school quality ratings were more likely to have fewer programs and vice versa (see Figure 3). The implication of this for my results is that the social support program variables are less likely to be associated with positive college success outcomes than originally expected. This was true for the high school with the highest number of programs, in that students from this school had worse college success outcomes than schools with few programs. Follow-up exploration of the program data with a larger sample of students and schools is needed; there were only four students in my sample from the high school with the highest number of programs.

A limitation in coding the social support variables by counting the number of programs enacting each form of social support is that it is not clear whether emotional social support had a stronger relation with college success outcomes compared with three other forms of social support (i.e., appraisal, informational, and instrumental support). This was problematic to test because types of social support were tested as predictors of college success in separate models, none were significant predictors of the college success outcomes, and the way social support was measured did not lend itself to this comparison. Although I tested whether higher numbers of each type of support program was associated with college success, some programs provided multiple forms of support, meaning that I could never fully isolate just emotional support from the other types of support.
Higher levels of social support were not associated with a more positive academic mindset for students in their first year of college, contrary to my predictions. One explanation for this finding is that social support in high school might not have an enduring influence on students’ academic mindset in college. If this is the case, the implications are: (a) students at risk of having a negative academic mindset due to life stressors during college or low levels of support from family, friends, or community members would benefit from intervention in the form of consistent and positive interactions to bolster their academic mindset in college (and not necessarily a prevention-focused intervention during high school); (b) other factors that explain the relation between high school social support and college success should be considered, such as perceived academic support from peers and teachers in high school courses. An alternative explanation for why social support/college-going culture did not predict academic mindset is that, as explained previously, many of the social support programs were for struggling students, and the college students in the present study may not have had much interaction with those types of supports. Future studies should collect data on program usage and quality for the sample population, so that there is greater clarity around what dosage and quality of programming in high school tends to support student success in college.

A possible limitation of this study was the missing data on several indicators for charter schools. It is unclear how valid the imputed data were for those schools. In the future, researchers should consider including graduation from charter school as a control variable, or do a comparison of high school-level effects between charter and non-charter high schools.

Future research should build upon my analysis of the relation between social support and academic mindset by exploring the potential interaction between motivation/goal orientation and academic mindset. Motivation/goal orientation might interact with academic mindset, such that
social support predicts academic mindset only under certain motivation conditions. As indicated in Farrington et al. (2012), academic mindset gives rise to motivation. Social support might promote academic mindset only for students who are motivated by the goal of appearing intelligent and successful to others (or not appearing unintelligent), and not associated with academic mindset for those who are motivated by mastering skills as an end goal (Hsieh, Sullivan, & Guerra, 2007). This would make sense given that students who are motivated by mastering skills, and not by the external motivation of how others view them, would not mind as much if they were not given regular social support for their academic pursuits in a college-going culture. In a similar vein, an additional control variable to consider for future research is pre-high school intent/motivation to attend college. Although such a factor was not included, it is possible that other control variables captured pre-high school motivations for academic pursuits, such as high school GPA, which is a composite variable some have suggested represents student motivation and success (Harackiewicz, Barron, Tauer, & Elliot, 2002; Clarizio, 1979).

I predicted that the mediating effects of academic mindset would partially explain the association between high school-level social support and college success. Since none of the social support variables were significantly associated with self-efficacy or sense of belonging, the results did not support this prediction. A possible reason for the lack of findings is that my theory might not adequately explain how and under what conditions high school social support relates to college success. For example, it is possible that social support in high school does have bearing on future academic mindset, but that other factors also influence academic mindset and moderate the effect. Intervening variables such as positive peer interactions (Patrick, Hicks, & Ryan, 1997), college instructor support (Freeman, Anderman, & Jensen, 2007) or stressful life events (e.g., financial struggles to pay for college) are plausible intervening factors on the
hypothesized association between high school social support and academic mindset. Future studies should also include college generational status, as it is a theoretically and statistically significant predictor of college student success that was excluded primarily due to sample size limitations in the present study.

Another methodological consideration is that the design effects computed in this study indicate that the sample size for future studies should be larger to account for the effect of clustering students by school. The design effect is often estimated prior to data collection to determine the sample size needed for a study; in this case, the sample size should have been increased by a factor of 2.38, 3.07, and 4.76 respectively (i.e., the design effect values) for each outcome compared with a sample obtained via simple random sampling. Researchers can use these results as a benchmark for estimating the design effect for similar college student outcomes clustered by high schools. It is possible that a better statistical model fit would be achieved if these limitations were to be addressed in future studies.

This study is an important first step in testing the significance of college-related support in high school (e.g., the proportion of students in AP courses) as a predictor of college success. Yet, research with systems-level data should be interpreted with caution, as it is not often collected with the same level of care and precision taken with individual-level research data. More research is needed to explore the perspectives of students about whether these results are practically significant for their academic mindset, academic behaviors, and decision-making in college. Qualitative data from students about the hypothesized associations between social support in high school, academic mindset, and college success are needed to assess the practical significance of the study findings. There were largely non-significant effects of the proposed associations in this study between high school-level and individual-level factors; this does not
necessarily indicate a lack of association between college-going culture in high schools, academic mindset, and college success, rather, it indicates a need for further research with data that responds to the limitations identified in the present study.

**B. Implications of Findings for Applied Settings**

There are several lessons learned from this study of which high school policy-makers and administrators should take note. First, my results raise the question of whether programs are being provided in an equitable way across schools. One high school in this study had 14 college-related programs, whereas two schools had only one college-related program (see Figure 2 for a full distribution). Why is there such a large discrepancy? Also, work is still needed to measure the quality of social support provided to students in these high school programs geared toward preparing for college. This study found no relation between number or type of program and students’ perceived sense of belonging and self-efficacy in college. Perhaps if better measures of the quality of these programs were available, a more compelling case could be made for instituting college-related support programs in high schools. Policies should be put in place to encourage more evaluative research in schools on the effects of various high school social supports on college success. This research should include better measures of the quality and dosage of social support provided in programs than was available for the present study. It was interesting to note that, based on program descriptions, there were no programs specifically targeting an increase in social support needed for boosting students’ academic mindset or perceived support for college.

Through this study we also learned that when a higher proportion of students was engaged in AP courses, students who attended college from those high schools tended to get higher grades and more credits early on in college than students from high schools with lower
portions of students engaging in AP courses. This is a key finding for high school administrators. Given this association, high schools should consider incorporating more AP courses, or key components of AP courses, into existing programs. Careful attention should be paid to the racialized nature of peer-to-peer and teacher-to-student relationships, even within AP courses, influencing students’ academic mindsets (Diamond, Lewis, & Gordon, 2007). What high schools could take away from this study more generally is that school culture matters, and schools with a greater proportion of students engaging in rigorous coursework, where self-efficacy and sense of belonging are actively fortified, produce students who go on to achieve success not just during their high school years, but in college as well.
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Footnotes

1 Due to sample size limitations, the number of variables was reduced from what was originally proposed. I excluded age and gender as control variables because preliminary analyses indicated that neither was significantly correlated with academic mindset or any of the three college success outcome variables in the study. First-year writing course placement was also dropped from the study given that three other factors measuring prior academic success were included in the model, and of the four factors, writing course placement had the lowest zero-order correlation with the outcomes. Among the two parent background variables, parent education level was less highly correlated with the college success outcome variables than parent income, so it was dropped from the study as well. I also excluded one high school-level control variable (i.e., high school enrollment), favoring high school quality ratings as a more comprehensive factor to control for at the high school-level. Dropping these variables from the analysis was a necessary and sufficient solution to allow the multi-level models to run properly in Mplus.

2 The “fit” of a model is the ability of the statistical model to reproduce the patterns of variance and covariance in the existing data. Model fit is important in determining whether it is advisable to interpret the causal paths specified in the model. Two model fit statistics are commonly used when reporting results. The Root Mean Square Error of Approximation (RMSEA) is a model fit statistic, and the following standards are used to interpret the RMSEA: Values around .01 are considered excellent, values around .05 are considered moderate, and values around .08 or higher are considered a poor fit for the data (MacCallum, Browne, & Sugawara, 1996). For the Standardized Root Mean Square Residual
(SRMR) model fit statistic, a value of zero is considered perfect fit, and values less than .08 are considered a good fit (Hu & Bentler, 1999).

Design effects for the larger sample ($n=384$) differed by less than .5 from results using the smaller sample for each outcome variable, and all were above the recommended cutoff value of 2.
Table 1.

*High School Program Descriptions and Target Populations from Program Websites.*

*Content has been summarized and edited for brevity in some cases.*

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Program Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  GEAR UP</td>
<td>GEAR UP is a program designed to increase the number of low-income students prepared to succeed in post-secondary education. Funds are used for college scholarships, in-school instruction, student development seminars, tutoring, AP classes, early credit courses, summer programs, college readiness programs, parent programs, and teacher professional development.</td>
</tr>
<tr>
<td>2.  Postsecondary Partners (UMOJA, OneGoal)</td>
<td>Umoja is a program that builds the skills and behaviors that students need for college enrollment and completion through on-the-ground supports, comprehensive postsecondary curriculum, tools and protocols, and professional development for all teachers, counselors and para-professionals. OneGoal is a three-year college success model that recruits high school teachers to implement a curriculum which includes progress-tracking for students, skill-building (including academic mindset), and partnerships with colleges.</td>
</tr>
<tr>
<td>3.  Ladder Up</td>
<td>Program that builds the skills and behaviors that students need for college enrollment and completion through purposeful relationships (counseling, advising, post-graduation support); assistance filling out applications; family workshops; ACT prep; connections with the business community; comprehensive postsecondary curriculum (including how to make healthy choices, winning behaviors, how to do school, social justice and service-learning); and professional development for all teachers, counselors and para-professionals.</td>
</tr>
<tr>
<td>4.  Enlace Schools</td>
<td>A three-year college success model that recruits high school teachers to work with 20-25 students to implement a daily curriculum which includes progress-tracking for students; proactive and reactive interventions; skill-building (including hard and soft skills; academic mindset); and partnerships with colleges. Once students enter college, they are supported during their first year through a virtual curriculum and ongoing relationships with high school staff to discuss issues such as homesickness, depression, or anxiety associated with college.</td>
</tr>
<tr>
<td>5.  UPWARD BOUND</td>
<td>A non-profit that partners with schools to provide college financial aid application (FAFSA) assistance and informational workshops about financing college. Most Upward Bound programs combine two approaches to student contact: A summer program where high school students take college prep classes and earn work experience at a college campus for six weeks, and</td>
</tr>
<tr>
<td>Program</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6. College Advising Corps - Chicago</td>
<td>College access advisors who are recent graduates of CPS high schools guide students through college application processes. Then, college coaches follow students during the college transition to provide ongoing support between the first and second year of college.</td>
</tr>
<tr>
<td>7. Talent Search</td>
<td>Identifies and assists individuals from disadvantaged backgrounds who have the potential to succeed in higher education. The program provides academic, financial, career, or personal counseling, including advice on entry or re-entry to secondary or postsecondary programs.</td>
</tr>
<tr>
<td>8. Youth Guidance</td>
<td>Afterschool programming, Career awareness and job readiness training, job placement, retention and follow-up services, financial literacy education, college application seminars, part-time employment opportunities, counseling and case management.</td>
</tr>
<tr>
<td>9. City Year</td>
<td>An AmeriCorps program where volunteers work in schools to check in with and advise students about their academic and behavioral progress and needs.</td>
</tr>
<tr>
<td>10. ASPIRA.org</td>
<td>A national Hispanic organization dedicated to developing educational and leadership capacity. The program provides leadership training, cultural enrichment activities, and community action projects that teach students how to develop their abilities to become effective leaders of their communities.</td>
</tr>
<tr>
<td>11. Mikva Challenge</td>
<td>Challenge high school students to be active participants in the political process through elections, community problem solving, and policy-making programs.</td>
</tr>
<tr>
<td>12. Network for Teaching Entrepreneurship</td>
<td>Students receive a project-based learning curriculum about entrepreneurship, develop and present business plans, and meet entrepreneurs in the local community.</td>
</tr>
<tr>
<td>13. Network for College Success</td>
<td>Assists school leaders and program staff in implementing research-based practices. Principals from Chicago Public high schools meet regularly to talk about specific goals in school improvement, with an emphasis on instructional leadership and teacher supervision and development.</td>
</tr>
<tr>
<td>14. College and career coaches</td>
<td>Create peer groups around college and provide an adult (the coach) with college knowledge (and typically some experience with youth development) who interacts frequently with students. Coaches organize formal college programming (e.g., college fairs, workshops, tours) and also provide on-going assistance in a “college room.”</td>
</tr>
<tr>
<td>15. College and Career Readiness Suites</td>
<td>Dedicated space for students to engage in career exploration, build college awareness, apply to/select colleges, and to identify and seek scholarship and financial aid opportunities.</td>
</tr>
</tbody>
</table>
16. AP courses
Advanced Placement (AP) is a program offering college-level curricula and examinations to high school students. Colleges and universities often grant placement and course credit to students who obtain high scores on the examinations.

17. IB Programs/Curricula
In IB programs, students are responsible for their own learning, choosing topics and devising their own projects, while teachers act more as supervisors or mentors. Encourages students to learn from their peers. Students express themselves through writing, are required to do community service, and aim to be "inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect."

18. Selective Enrollment/Gifted Program
Selective Enrollment High Schools provide academically advanced high school students with a challenging and enriched college preparatory experience. Each of the Selective Enrollment High Schools offers a rigorous curriculum with primarily honors and Advanced Placement (AP) courses. Teachers expect students to be self-driven and highly engaged. Classes develop students’ critical and analytical thinking skills and promote diverse academic inquiry by bringing together students from a wide range of backgrounds and experiences. Gifted programs can be whole schools or within-school programs for students who excel in a particular subject or area.

19. Magnet Program
Places an emphasis on one particular subject area, such as math/science, world language, or fine and performing arts.

20. Early College STEM School/Corporate Sponsor
Students receive high school and college credit for the same courses, with a focus on Science, Technology, Engineering, and Math (i.e., STEM).

21. Career and Technical Education Program
While in high school, in addition to taking all CPS college prep core courses, students experience hands-on training in their chosen industry. They might also have the opportunity to receive college scholarships, attain industry-recognized certifications, earn college credit, participate in job shadows and internships, attend college fairs and tours, and compete in city, state and national competitions.

22. Dual Credit High School
High-school juniors and seniors enroll in 1 college course per term at one of the seven City Colleges (CCC). Students might earn both college and high-school credit depending on the course.

23. Senior Seminar
All high school seniors participate in a class to do all steps required to researching and match with colleges and strengthen and develop post-secondary life skills.

24. School Counselor
Help students one-on-one in the areas of academic achievement, personal/social development and career development.

25. Neighborhood Parent Network
A network for parents to inform their school choices on behalf of their children.
### Results of Coding Procedure for Type of Social Support Provided by Programs

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Social Support Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emotional Social Support</td>
</tr>
<tr>
<td>1. GEAR UP</td>
<td>X</td>
</tr>
<tr>
<td>2. Postsecondary Partners (Umoja, OneGoal)</td>
<td>X</td>
</tr>
<tr>
<td>3. Ladder Up</td>
<td>X</td>
</tr>
<tr>
<td>4. Enlace Schools</td>
<td>X</td>
</tr>
<tr>
<td>5. UPWARD BOUND</td>
<td>X</td>
</tr>
<tr>
<td>6. UIUC College Advising Corps</td>
<td>X</td>
</tr>
<tr>
<td>7. Talent Search</td>
<td>X</td>
</tr>
<tr>
<td>8. Youth Guidance</td>
<td>X</td>
</tr>
<tr>
<td>9. City Year</td>
<td>X</td>
</tr>
<tr>
<td>10. ASPIRA.org</td>
<td>X</td>
</tr>
<tr>
<td>11. Mikva Challenge</td>
<td>X</td>
</tr>
<tr>
<td>13. Network for College Success</td>
<td>X</td>
</tr>
<tr>
<td>14. College and career coaches</td>
<td>X</td>
</tr>
<tr>
<td>15. College and Career Readiness Suites</td>
<td>X</td>
</tr>
<tr>
<td>16. AP courses</td>
<td>X</td>
</tr>
<tr>
<td>17. IB Programs/Curricula</td>
<td>X</td>
</tr>
<tr>
<td>18. Selective Enrollment/Gifted Program</td>
<td>X</td>
</tr>
<tr>
<td>19. Magnet Program</td>
<td>X</td>
</tr>
<tr>
<td>20. Early College STEM School/Corporate Sponsor</td>
<td>X</td>
</tr>
<tr>
<td>21. Career and Technical Education Program</td>
<td>X</td>
</tr>
<tr>
<td>22. Dual Credit High School</td>
<td>X</td>
</tr>
<tr>
<td>23. Senior Seminar</td>
<td>X</td>
</tr>
<tr>
<td>24. School Counselor</td>
<td>X</td>
</tr>
<tr>
<td>25. Neighbor-hood Parent Network</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 3.

*Frequency and Percent of Missing Values*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency Missing</th>
<th>Percent Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identification Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student ID</td>
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<td>0%</td>
</tr>
<tr>
<td>High School ID</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>College Success Outcome Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Grade Point Average College First term</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Student Credits Earned College First year</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Student Retention to 2nd Year College</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Student Control Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Race/Ethnicity</td>
<td>35</td>
<td>9%</td>
</tr>
<tr>
<td>Student’s Parent Income</td>
<td>31</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Student Prior Academic Success Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Unweighted Cumulative Grade Point Average High School</td>
<td>1</td>
<td>0.2%</td>
</tr>
<tr>
<td>Student Number of AP Credits Earned</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Student ACT Composite Score</td>
<td>5</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Student Academic Mindset Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student College Perceived Academic Self-Efficacy 7- Item Factor Score</td>
<td>4</td>
<td>1%</td>
</tr>
<tr>
<td>Student College Perceived Sense of Belonging 5-Item Factor Score</td>
<td>7</td>
<td>2%</td>
</tr>
<tr>
<td><strong>High School Control Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School Quality Rating</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td><strong>High School Social Support Variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Number of College Support Programs</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Number of Emotional Support Programs</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Number of Appraisal Support Programs</td>
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<td>0%</td>
</tr>
<tr>
<td>Total Number of Instrumental Support Programs</td>
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<td>0%</td>
</tr>
<tr>
<td>Total Number of Informational Support Programs</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Percent of Students Served by AP Classes</td>
<td>59</td>
<td>14%</td>
</tr>
<tr>
<td>Teacher Expectations of Post-Secondary Education for Students</td>
<td>102</td>
<td>25%</td>
</tr>
</tbody>
</table>
Table 4.

*Descriptive Information and Correlations among Student Variables (Individual-Level)*

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. College GPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. College Credits Earned</td>
<td>.66***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. College Retention</td>
<td>.35***</td>
<td>.52***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Parent Income</td>
<td>.17**</td>
<td>.16**</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. High School GPA</td>
<td>.40***</td>
<td>.34***</td>
<td>.14**</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. AP Credits Earned</td>
<td>.34***</td>
<td>.29***</td>
<td>.10*</td>
<td>.12*</td>
<td>.29***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. ACT Composite</td>
<td>.41***</td>
<td>.38***</td>
<td>.13*</td>
<td>.28***</td>
<td>.11*</td>
<td>.50***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Self-Efficacy</td>
<td>.26***</td>
<td>.22***</td>
<td>.07</td>
<td>.11*</td>
<td>.09</td>
<td>.22***</td>
<td>.18***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Sense of Belonging</td>
<td>.02</td>
<td>.06</td>
<td>.05</td>
<td>.00</td>
<td>.06</td>
<td>.05</td>
<td>.05</td>
<td>.31***</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>2.73</td>
<td>23.33</td>
<td>0.84</td>
<td>$45,702</td>
<td>3.31</td>
<td>0.24</td>
<td>23.17</td>
<td>2.51</td>
<td>2.76</td>
</tr>
<tr>
<td>SD</td>
<td>0.90</td>
<td>7.79</td>
<td>0.37</td>
<td>$36,686</td>
<td>0.39</td>
<td>0.43</td>
<td>3.35</td>
<td>.41</td>
<td>.66</td>
</tr>
</tbody>
</table>

*Note: ***p < .001, **p < .01, *p < .05*
Table 5.

**Multilevel Mediation Models of Proportion of H.S. Students in A.P. courses on First Term GPA through Academic Mindset.**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>IV: Proportion in AP courses; Mediator: Self-efficacy; without controls</td>
<td>.00</td>
<td>.01</td>
<td>.25***</td>
<td>.04</td>
<td>.02**</td>
</tr>
<tr>
<td>2</td>
<td>IV: Proportion in AP courses; Mediator: Self-efficacy; with controls a</td>
<td>.00</td>
<td>.01</td>
<td>.17***</td>
<td>.04</td>
<td>.00</td>
</tr>
<tr>
<td>3</td>
<td>IV: Proportion in AP courses; Mediator: Sense of Belonging; without controls</td>
<td>.00</td>
<td>.00</td>
<td>.03</td>
<td>.04</td>
<td>.02**</td>
</tr>
<tr>
<td>4</td>
<td>IV: Proportion in AP courses; Mediator: Sense of Belonging; with controls a</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.04</td>
<td>.00</td>
</tr>
</tbody>
</table>

*Note.* a High school-level control variable added: HS Quality Rating; Student control variables added: HS GPA, Race/Ethnicity, Parent Income, AP Credits Earned, ACT Composite. ***p < .001, **p < .01, *p < .05.
Table 6.

*Multilevel Mediation of Total/Appraisal Support Programs on First Term GPA through Academic Mindset.*

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>( B )</td>
<td>( SE )</td>
<td>( B )</td>
<td>( SE )</td>
<td>( B )</td>
</tr>
<tr>
<td>1</td>
<td>IV: Total Support Programs; Mediator: Self-efficacy; without controls</td>
<td>.01</td>
<td>.03</td>
<td>.24***</td>
<td>.04</td>
<td>.03</td>
</tr>
<tr>
<td>2</td>
<td>IV: Appraisal Support Programs; Mediator: Self-efficacy; without controls</td>
<td>.02</td>
<td>.03</td>
<td>.24***</td>
<td>.04</td>
<td>.04</td>
</tr>
<tr>
<td>3</td>
<td>IV: Total Support Programs; Mediator: Sense of Belonging; without controls</td>
<td>.01</td>
<td>.09</td>
<td>.02</td>
<td>.04</td>
<td>.03</td>
</tr>
<tr>
<td>4</td>
<td>IV: Appraisal Support Programs; Mediator: Sense of Belonging; without controls</td>
<td>.01</td>
<td>.01</td>
<td>.02</td>
<td>.04</td>
<td>.04</td>
</tr>
</tbody>
</table>

*Note:***\( p < .001\), **\( p < .01\), *\( p < .05\)
Table 7.

*Multilevel Mediation of Emotional/Informational Support Programs on First Term GPA through Academic Mindset.*

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
</thead>
<tbody>
<tr>
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<td>B</td>
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<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td><em>IV</em>: Emotional Support Programs; <em>Mediator</em>: Self-efficacy; without controls</td>
<td>.03</td>
<td>.05</td>
<td>.24***</td>
<td>.04</td>
<td>.03</td>
</tr>
<tr>
<td>2</td>
<td><em>IV</em>: Informational Support Programs; <em>Mediator</em>: Self-efficacy; without controls</td>
<td>.02</td>
<td>.03</td>
<td>.24***</td>
<td>.04</td>
<td>.03</td>
</tr>
<tr>
<td>3</td>
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<td>.02</td>
<td>.04</td>
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</tr>
<tr>
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<td>.07</td>
<td>.02</td>
<td>.04</td>
<td>.03</td>
</tr>
</tbody>
</table>

*Note: ***p < .001, **p < .01, *p < .05*
Table 8.

**Multilevel Mediation of Instrumental Support Programs/Teacher Expec. on First Term GPA through Academic Mindset.**

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
</thead>
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<td>B</td>
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<td><em>IV:</em> Instrumental Support Programs; <em>Mediator:</em> Self-efficacy; without controls</td>
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<td>.03</td>
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<td>.04</td>
<td>.03</td>
</tr>
<tr>
<td>2</td>
<td><em>IV:</em> Teacher Expec.; <em>Mediator:</em> Self-efficacy; without controls</td>
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<td>.01</td>
<td>.24***</td>
<td>.04</td>
<td>.01</td>
</tr>
<tr>
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<td>.01</td>
<td>.02</td>
<td>.04</td>
<td>.01</td>
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</table>

*Note:* ***p < .001, **p < .01, *p < .05
Table 9.

Multilevel Mediation of Proportion in AP courses on First-year College Credits Earned through Academic Mindset.

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
</thead>
<tbody>
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<td>SE</td>
<td>B</td>
</tr>
<tr>
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<td>.01</td>
<td>1.51**</td>
<td>.34</td>
<td>.18**</td>
</tr>
<tr>
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<td>.53</td>
<td>.32</td>
<td>.13t</td>
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<td>.60</td>
<td>.37</td>
<td>.18**</td>
</tr>
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<td><em>IV</em>: Proportion in AP courses; <em>Mediator</em>: Sense of Belonging; with controls *</td>
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<td>.00</td>
<td>.53</td>
<td>.33</td>
<td>.13t</td>
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</table>

*Note: ***p < .001, **p < .01, *p < .05, t p = .05*
Table 10.

*Multilevel Mediation of Total/Appraisal Support Programs on First-year College Credits Earned through Academic Mindset.*

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
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<tbody>
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<td>$B$</td>
<td>$SE$</td>
<td>$B$</td>
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<td><em>IV: Total Support Programs; Mediator: Self-efficacy; without controls</em></td>
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<td>.03</td>
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<td>.03</td>
<td>1.47**</td>
<td>.34</td>
<td>-.02</td>
</tr>
<tr>
<td>3</td>
<td><em>IV: Total Support Programs; Mediator: Sense of Belonging; without controls</em></td>
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<td>.58</td>
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<td>.03</td>
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<td><em>IV: Appraisal Support Programs; Mediator: Sense of Belonging; without controls</em></td>
<td>.01</td>
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*Note:* ***$p < .001$, **$p < .01$, *$p < .05$.  

Table 11.

Multilevel Mediation of Emotional/Informational Support Programs on First-year College Credits Earned through Academic Mindset.

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to M (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
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<tbody>
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<td>.05</td>
<td>1.47**</td>
<td>*</td>
<td>.34</td>
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<td>IV: Informational Support Programs; Mediator: Self-efficacy; without controls</td>
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<td>.03</td>
<td>1.46**</td>
<td>*</td>
<td>.34</td>
</tr>
<tr>
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<td>IV: Emotional Support Programs; Mediator: Sense of Belonging; without controls</td>
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<td>.03</td>
<td>.59</td>
<td>.36</td>
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*Note: ***p < .001, **p < .01, *p < .05.*
### Table 12.

Multilevel Mediation of Instrumental Support Programs/Teacher Expec. On First-year College Credits Earned through Academic Mindset.

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
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<td>(B)</td>
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<td>(B)</td>
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<td>.03</td>
<td>1.47**</td>
<td>.34</td>
<td>-.03</td>
</tr>
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<td>(IV): Teacher Expec.; (Mediator): Self-efficacy; without controls</td>
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<td>.01</td>
<td>1.48**</td>
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<td>(IV): Instrumental Support Programs; (Mediator): Sense of Belonging; without controls</td>
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Note: ***\(p < .001\), **\(p < .01\), *\(p < .05\).
Table 13.

Multilevel Mediation of Proportion in AP courses/Total Support Programs on Retention through Academic Mindset.

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
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<tbody>
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<td>( B ) ( SE )</td>
<td>( B ) ( SE )</td>
<td>( B ) ( SE )</td>
<td>RMSEA</td>
</tr>
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<td>.04(^{1}) .02</td>
<td>.00 .00</td>
<td>.00 .00</td>
<td>.06</td>
</tr>
<tr>
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<td>( IV ): Total Support Programs; ( Mediator ): Self-efficacy; without controls</td>
<td>.01 .03</td>
<td>.04(^{1}) .02</td>
<td>.00 .01</td>
<td>.00 .00</td>
<td>.06</td>
</tr>
<tr>
<td>3</td>
<td>( IV ): Proportion in AP courses; ( Mediator ): Sense of Belonging; without controls</td>
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<td>.05(^{**}) .02</td>
<td>.00 .00</td>
<td>.00 .00</td>
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<tr>
<td>4</td>
<td>( IV ): Total Support Programs; ( Mediator ): Sense of Belonging; without controls</td>
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<td>.05(^{**}) .02</td>
<td>.00 .02</td>
<td>.00 .00</td>
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*Note:* ***\( p < .001 \), **\( p < .01 \), *\( p < .05 \), \(^{1}\)\( p = .07 \).
Table 14.

*Multilevel Mediation of Emotional/Appraisal Support Programs on Retention through Academic Mindset.*

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
</tr>
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<td>$B$</td>
<td>$SE$</td>
<td>$B$</td>
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<td>1</td>
<td>$IV$: Emotional Support Programs; <em>Mediator</em>: Self-efficacy; without controls</td>
<td>.04</td>
<td>.05</td>
<td>.04*</td>
<td>.02</td>
<td>.01</td>
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<tr>
<td>2</td>
<td>$IV$: Appraisal Support Programs; <em>Mediator</em>: Self-efficacy; without controls</td>
<td>.02</td>
<td>.03</td>
<td>.04*</td>
<td>.02</td>
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</tr>
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<td>3</td>
<td>$IV$: Emotional Support Programs; <em>Mediator</em>: Sense of Belonging; without controls</td>
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<td>.02</td>
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<td>$IV$: Appraisal Support Programs; <em>Mediator</em>: Sense of Belonging; without controls</td>
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<td>.01</td>
<td>.05**</td>
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*Note:* ***$p < .001$, **$p < .01$, *$p < .05$, *$p = .07$.**
Table 15.

*Multilevel Mediation of Instrumental/Informational Support Programs on Retention through Academic Mindset.*

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
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<td><em>IV</em>: Informational Support Programs; <em>Mediator</em>: Self-efficacy; without controls</td>
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<td>.03</td>
<td>.04</td>
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<td><em>IV</em>: Informational Support Programs; <em>Mediator</em>: Sense of Belonging; without controls</td>
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<td>.05</td>
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<td>.00</td>
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*Note:* ***p < .001, **p < .01, *p < .05, †p = .07.*
Table 16.

*Multilevel Mediation of Teacher Expectations on Retention through Academic Mindset, and Proportion in AP courses on Retention through Academic Mindset with controls.*

<table>
<thead>
<tr>
<th>Model #</th>
<th>Variables Included</th>
<th>IVs to Mediators (a paths)</th>
<th>Mediators to DVs (b paths)</th>
<th>IVs to DVs (c paths)</th>
<th>Indirect Effect (a*b)</th>
<th>Model Fit Statistics</th>
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<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
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<td><em>IV:</em> Teacher Expec.; <em>Mediator:</em> Self-efficacy;</td>
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<td>0.01</td>
<td>0.04*</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>without controls</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td><em>IV:</em> Teacher Expec.; <em>Mediator:</em> Sense of Belonging;</td>
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<td>0.01</td>
<td>0.05**</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>without controls</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><em>IV:</em> Proportion in AP courses; <em>Mediator:</em> Sense of</td>
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<td>0.05**</td>
<td>0.02</td>
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<td>Belonging; with controls</td>
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</tbody>
</table>

*Note:* ***$p < .001$, **$p < .01$, *$p < .05$, $^*p = .07$.**
Figure 1. Conceptual Model of the Associations between Social Support, Academic Mindset, and College Success. Path A*B (not pictured) is the indirect effect of social support on college success through academic mindset.
Figure 2. Bar graph of the total number of college-related social support programs offered by frequency of high schools.
Figure 3. Number of Programs at the High School by Frequency of High Schools for each High School Quality Rating (5 = Highest Quality, 1 = Lowest Quality).
Appendix

Codebook for Interrater Reliability

**Independent Rater Instructions:**

1. Review the description of the program.
2. Then, review the definitions of types of social support provided below.
3. Finally, place a check mark in the table by the types of social support you think are most closely associated with the program offerings. Only program components related to services for students should be coded.

- **Emotional social support** often comes from interactions between people that are comforting, or that elicit positive feelings. Emotionally supportive interactions transcend a specific task. For example, a student might seek out a person who is emotionally supportive to discuss a personal issue. Emotional support communicates to a student that the other person cares about him or her as a human being beyond simply caring if he or she gets a good grade or turns in a paper on time. A student might be more likely to discuss his or her struggles and ask for help from someone they perceive to be emotionally supportive. Emotional support comes from listening and communicating love, care, respect, approval, and acceptance.

- **Informational social support** is support in the form of information about a topic that a person needs to better understand. In the context of college readiness, informational support might refer to access to information about various colleges. This might also refer to providing content knowledge about academic subjects that are important for college. For example, in a classroom a teacher might provide college-level coursework to students, or take students on a field trip to a local university to learn about their programs.

- **Appraisal social support** is feedback from others that is supportive of a goal; a socially supportive appraisal about college is, for example, a counselor helping a student to evaluate how prepared the student is for a particular college program. A teacher might also offer appraisal support by praising a student for their hard work.

- **Instrumental social support** is assistance with very tangible needs of a student, such as materials, money, working through a tough math problem together or helping them fill out applications. This form of assistance does not require an emotional commitment to a student, but rather, it requires other resources such as time, an extensive professional network, or power to influence decisions that might affect a student’s chances of success on a particular task such as gaining admission to college.
Program Description – Sample 1

This manualized intervention consists of two meetings between a therapist and a teenager, 7 to 10 days apart, and a meeting between the therapist and the teen’s parent. In the first session, therapist and teen discuss the teen’s substance use, examine the pros and cons of use, discuss the teen’s willingness to change, and identify goals for behavior change. In the second session, the two review the teen’s progress toward achieving the goals, identify high-risk situations associated with drug-use triggers, generate strategies to deal with peer pressure, and negotiate long-term goals related to substance use. A third, parent-only session, involved the therapist and parent discussing how to improve communication with the teen and to support the teen’s intervention goals. Information retrieved from http://www.drugabuse.gov/news-events/nida-notes/2012/12/brief-intervention-helps-adolescents-curb-substance-use

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Emotional Social Support</th>
<th>Appraisal Social Support</th>
<th>Informational Social Support</th>
<th>Instrumental Social Support</th>
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</thead>
<tbody>
<tr>
<td>Sample 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Program Description – Sample 2

Under the supervision of the High School Guidance Counselor, the high school Graduation Specialist will carry out the following duties to improve graduation rates:
Use a data profile of characteristics of potential dropouts to identify middle and high school students with a high probability of dropping out; 2) Work with students to develop a graduation and achievement plan to include the best program to meet academic and post-secondary goals; 3) Connect individual students and their parents with programs such as Communities in Schools, and technical colleges. Information retrieved from http://images.pcmac.org/Uploads/LamarCountySchools/LamarCountySchools/Divisions/DocumentsCategories/Documents/GrdSpec.pdf

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Emotional Social Support</th>
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<th>Instrumental Social Support</th>
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<tr>
<td>Sample 2</td>
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<td></td>
</tr>
</tbody>
</table>
VITA

Meredith E. Wellman
meredith.poff@gmail.com

EDUCATION

University of Illinois at Chicago
Ph.D. in Psychology, 2016
Specialization in Community and Prevention Research
Minor in Statistics, Methods, and Measurement

University of Illinois at Chicago
M.A. in Psychology, 2011

Miami University of Ohio
B.A. in Psychology, 2008

PROFESSIONAL EXPERIENCE

Project Manager and Data Analyst, The Ohio State University
Fall 2014-present
- Works with the Results Management Team at the Center on Education and Training for Employment at The Ohio State University
- Manages and executes the local evaluation on a SAMHSA Circles of Care project for a Native American tribe in the Pacific Northwest
- Manages the family engagement components of Ohio’s Safe Schools Healthy Students and Project AWARE grants
- Assists with coordination of a State Professional Development Grant (SPDG) for the Ohio Department of Education
- Assists on the evaluation of two Anti-Human Trafficking grants for The Salvation Army
- Provides survey development, analysis, and reporting for several Ohio school districts conducting surveys with staff, students, and families

Graduate Research Assistant, University of Illinois at Chicago
Spring 2013-Fall 2014
- In charge of institutional dataset of 30,000 UIC students with over 600 variables; facilitated the creation, cleaning, maintenance, and analysis of the dataset
- Developed and piloted non-cognitive factors survey distributed to 1,500 students
- Used Multilevel Modeling techniques in SPSS and Mplus Software to develop predictive models of student success
- Developed reports and presentations with survey data
Evaluator, Community Schools Initiative  
Fall 2009-Fall 2012 
- Worked with a team of three evaluators to develop and carry out a qualitative process-oriented program evaluation 
- Developed a logic model 
- Developed and presented professional development for staff 
- Presented evaluation findings at the National Community Schools Conference in San Francisco and Psychology Conferences in Chicago 
- Collaborated with the American Institutes for Research on an external evaluation to create self-assessment rubrics specifically for Community Schools in Chicago

Reading Instructor  
Summer 2008 
Institute for Reading Development 
- Reading instructor for preschoolers, elementary, middle, high school aged youth and also adults. Implemented a strict reading curriculum for all ages at different sites throughout Chicago.

SCHOLARLY PUBLICATIONS


HIGHER EDUCATION REPORTS


SELECTED PRESENTATIONS


Diaz, D., Farruggia, S. P., **Wellman, M. E.**, Bottoms, B. L. & Moss, T. P. (2014, March). Honors colleges: Supporting students to succeed in university. Presentation at the biennial meeting of the Society for Research on Adolescence, Austin, TX. (Chosen for special additional presentation at the Adolescence in Diverse Contexts Reception.)


**VOLUNTEER EXPERIENCES**

*Journal Article Reviewer*, Spring 2016
Global Journal of Community Psychology Practice

*Social Impact Evaluator*, Spring 2013-Fall 2014
The People’s Music School Youth Orchestra Program
- Volunteered to assist with the development of the organizational logic model and surveys to measure the social impact of the program
- Coordinated data entry and analysis of social impact data to build support for the program

*Pen Pals Program Developer* Fall 2007-Spring 2008
Project: Bogan Elementary Pen Pals Project
- Ran free during-school pen pals project between schools in Ohio and Tanzania
- Examined pre- and post-program effects on students’ DIBELS reading scores

*Organization President* 2004-2008
African School Advancement Program
- Lead a team of 10 individuals to Tanzania to teach English for 1 month
- Lead a team of 2 individuals to Ghana to deliver school supplies
- Brought a range of nationally relevant African affairs speakers to Miami University’s campus; developed educational and fundraising programs along with marketing and recruitment materials

*Building Volunteer*, Habitat for Humanity 2007, 2014

*Donor*, American Red Cross 2003-present
HONORS & AWARDS

Outstanding Presentation Award, Midwest ECO Conference
2010
Miami University Dean’s List
2008
Miami University President’s Award for Service
2008

PROFESSIONAL AFFILIATIONS

National Association for Family, School, and Community Engagement
American Psychological Association – Division 27, SCRA