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Relationships that Create Confidence: Understanding Postsecondary Academic Choices of Mexican Heritage High School Graduates in Light of Influential Relationships, Self-efficacy, and Mathematical Experiences

A dissertation submitted in partial satisfaction of the
requirements for the degree of Doctor of Education

in

Teaching and Learning

by

Daniel Allen Cohen

Committee in charge:

Claire Ramsey, Chair
Randall Souviney
Gabriele Wienhausen

2009

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Chair

University of California, San Diego
2009

DEDICATION

For Heather, Elijah, and baby girl.

Mother and children,
Play, read, write, sing, and create,
Daddy has come home.

EPIGRAPH

Keep away from people who try to belittle your ambitions. Small people always do that, but the really great make you feel that you, too, can become great.

Mark Twain

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This work would not have been possible without the willingness of the participants to share their stories in the hope that we will improve public education for all students. I only hope I have done their unique perspectives justice so their feedback is taken seriously and acted upon.

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Randy and Gabrielle, thank you for advising me and holding my work to a high standard, I am better because of you.

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Dave, Diane, Season, and Shivani we have grown a lot these last three years and I think our common struggle has given us all a little more stamina.

To all of my UCSD professors, you have each given me something to think about and I am thankful for that.

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ABSTRACT OF THE DISSERTATION

Relationships that Create Confidence: Understanding Postsecondary Academic Choices of Mexican Heritage High School Graduates in Light of Influential Relationships, Self-efficacy, and Mathematical Experiences

By

Daniel Allen Cohen

Doctor of Education in Teaching and Learning

University of California, San Diego 2009

Claire Ramsey, Chair

This study examines Mexican heritage high school graduates' postsecondary academic choices through a Social Capital and Self-Efficacy lens. Mathematical experiences and the relationships within which these experiences took place are considered. A cross-sectional recruiting design was used to find out if measures of academic self-efficacy that were recalled by participants changed as time since

graduation increased. Three graduates were selected from each of the classes of 1998, 2003, 2006, and 2007 (n=12) from a large suburban high school in southern California. The participants represented three postsecondary academic paths: university, community college, and *experimentation*. The *experimentation* group is defined by a lack of long-term goals for their education or employment at the time of graduation from high school. Data was collected using semi-structured interviews. Interview transcripts were analyzed for relationships, self-efficacy and mathematical experiences. Specifically, participants answered questions about influential people in their lives during high school and about their experiences with mathematics before and after high school. An analysis of participants' course-taking and outcomes was derived from high school academic records.

The findings of this study indicate that the development of social capital through influential relationships with institutional agents varies categorically. Peers and teachers were the most significant categories of people in the lives of informants during high school. Academic self-efficacy, as defined by mathematics student identity and mathematics course expectations, was enhanced by the presence of higher levels of social capital. Graduates with high levels of self-efficacy for mathematics expected that mathematics courses would be easier for them. Loci of control orientations for the informants were closely aligned with postsecondary outcomes. Graduates who went to 4-year universities had internal LOC while community college and experimentation graduates had external LOC.

Chapter 1

Introduction

Mexican Americans

In 2000, people of Mexican heritage were the largest Hispanic group in the US, accounting for 59% of the total Hispanic population. In general, Mexicans represented 7.4% of the population of the US (Census, 2000). As a population, Mexicans increased by 52.9% from 1990 data to a size of 20.6 million people. About 40% (8.4 million) of all Mexican Americans in the US lived in California while another 25% (5 million) Mexican Americans lived in Texas (Census, 2000). Mexican Americans are among the youngest population in the US with a median age of just 24.7 years in 2000 compared to the average age for the US of 35.3 years.

In terms of employment in the US in the year 2000, only 18.1% of Hispanics worked in management, professional and related occupations compared to 31.3% of the total US population. On the other hand, 21.2% of Hispanics worked in production, transportation and material moving occupations compare to 14.6% of the total US population. The differences in occupations led to median yearly earnings of $29,749 for Hispanics versus a $41,568 median national income for full-time, year-round workers.

Educational Progress of Mexican American Students at the Secondary Level

According to the 2007 American Community Survey Hispanics in the US trail their peers in high school graduation rate, bachelors degree completion rate, and standardized test scores. Native-born Hispanics had a 76.5% high school completion rate compared to a 49.3% rate for foreign-born Hispanics. The national average of

87.6% high school completion for native-born citizens and 68% completion for foreign-born citizens is higher. When it comes to higher education, Hispanics had a 15.9% rate of bachelor's degree completion versus an average of 27.6% for the US population.

The college-going rate for Mexican American high school graduates in 2002 was 50.6% while the rates for Puerto Ricans and Cubans were 66.8% and 70.8% respectively (U.S. Census, 2003). The majority of Mexican American college students start out their career at community colleges but few transfer to 4-year universities after their studies are complete (Rendon & Nora, 1988). In order to attend a 4-year university right out of high school, graduates must meet a rigorous set of course requirements, grade point average, and standardized test (SAT or ACT) score. Latinos made up nine percent of SAT-takers in 2001, up from seven percent in 1991 (Llagas & Snyder, 2003). Llagas and Snyder noted that in 2001, Mexican Americans scored 451 on the verbal section and 458 on the mathematics section compared to 506 and 514 respectively for the national average. The UC and CSU systems in California use an eligibility index which weights SAT score and grade point average to determine the minimal level competency. For example, a 900 SAT mathematics and verbal combined score requires a 2.5 gpa for eligibility to apply to a UC or CSU campus.

Community colleges do not have the same requirements for admission as 4-year universities so students may not take standardized tests. To gauge the progress of Latino community college path students, Llagas and Snyder (2003) pointed out that in 1998 on average they earned 17.7 credits in high school compared to the totals for African Americans (17.2 credits) and European Americans (18.1 credits). Although

the difference in credits is negligible, there are still gaps in the highest mathematics course completed by ethnic groups. While 45.1% of White high school graduates had taken pre-calculus, trigonometry, or calculus in 1998 only 26.2% of Latino graduates and 30.4% of African American graduates had done the same. These high-level mathematics courses are an indicator of college readiness as well as being gatekeepers to certain majors in the science, technology, engineering, and mathematics (STEM) fields. On a positive note, the number of Latinos taking rigorous advanced placement (AP) exams in 2000 had risen to nine percent of the total student population (Llagas & Snyder, 2003).

By using Hackett's (1994) Social Cognitive Career Theory with 89 English speaking Mexican American students, Flores, Navarro, and De Witz (2005) found that participants reported higher levels of educational goal aspirations than expectations. In addition, a multiple variable regression analysis revealed that Anglo-oriented acculturation was significantly positively related to educational goal expectations and aspirations. The authors suggest that future research be informed that Anglo-oriented Mexican American students may be more comfortable in navigating the process of going to college than their Mexican-oriented peers. It is clear that Mexican American students have high aspirations for their postsecondary education but they do not expect to reach their goals in many cases.

The educational paths of Latino students have shown improvement in recent years which could be interpreted as a willingness on the part of students to strive for educational excellence. However, the availability of college preparatory courses and economic resources also has an effect on the achievement of students (Contreras,

2005). Betts, Rueben, and Danenberg (2000) found that the median high-socioeconomic status (SES) schools offered 50% more AP courses than the median low-SES schools. The researchers also reported that low-SES schools' course offerings were composed of 52% of classes that met college preparatory requirements while the same courses rose to 63% in high-SES schools.

Postsecondary Progress of Mexican Americans

Fry (2004) makes it abundantly clear that Latino high school graduates could narrow the postsecondary achievement differential by enrolling in more selective postsecondary institutions and completing their studies. As of 2004, 57% of Hispanic postsecondary graduates were at least minimally qualified for 4-year university work (Swail, Cabrera, & Lee). Despite their preparation for 4-year universities, the high school graduates chose to attend less selective institutions like community colleges and trade schools. Choy (2002) stated that completion of a 4-year degree is increased when students enroll in a 4-year degree granting institution directly after graduating from high school.

As I stated previously, many Latino high school students begin their postsecondary careers at community colleges in the US. This can be problematic if the educational aspirations of these same students are to earn a 4-year degree. According to the Los Angeles Times in 2007, 60% of enrollees in California community colleges have the intention of earning an associate's degree or transferring to a 4-year university. Only 25% of those students actually ended up fulfilling their aspirations. That means three out of four community college students in California who intended to earn a degree or transfer did not do so. Cohen (2003) points out that a large number

of incentives have been put into place to boost transfer rates but only a small number of students take advantage of them.

The reasons Latino students do not attend a 4-year university directly after high school are typically: financial, family responsibilities, lack of information, and lack of preparedness. A study by Swail, Cabrera, and Lee (2004) found that nearly 59% of Latino students were characterized as not qualified for postsecondary education, as compared to 41 percent of white students and 32% of Asian American students (Swail et al, 2004). Fry (2004) pointed out that it seems Latino youth are not enrolling in universities because they are not taking the necessary steps to make themselves eligible, like taking the SAT. In the year 2000 Hispanic students made up eleven percent of the nation's high school graduates but only eight percent of the students who took the SAT I that year were Hispanic.

Consequences

Suarez (2003) reminds us that many Mexican American students aspire to complete a 4-year degree after high school graduation and that fewer of them actually expect to do so. Most Mexican American college goers end up at community colleges with a reduced chance of earning a 4-year degree because of the low transfer rate.

Some of the barriers facing Mexican American students who want to get a postsecondary degree are cost of the institution, family responsibilities, and course-taking in high school. According to the Pew Hispanic Center (2004), the main reason Latino students claimed for not going to college or for failing to complete college was the cost of tuition or the need to work and earn money. In the same survey, twice as many Latino students (33%) than White students (16%) claimed that the need to be close to family was a reason for not going to college or failing to complete college.

Part of family responsibilities for Latino students means supporting the family financially and taking care of each other. This can be an obstacle when students try to leave for college. High school course-taking can also be a barrier to higher education because Latino students at low-SES schools do not have the same access to advanced courses that their high-SES peers have (Llagas & Snyder, 2003).

In 2004, the College Board published a report by Baum and Payea entitled, Education Pays: The Benefits of Higher Education for Individuals and Society. According to their report the benefits of higher education are plenty: longer life, increased lifetime earning potential, and an increase in the overall economy to name a few (Baum & Payea, 2004). They even go so far as to say college graduates have fewer incidences of smoking and incarceration while graduates have higher rates of volunteerism, blood donation, and civic participation. A gap in the college attendance by any ethnic group is a burden for all in society. As Gottlieb wrote in Liberating Faith, Dr. Martin Luther King Jr. said, “Injustice anywhere is a threat to justice everywhere” (p. 178).

Educators and policy-makers must act now to close the gap in differential access to higher education for our nation’s fastest growing ethnic minority. Educators need to provide high quality education and encouragement to all students. Policy-makers need to allocate resources to the neediest schools serving our ethnic minority students in a manner that will promote the attainment of more baccalaureate degrees. Failure to act will result in the maintenance of a large class of undereducated citizens who depend on safety-net programs that the rest of society will not be able to provide.

Theoretical Perspective

In chapter two, a description of the existing literature on Mexican Americans will help to elucidate some of the factors that have added to the educational underachievement of this group. The major theoretical lens through which this problem will be viewed is social capital theory (SCT), first outlined by Coleman (1988) and Bourdieu (1986), and later elaborated on by several researchers including Stanton-Salazar (1997, 2004) and Adler and Kwan (2001). This choice was made because SCT takes into account the relationships that people belong to and helps explain how those relationships provide some advantage (e.g. economic, safety, information).

Defining Social Capital

Coleman (1988) outlines three forms of social capital in terms of the role each plays in society: (a) obligations and expectations, (b) information channels, and (c) social norms. One of the key concepts of SCT is that the first and third forms are most active when the group being studied has a high-degree of closure, meaning that the group is highly interdependent. If a group were fragmented then the members of the group would have a hard time enforcing obligations and expectations, and social norms because they would not be able to leverage their friendships with what they want to accomplish. Coleman (1988) conceived of social capital as a way to account for deficiencies in the way sociology or economics could explain the three phenomena mentioned previously. Sociology explains how actions are shaped, constrained, and redirected and economics explains that actions are made independently to fulfill self-

interests. Social capital blends the disciplines to create a richer theory that can account for specific social actions.

Social capital was defined by Bourdieu (1986) as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition, in other words, to membership in a group" (p. 248). He proposed that the amount of social capital possessed depends on the size of the network of connections individuals can organize and on the volume of the capital (economic, cultural, or symbolic) owned by each person with whom one is connected. To use an example from Coleman (1988), the Speaker of the House has a high volume of social capital that may be used in the obligations and expectations function to get legislation through the body that otherwise might have stalled-out.

Stanton-Salazar (1997) defines the concept of social capital as "the degree and quality of middle-class forms of social support inherent in a young person's interpersonal network" (p. 4). More specifically, he analyzed social capital in terms of relationships with institutional agents that can be converted into socially valued resources and opportunities. By merging social capital and institutional support, Stanton-Salazar defines institutional agents as "individuals who have the commitment and capacity to transmit directly, or negotiate the transmission of institutional resources and opportunities" (p. 6). Stanton-Salazar (1997) observed that connections to caring adults within the school setting drove several low-performing youth to become academically successful and apply to college with the adults acting as bridges. Although Stanton-Salazar (1997) noted that institutional agents often serve as conduits

for the reproduction of race and class social inequalities he admitted that they may also serve as life-lines for low-income minority students as they confront and overcome institutional barriers. He also argues that it is through relationships and the development of a pro-school ethos that minority students acquire the disposition to attend college and a college-going identity.

Social capital in this study is defined as the relationships between individuals and networks that can provide access to resources and forms of support that facilitate the accomplishment of goals (Stanton-Salazar, 2004). I chose this definition to allow all three functions of social capital (i.e. information channels, obligations and expectations, and social norms) to emerge in the analysis of relationships. According to Adler and Kwon (2001), SCT can help explain the exchange of social resources, which is a concept underlying what I am looking at in this study.

Postsecondary Academic Choice

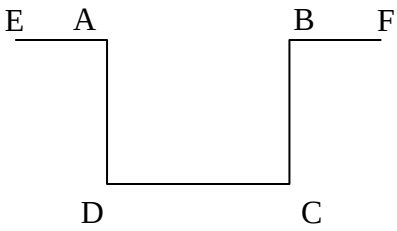
The present study defines postsecondary academic choice along three pathways. The first two are the result of the decision to attend, or not to attend, a community college or baccalaureate institution. I count making the choice not to attend college as an academic choice. I further distinguish a third pathway, which has been termed *experimentation* by Manski (1989). Students who take this pathway postpone college for work, or attend a community college without a clearly articulated long-term goal. The key point is that these high school graduates are not sure if college is right for them so they experiment with college or work to determine their next course of action.

Closure

Understanding the college choice of Mexican American students through a SCT lens requires that I find out about their relationships during high school. Coleman (1988) argues that to study two of the three forms of social capital, namely obligations and expectations, and social norms, the group should have closure. He defines closure as the interdependence of a specific group of people. I argue that peer groups of high school students tend to be closed due to institutional tracking, or grouping, of students by interests and ability. Now, I am not proposing that these groups are as interdependent as Coleman's (1988) example of the diamond traders in New York who tend to go to the same synagogues, live in the same communities and intermarry. This is the prototypical example of a very high degree of closure within a network. I do feel, however, that high school relationships have a high enough degree of closure that they may be studied for social capital, which fulfills obligations and expectations, and social capital that influences social norms.

On a high school campus there are certain groups that have higher degrees of closure than others. Figure 1 illustrates the concept of closure as Coleman (1988) described it.

A Group with a high degree of closure is able to leverage relationships to enforce sanctions.



A group that is not closed does not have the same ability to enforce sanctions through relationships.

Adapted from Coleman (1988)

Figure 1. Graphical representation of a group with a high degree of closure and one without such closure

Some examples of these groups are the advanced placement group, the mariachi group, and the thespians. These groups tend to spend a lot of time together and little time with other groups, thus they become interdependent. Members of these groups are expected to commit a lot of their time with the group. It is hard to get to know people within these groups unless you immerse yourself in them. Members of these groups are highly susceptible to being influenced by their groupmates because of their dependence on one another. In a sense, these students are obligated to provide services to each other when services are rendered because failure to do so could mean isolation. In addition, the social norms within the group are more easily enforced because of the close bond the students have.

On the other hand, some groups exhibit low levels of commitment and thus draw people with a variety of backgrounds and interests. It is easier to gain access to people in these groups. Groups with low degrees of closure would include the future educators of America club and the honor society. These groups meet less often and require less time commitment on the part of their members. The lower degree of

closure for these groups means that the members can not enforce sanctions as easily against other members. Thus, the influence members have on one another to enforce social norms is limited. Similarly, it is more difficult to require members to fulfill obligations due to the lack of dependence between them.

Information Channels

The second form of social capital, information channels, is also highly applicable to the present study because it is through information sharing that students learn about college. As Coleman (1988) points out, information is a scarce commodity and acquiring it is the basis for action. There is a wide body of research to support the assertion that peers play an important role in helping Mexican American students choose which level of postsecondary institution to attend (Chiang, Hunter, & Yeh, 2004; Gibson, Gandara, & Koyama, 2004). The role of peers in the college choice needs attention particularly because Mexican American youth spend more time with their peers than with anyone else (Shneider & Stevenson, 1999). Social capital provides information channels when people with knowledge about college provide that knowledge to others.

Obligations and Expectations

Social capital can take the form of obligations and expectations in a high school when students provide emotional or academic support to each other in the understanding that those services should be reciprocated in the future. Agents may also provide some form of assistance (i.e. tutoring) and in return expect an increase in engagement and effort from the student. If a student is ridiculed by her peers for studying too much, because those traits do not suit the particular group, then she will

be brought back to the acceptable social norms. Social capital as social norms is dependent on several factors including: ethnic customs, home life, geographic location, socio-economic status, and track placement. Since my population is fairly homogeneous with regard to ethnicity, SES, customs, and location I expect that the main differences in social customs will emerge from home life and track placement.

SCT is appropriate to apply to various ethnic groups because it was initially conceived to study the relationships of specific groups. Coleman (1988) described the diamond wholesale market as being very interdependent, which worked to their advantage since trust was an enforceable social norm. Coleman (1988) uses other examples, such as Asian immigrants that buy two text books for each child so the mother can help with schoolwork and Catholic school students who drop out of high school less than their public school peers hypothetically because their social network's social norms work against dropping out. The specificity of my sample aids in the application of SCT because although Mexican Americans vary widely across the social and economic spectrum, I am able to draw conclusions that may not be made of Latinos in general.

High School Mathematics Experiences

In addition to SCT several other philosophical theories contributed to the underpinnings of the present study. As a mathematics educator I am familiar with the arguments surrounding the best ways to teach mathematics, the algebra for all mandate, and the importance of mathematics as a gatekeeper course for college. Even though my passion for mathematics as a subject sometimes clouds my opinion of its usefulness I am reassured that mathematics is indeed an essential part of any

education. As Adelman (2006) pointed out, the level of achievement in high school mathematics has shown to be a predictor for college success. Adelman writes:

> The highest level of math reached in high school continues to be a key marker in precollegiate momentum with the tipping point now firmly above Algebra II. The world has gone quantitative: business, geography, criminal justice, history, allied health fields – a full range of disciplines and job tasks tells students why math requirements are not just some abstract school exercise. (p. xix)

I am interested in discovering what role high school mathematical experiences play in the decision to attend college, if any at all. I will examine mathematics experiences through a SCT lens to find the answer to this question.

Academic Self-Efficacy

In his 1996 review of educational research on academic self-efficacy, Pajares articulated that efficacy beliefs help determine how much effort, persistence, and resilience people will demonstrate when faced with an activity. Among the thoughts that affect action, there is none more important or central than students' evaluation of their abilities to exercise control over events that affect their lives (Bandura, 1989). Low amounts of self-efficacy can affect a person's attitude and thoughts, making simple tasks appear much harder. At the same time, high amounts of self-efficacy allow individuals to approach even challenging tasks and activities with calm. Pajares (1996) writes that it is because of these influences that self-efficacy beliefs are strong predictors of the success that individuals eventually attain.

Building self-efficacy is a multi-faceted activity that happens over periods of time through interactions with other people. Bandura (1989) points to four principle sources of information for determining self-efficacy: performing a task, watching others

perform a task, talking to people about a task, and emotional states in which people partly judge their capableness, strength and vulnerability. I am operationalizing self-efficacy through the psychological factors of mathematics student identity, mathematics course expectations, and locus of control (Figure 2). The amount of social capital accumulated by the individual plays a role in the development of self-efficacy and locus of control by providing opportunities to watch others perform a task, talking to people about a task, and experiencing emotional states. As students create their mathematics student identity they are using their beliefs about their self-efficacy. High school students' sense of self-efficacy leads them to make assumptions about the nature of their mathematics classes that carry the weight of setting the students up for success or failure. Finally, internal locus of control is a complement to self-efficacy in that it supports an individual's ability to overcome adversity. By using these factors as lenses to examine my data I can describe the differences in the self-efficacy of my participants over time and across their respective postsecondary paths.

These same factors also play a role in the postsecondary decision in that they shape the way a student understands his or her potential academic achievements. In other words, a student who has experienced many successes in mathematics, expects that he can succeed in a mathematics class, and feels that he is responsible for his achievement will be more likely to choose a 4-year university over a community college.

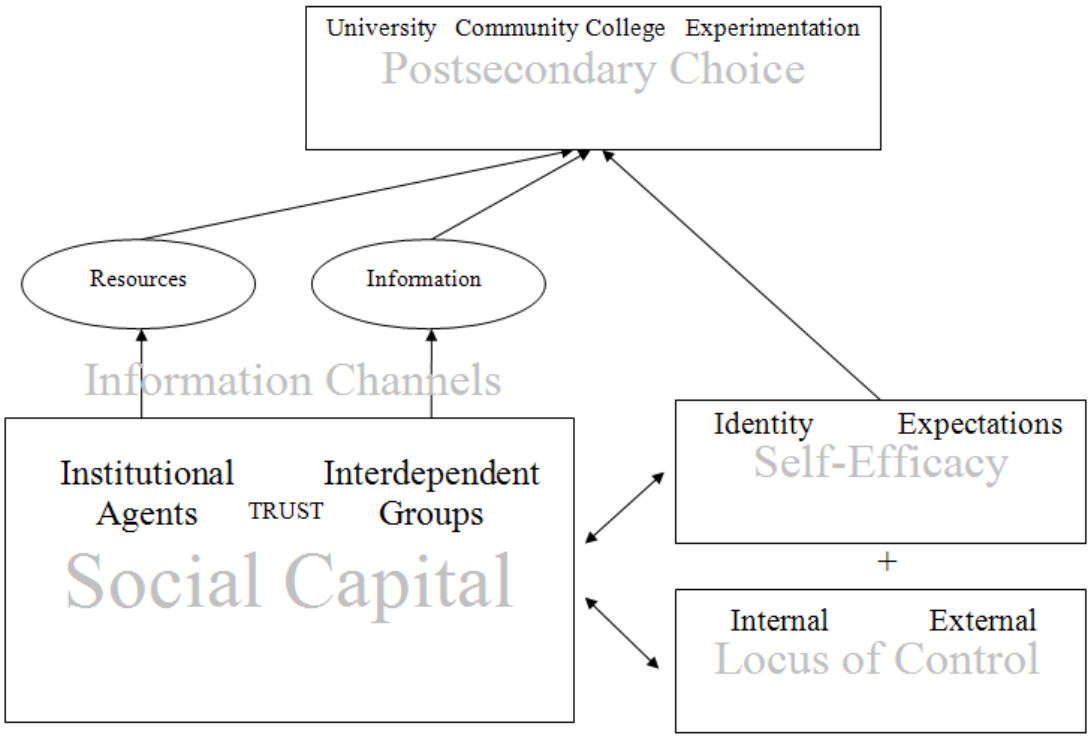


Figure 2.
Relationships between Social Capital Theory and Self-Efficacy Theory in the Postsecondary Choice Process.

Mathematics Student Identity

Stryker and Burke (2000) use identity to represent parts composed of the meanings that persons attach to the multiple roles they typically play in highly differentiated contemporary societies. As high school students form their mathematics identities, they are surrounded by experiences in and out of school. Of course, experiences within the context of mathematics have great potential to alter students' mathematics identities.

Boaler, William, and Zevenbergen (2000) conducted 120 interviews with high school students to determine the effect their identity as mathematics students had on their success in mathematics. The researchers found that students generally feel that

the subject of mathematics is rigid and inflexible, leaving no room for negotiation of meaning (Boaler et al., 2000). Boaler et al. (2000) concluded that the most important factor in determining students' attitudes towards mathematics was the perceived irrelevance of mathematics education beyond preparation for future education and careers. Furthermore, the students did not see success at mathematics as in any way relevant to their developing identities.

Mathematics Course Expectations

According to Brown, Brown, and Bibbey (2007), the main reasons students do not continue with their study of mathematics are perceived difficulty and lack of confidence. The researchers also found that disaffection with the subject and perceived lack of relevance are also important factors. Brown et al. (2007) argue that the aforementioned factors are closely related to mathematics grades. This means that students who perceive mathematics to be overly difficult will tend to perform worse than those who are more confident in their mathematics abilities.

Locus of Control

Ng, Sorenson, and Eby (2006) found that participants' locus of control greatly affected their performance in a stereotype threat activity. People whose locus of control was internal performed far better on the activity than people whose locus of control was external. In education, the locus of control represents the location of a person's reasoning for success or failure on a task. An internal locus of control implies that a student believes that he or she is responsible for academic achievement while an external locus of control implies someone or something else is responsible.

Students with sufficient amounts of social capital (i.e. relationships, access to resources, and access to support) have the chance to build self-efficacy (i.e. the belief in one's ability to accomplish a task). Furthermore, a student with a high degree of self-efficacy is more likely to continue on the path to a 4-year university. By using SCT and self-efficacy as lenses I will be able to more fully analyze participants' recollections of their high school social relationships and mathematics experiences to add to our understanding of the postsecondary choice.

Purpose of the Study

Since my focus is to understand how Mexican American high school graduates' social relationships and mathematics experiences play a role in their postsecondary decision- making process, I ask the following research questions:

1. What do high school graduates report about their self-efficacy beliefs regarding mathematics learning during their high school careers?
    A. How do graduates' reports differ across their postsecondary paths?
    B. How do the reported differences in self-efficacy beliefs change as time from high school graduation increases?

2. How do graduates describe the influence of their high school social relationships on their postsecondary academic choice; specifically the influence of peers, family, school personnel, and community members?

To gather data that will answer these questions I conducted interviews of twelve high school graduates in different stages of their academic careers. My paradigm for approaching this qualitative study is based on the constructivist premise that people construct their own realities. A single, true reality may never be known. That means that I will take the opinions of my participants to be just that, their opinions. Although I am realistic that a study of this size will not be generalizeable to the larger Mexican American community, but hope to provide some systemic insights into the complex

relationship among these critical factors associated with academic success and motivate further study of this increasingly important issue.

One of the purposes of this study is to find out how high school graduates describe the influence of their network of peers, family, teachers, and other institutional agents on their postsecondary career choice one year, two years, five years, and ten years after high school graduation. The answer to this question requires an analysis of social relationships that the student made in high school. Many researchers have turned to the concepts of cultural and social capital (Bourdieu, 1977; Coleman, 1988; Stanton-Salazar, 1997) to help explain the influence that relationships can have on the postsecondary choices of high school students (Ceja, 2006; Gandara, 1982; Gonzalez, Stoner, & Jovel, 2003; Perna, 2000; Saunders & Serna, 2004; Venegas, & De La Rosa, 2006). A longitudinal study that tracks the same people over the course of ten years would be a superior option to answer my research questions. Each participant in a longitudinal study would attend high school during the same time period so they would be subjected to the same conditions (e.g. testing requirements, gangs, school budgets). The time constraints on my study will not permit such a time and labor intensive process. Also, mathematics teaching has not changed much over the last ten years so I feel comfortable that my participants were all exposed to similar course content and teaching styles.

This study seeks to understand the ways relationships influence high school graduates to make the college-choice. Furthermore, this study attempts to describe factors that support the development of academic self-efficacy in the context of high school mathematics.

Chapter 2

Literature Review

Researchers have shown that ability and achievement alone cannot explain the low college attendance of minority adolescents (Gonzalez, Stoner & Jovel, 2003; McDonough, 1997; Oakes, 1985, 1990; Solorzano, Villalpando, & Oseguera, 2005). In other words, we do not live in a strict academic meritocracy, in which the brightest people always receive the best jobs and compensation. In fact, we know that social relationships are just as important, if not more important, than academic ability for obtaining financial success in society. The accumulation of social capital leads to the development of self-efficacy, which drives students to higher levels of achievement in education. For these reasons, I have chosen a social capital theory (SCT) framework coupled with self-efficacy formation for examining the following research questions:

1. What do high school graduates report about their self-efficacy beliefs regarding mathematics learning during their high school careers?
    A. How do graduates' reports differ across their postsecondary paths?
    B. How do the reported differences in self-efficacy beliefs change as time from high school graduation increases?

2. How do graduates describe the influence of their high school social relationships on their postsecondary academic choice; specifically the influence of peers, family, school personnel, and community members?

I have organized my literature review to begin with the relevant research on high school and college as institutions, and then I cite the research that provides background for my questions for Mexican American high school graduates. By starting from the general and gradually becoming more specific I hope the reader will be able to take away a sense of the importance of the high school experience,

mathematically and socially, for postsecondary opportunities and ways that SCT can shed light on the topic. This is the motivation for my quest to improve this experience for all students.

High School Mathematics in the College Choice

Achievement gap

Whether or not the family a child is born into promotes pro-school activities will be a predictor of success in school (Ladsen-Billings, 1995; Vogt, Jordan, & Tharp, 1987). These pro-school activities often take the form of reading to children and asking children questions because these activities are aligned with white middle-class cultural values. Often, minority students begin school behind their peers because of differential expectations on the part of parents and schools. It is not that certain cultures devalue education. Rather they hold different views of what constitutes an education. I address these differences with research that examines the achievement gap. My study is specifically aimed at understanding Mexican American high school graduates' college choice, but much of the current research does not differentiate between Latino sub-categories. For this reason I am forced to use the umbrella ethnic categories, Hispanic and Latino, as the best possible alternatives.

The achievement gap in high school between Latino students and their non-Latino peers is not surprising because many Latino students begin school far behind in literacy and numeracy skills (Gandara, 2006). In the Early Childhood Longitudinal Study (U.S. Department of Education, 2000) of 22,000 kindergarteners from across the United States, Latino and African American students were far behind their Asian and White peers even before school began. Gandara's data (2006) is summarized in

Table 1. The argument is that if students start school behind their peers, given the already stratifying nature of US education, the differences will become more pronounced by the time the students get to high school. The children in the study were selected to provide a representative sample of racial, ethnic, geographic, gender, and socioeconomic diversity.

Table 1.
Percentage of Kindergartners in Lowest and Highest Quartile of Reading and Mathematics Skills (by Ethnicity, Fall 1998)

	Reading		Mathematics	
Group	% Lowest Quartile	% Highest Quartile	% Lowest Quartile	% Highest Quartile
African American	34	15	39	10
Latino	42	15	40	14
Asian	13	39	13	38
White	18	30	18	32

Source: Data from the US Department of Education (2000a)

Several intervention programs have been created to level the playing field for minority students before they begin kindergarten. While most researchers agree that pre-school interventions are effective for closing the gap in achievement early before it has a chance to widen, politicians are hesitant to spend money on time- and labor-intensive programs. These data serve establish that the roots of the school achievement gap for students like my interviewees are planted early in their school careers, and will not be discussed further.

Mathematics is a Gatekeeper

The US Department of Education (USDE) prepared a 1997 White Paper entitled *Mathematics Equals Opportunity* and the 1999 follow-up to the 1988 National Education Longitudinal Study (NELS: 88) entitled *Do Gatekeeper Courses Expand Education Options?*, to substantiate the claim that mathematics is an important

gatekeeper to higher education. The gatekeeper metaphor means that success in mathematics is a necessary component to access to further education, as well as success in later academic pursuits. Both studies were prepared using the data from the NELS: 88 samples of 24,599 eighth graders from 1,052 schools, and the 1992 follow-up of 12,053 students.

According to *Mathematics Equals Opportunity* (USDE, 1997) knowledge of mathematics provides an advantage to students in academics and the job market. Moreover, completion of algebra in the eighth grade provides students access to college preparatory mathematics and science courses. Even though algebra has been given this gatekeeper status, most eighth grade students were not taking it in 1997. Successful completion of rigorous mathematics and science courses, especially for low-income students, greatly increases the likelihood of college admission and improves future employment opportunities. Algebra is held in high regard throughout the government's report, based on statistical analyses, because it is the gatekeeper to advanced mathematics courses which in turn provide opportunities for higher education.

A salient finding reported in *Mathematics Equals Opportunity* (USDE, 1999) is that there is a direct correlation between enrollment in algebra in the eighth grade and enrollment in advanced mathematics courses (e.g. algebra 2, trigonometry, or calculus) later in high school. In addition, students who went on to complete an advanced mathematics course after successfully completing algebra in the eighth grade were more likely to apply to college than students who only completed an

advanced mathematics course. This may have to do with the increase in self-efficacy that goes along with being tracked in the higher mathematics level.

The study provides a compelling case that students aspiring to attend college must take and succeed in advanced mathematics courses beginning with algebra in eighth grade. One of the findings in *Do Gatekeeper Courses Expand Education Options?* was that not all students who completed advanced mathematics courses in high school went on to enroll in a four-year college, but they were more likely to do so (USDE, 1999)—re-affirming the belief that mathematics is a gatekeeper.

You may wonder why more students simply do not enroll in algebra as eighth graders if that is the key to success. In the post-Sputnik era of preparing students to be good at mathematics and science, enrollment in advanced mathematics courses was limited for specific groups: female students, minority students, and poor students, who have historically been discriminated against in the US based on cultural traditions of perceived ability (Lee & Bryk, 1988). There are still lingering remnants of discrimination in our social norms concerning mathematical ability. More specifically, in contrast to reading, it is socially acceptable for people to be poor students of mathematics. As a teacher, I have witnessed parents who make excuses for their children's low mathematics achievement, and so continue the cycle of mathematics failure.

Tracking and outcomes

The use of tracking in the US provides another reason why it is not easy to correct the problem of unequal access to algebra in the eighth grade. LeTendre, Hofer, and Shimizu (2003) conclude that nation-specific values determine acceptable

curricular differentiation. In other words, it is up to the people of each country to decide how their young will be educated. In the US we have a system that separates students into tracks as young as fourth grade. Oakes (1985) defines tracking as the process whereby students are divided into categories so that they can be assigned in groups to various kinds of classes. One of the fundamental problems that tracking creates is that if a student is assigned to a specific group, then he or she will most likely take on the identity of that group, for better or worse. If the group happens to be the low-track then the student's academic growth is more likely to be stifled. Conversely, a student who is accidentally assigned to the high-track may rise to the occasion academically and benefit from the placement. However, I have seen many students in my classes who consistently perform below his or her peers in a high-track course and subsequently this can create a low sense of self-efficacy for these misplaced students. Take for example a student who performed slightly above her peers in reading and mathematics and is subsequently tracked into a class with higher performing students. Now, compared to her high-track peers the student appears to be a slow learner and is consistently outperformed on exams and assignments. She is likely to feel that she is no longer as good as she thought at reading and mathematics.

Another critical tracking issue is who gets to decide at which level individual students are placed. In her study using the NELS:88 data, Ballon (2009) found that prior mathematics achievement largely accounted for the underrepresentation of Mexican Americans in the college and honors track. Moreover, she found that taking algebra in the eighth grade was significantly and positively associated with being placed in the college and honors mathematics tracks. However, Ballon (2009)

acknowledged that no single factor emerged as a criterion for track placement. In fact, prior mathematics achievement was also linked to an overrepresentation of Asian American students in the college or honors tracks. Since some high achieving Mexican American students are being placed into low tracks and some low achieving Asian American students are being placed into high tracks, parent expectations might be an influence in placement in advanced mathematics.

In addition to parent expectations there may be other forces affecting the placement of students into tracks. For example, in the 1960's school counselors in the US were largely responsible for putting minority students in vocational courses while keeping white students on the college-bound track. Placement based on ethnic categories, either consciously or subconsciously assigned, reinforces the notion that groups that have been historically discriminated against may continue to be held back by the tracking ideology.

Extensive ability grouping begins in elementary school in the US, followed by formal curricular differentiation in grades 5-7, and placement into differentiated secondary tracks in high school. It is possible to move between tracks but scholars (Kilgore, 1991; Oakes, 1985; Page, 1991) have documented the effects of being placed in the lowest educational track as the equivalent of educational warehousing. Once students are placed in the warehouse they sit there until their time is up. Another component of the warehouse metaphor is that once a student is placed in the lowest track it is very difficult to be moved to another place. Martinez and Klopott (2006) go so far as to say that all high school tracks which are not academically rigorous (i.e.

college preparatory) should be eliminated to provide greater access to college for low-income and minority youth.

One unfortunate outcome of tracking is uncovered by Gamoran (1987) who concludes that the difference in academic achievement between tracks at a school is greater than the difference between students and dropouts. In other words, differences in achievement are affected more by where one is placed in school than by whether or not one is enrolled in school. This startling finding would make one wonder why we have any curricular differentiation, but later I will address what happens when schools attempt to do away with those systems. Gamoran (1987) also found that differential course-taking was responsible for most of the within-school differences in achievement.

In the third annual Brown lecture in educational research, Darling-Hammond (2007) pointed out that although most states are moving towards common standards for all students there has not been an equalization of funding and access to educational resources. In her book, *Multiplying Inequalities,* Oakes (1990) reports that because of the unequal distribution of money, Hispanic students, among several other groups, lack access to highly qualified teachers, mathematics and science resources, and classroom opportunities to learn mathematics and science. Oakes (1990) concludes that as a result, American schools do not give Hispanic students, among others, an equal opportunity to participate in scientific and technological fields. A lack of resources only compounds the ever-widening gap in achievement between minority students and their White and Asian peers.

In an effort to narrow the achievement gap caused by tracking, Yonezawa, Wells, and Serna (2002) explored detracking by providing students and parents with greater freedom of choice in track placement. Not surprisingly, Latino and African American students resisted entering high-track classes where their mostly White peers resided. The authors concluded that hidden institutional barriers, the students' goals, and the desire of students to learn in places of respect prevented the effort to de-track through the choice mechanism. Rubin (2003) examined de-tracking from within the classroom and found that aspects of the overall school context framed and permeated students' interactions in their de-tracked classes, sometimes leading to the duplication of inequalities within the classroom that de-tracking was designed to eliminate. Thus, de-tracking is ideologically appropriate but has not been implemented successfully using a choice mechanism. Charter schools seem to be the most advanced at eliminating tracking but some would argue that they represent an exclusive track since their enrollment is usually selective.

College Choice

Latino students are more likely than students from other ethnic categories to begin their postsecondary education at a community college (Adelman, 2006). To help explain this trend researchers using rational choice models (e.g. Bell, 1977; Monk-Turner, 1998) have suggested demographic reasons like finances or school achievement.

Kurlaender (2006) found that some of the most common explanations for Latinos' choice to attend community colleges are not entirely accurate. Many researchers argue that socioeconomic status can predict Latino enrollment in

community college because Latinos come from disadvantaged families more often than other ethnic groups. Kurlaender's (2006) data indicate that even the students from high-SES Latino families have a 40% probability of attending community college compared to a 10% probability for African Americans and White students of similar financial backgrounds. In terms of prior academic achievement, Kurlaender (2006) found that the Latino students with highest achievement on standardized mathematics tests had around a 45% probability of attending community college compared to a 5% probability for African Americans and White students of similar achievement levels.

According to Kurlaender (2006), Latino students report lower rates of baccalaureate degree intention (45.2%) than African Americans (42.9%) or Whites (55.7%). The degree objective of Latino students may help explain the differences in community college enrollment. Another factor that can help explain the overrepresentation of Latino students in community colleges are that Latino students have a greater preference to live at home compared to White students (Grodsky, 2002). Taking degree objective and proximity of family into consideration, there are still variations in the college choice of Latino students that cannot be explained. Thus, I look to social capital theory for help explain college choice-making.

Social Capital and College Choice

Recent studies have focused on the lack of relationships that would bring ethnic minority students accurate information about college opportunities (Ceja, 2006; Gonzalez, 2003; Perna, 2000; Saunders & Serna, 2004; Tierney, Venegas, & De La Rosa, 2006). Some of the reasons Mexican American students lack the network

connections that would prepare them for college is that their parents are generally less educated than White and Asian parents, their friends are less likely to attend college than friends of their White and Asian peers, and pervasive misinformation influences them to stay away from college. If students are exposed to more advantageous social influences regarding college they are more likely to attend.

Sources of Social Capital

Conceptually speaking, a student who has accumulated a large amount of social capital, through connections to people with knowledge of the college application process, should be better prepared to make decisions regarding college. However, Tierney, Venegas, and De La Rosa (2006) found that low-income students make sense of college and financial-aid information through sometimes misleading and unreliable sources: their school culture, core beliefs about college affordability, and family backgrounds. Thus, just because students are connected to other people does not mean that they will make decisions that lead them to 4-year universities. What matters more is who the student believes.

On the other hand, in his study of an Advancement Via Individual Determination (AVID) program, Stanton-Salazar (2001) found that a supportive relationship with the AVID teacher and among the students themselves, enabled AVID participants to became attached, committed, and involved in their academic careers. It is also important that these social connections provide accurate and timely information about the college decision process.

Ceja (2006) explored the relationships of 20 Chicana high school seniors and found that their parents, despite putting a high level of importance on education, could

not transmit much social capital to their daughters. Siblings played a much greater role in advising the student about college and the process of applying. This was due to the parents' minimal knowledge of the educational opportunities available to their daughters in the US. The siblings, having navigated the process for themselves, were much better equipped to guide their sisters through the college choice process.

Gonzalez, Stoner and Jovel (2003) used life history research methods to understand how the relationships with family and school personnel affected postsecondary opportunities for two groups of Latina students: 12 students who were admitted to prestigious 4-year universities after finishing high school and 10 who began their postsecondary education at community colleges. By the time the latter group of students was in eleventh or twelfth grade they had no choice but to attend a community college because their grades during high school would not qualify for minimum eligibility requirements. All of the community college courses these students took were accepted into the University of California system as transfer credits. The transfer of 100% of the community college students in this study is remarkable considering that only 25% of students who enroll in community college to earn a degree or transfer actually fulfill their aspirations. The authors of this study suggest that the reason all of the community college students were able to transfer to 4-year universities was because they no longer faced institutional barriers to academic achievement and they were supported by institutional agents who helped them apply for transfer.

Gonzalez, Stoner and Jovel (2003) identified potential agents of social capital in the family (parents, siblings, and extended family members), in the school (honors

programs, teachers, and counselors) and at the college/university (college outreach and preparation programs). The authors also identified potential agents of institutional neglect and abuse: the general school curriculum, ESL and special education tracking, teachers, counselors, and school administrators. They define institutional neglect and abuse as "the inability or unwillingness of schools or its personnel to prepare students for postsecondary education, particularly 4-year universities" (p. 153). I have found similar aspects of neglect and abuse in my interviews with high school graduates.

Trust

The old adage that it's not what you know, it's who you know is only part of the story. Knowing someone is not enough to turn your social capital into a real advantage since the quality of the relationship is a significant factor in that process. This brings us to the issue of trust between students and other social actors who have the ability to influence their mathematics achievement. Goddard (2003) defined relational networks, social norms, and trust as forms of social capital that could have a potential impact on student achievement. He examined the fourth grade standardized state mathematics and writing exams, through a social capital lens, that allowed him to find out if schools characterized by high levels of social capital would have more proficient and advanced students than those with low levels of social capital.

In his article, Goddard (2003) uses social trust as a form of social capital in that if there is a high degree of trust in a relationship then people are more likely to act reliably and competently. To measure social trust he used teacher reports of the amount of trust between students and their parents and between teachers and parents. Goddard (2003) concluded that schools with teachers who reported a high amount of

social capital, in the form of trust, relationships and norms, also had a higher pass rate with students performing at or above proficient levels on state mandated standardized writing and mathematics exams.

Trust is an important factor in the relationship between students and mathematics teacher. If high levels of trust are present then both students and teachers are more likely to act in consistent and reliable ways that translates to higher achievement on the part of students.

Filling the Gaps

My study builds on the work in social capital theory by examining the effects of social capital, institutional neglect and institutional abuse, specifically in mathematics, by interviewing four sets of students, 1, 2, 5 and 10 years following their graduation from high school. I am also expanding the scope of those studies by taking into consideration the experiences of the high school graduates in the group I label *experimentation*. I believe studying *experimentation* students will help to shed light on what we are doing right and wrong as educators. Most studies regarding college choice examine the lives of high school seniors who are in the process of applying to college or college freshmen who have just been admitted to college. Not enough effort has been made to distinguish between the types of postsecondary academic careers in order to understand how students arrive at their choice of college.

Academic Self-efficacy

After reviewing the research on students' success and failure in high school mathematics and conducting a pilot interview with a current high school senior, I was able to establish the same parameters about what to expect from the interview data. I

hypothesized that students would mention factors relating to their sense of academic self-efficacy. Specifically, I expected to hear about students' mathematics identities, mathematics course expectations, and locus of control during their interviews. In the pilot interview, I heard specific responses that addressed each of these three operationalized constructs.

Lent, Brown, Gover, and Nijjer (1996) created a framework for examining mathematics self-efficacy by describing the places where students get information about who they are as mathematics students: prior mathematics experiences, vicarious learning, physiological reaction, interest, effort, teaching quality, and relevance. In their survey of 103 college students, on a question about sources of information for building their self-efficacy, prior successes in mathematics was listed as the most influential and was the most common response. Interestingly, the more college experience students had, the more accurate they were in describing their academic skills. Lent et al. (1996) examined accuracy by comparing students' responses to their GPA's. In other words, a college student during her first semester cannot predict her performance as accurately as a college student in her third semester.

Mathematics Student Identity

In his study of 115 Latino high school youth, Lopez (2001) found that mathematics teachers contributed more assistance, instructions, feedback, and questioning in mathematics than students' mothers, fathers, same-gendered peers, opposite-gendered peers, or mathematics tutors. In addition, he concluded that assisted performance was positively correlated with higher mathematics grades for students in the college-preparatory track. Assisted performance is the completion of a

task with the help of the teacher rather than the completion of a task by oneself. One unexpected discovery from this study was the inverse relationship between assisted performance and mathematics grades in the remedial mathematics track. Students who reported more assistance from their teachers actually performed worse in their remedial mathematics class. According to Lopez (2001) if students are already being tracked into low-level courses then teachers will not be able to improve the students' performance simply by offering more assistance. In this context, assistance means asking questions, providing feedback, and giving suggestions to aide the student. Could it be that other stakeholders (e.g. peers, counselors, family members) have the potential to affect positive change in the students or would the results be the same as teachers? We know that teachers can make a difference in the mathematics achievement of college path Mexican American youth since they have the greatest impact on assisted performance. Is there a way to help non-college path students improve mathematics outcomes?

Anderson (2007) developed an identity framework (engagement, imagination, alignment, and nature) to help teachers develop, support, and maintain positive mathematics learning identities among their students. The facets of identity can be summarized as *engagement, imagination, alignment,* and *nature*. Anderson (2007) proposes that student' mathematical identity develops as they create problem-solving methods, learn about the applications of mathematics, find out about the requirements for college, and develop their beliefs about mathematical ability. Each of these four areas contributes to a specific part of mathematics learning and mathematics identity.

Anderson (2007) mentions that the *nature* facet, which promotes the idea that mathematics learning is genetic and immutable, seems to be the least useful for understanding mathematics learning and identity since every student can learn mathematics. During high school, students develop *engagement* and *alignment* of mathematical identity as they learn to solve problems that are more challenging and come to know the requirements for college entrance. The *imagination* facet of identity is formed as students see themselves using mathematics in their future jobs and in life. Student identities are developed in relation to teachers, peers, family, and other people in their lives during high school.

Mathematics Course Expectations

From earlier pilot work and personal experience, I have come to realize that not everyone enrolls in a mathematics course with an open mind. Most students have preconceptions about the rigor and requirements for their courses. One of my interview questions asked students to tell me about their mathematics courses in high school. The pilot interviewee reported that she set herself up for failure by expecting that her pre-calculus course would be too demanding. This self-fulfilling prophecy was based on mathematics reputation as an abstract and difficult discipline.

In a study of high school students' attitudes toward mathematics, Telese (1999) revealed that the discipline does not evoke enthusiasm when taught in a traditional lecture format, and that in general students do not have a favorable attitude toward mathematics. The author also found that the oldest students in a mathematics class generally have the worst attitudes toward the subject. Telese (1999) suggested that the more mathematics classes a student takes, the worse they feel about the subject. This

research places mathematics educators in the difficult position of having to teach their subject to students who may already have well entrenched negative feelings and expectations about the class.

Correct placement in mathematics classes in addition to adequate levels of support is essential to creating success. Mathematics, as a discipline, can be an insurmountable obstacle for students who preconceive it will be too challenging. In order to change students' expectations that mathematics will be difficult we must adapt our instruction to fit more modern, applied approaches.

Locus of Control

Rotter (1954) first described locus of control to account for the reasons people give for the good or bad things that occur in their lives. This concept is closely related to self-efficacy in the following way. If a student believes that studying every night for two hours will lead to success in a test (an internal locus of control orientation) but feels that she is not capable of putting forth that much effort (a low sense of self-efficacy) then she may not perform well on the test. Locus of control usually remains consistent across many types of situations whereas self-efficacy is specific to certain domains. A person may have a high degree of self-efficacy for academics and at the same time also have a low degree of self-efficacy for sports. Locus of control tends to persist across situations so that if a person feels that external forces are at fault for his success or failure at sports, he is likely to feel that external forces are responsible for his success or failure in academics.

Chapter 3

Research Design and Methodology

This is a study of twelve Latino high school graduates—six men and six women—who graduated from Bayside High (pseudonym) in four different classes (1998, 2003, 2006, and 2007) and then chose one of three different paths: 4-year university, 2-year community college, or *experimentation*. *Experimentation* graduates did not have longterm goals for their education or employment and so they were experimenting with various goals for college and/or work (Manski, 1989). Participants' recounts of social relationships during high school are examined as well as their experiences with mathematics during and after high school. The actors within this social relationship include the graduates, family members, school personnel, peers, and community members who impacted the academic careers of these students in ways that can be minute or monumental.

Studies of college choice often cast a broad net in terms of the experiences that could have an effect on the participants' college choice so I feel it is justified to explore, in depth, the mathematical experiences of my participants. Given the push to require all eighth grade students to complete Algebra 1, it is important that we realize the benefits and consequences for our actions. The findings of this study are applicable to policy making about course-taking and postsecondary outcomes for this selected group of Bayside High graduates.

Most studies that investigate the short and long-term effects of high school relationships focus on the education careers of post-secondary enrollees and these studies document activities in the senior year of high school or the first two years of

college attendence (Ceja, 2006; Farmer-Hinton, 2008; Gonzalez, Stoner, Jovel, 2003). Although these studies offer useful insights into the short term effects of high school programs on college choice, they usually do include the experiences of students who are simply *experimenting* with college, attempt to gage the impact of high school experiences on five or ten year graduates. This study addresses these issues by including high school graduates who took courses at a community college without a clear plan for their postsecondary educational goals, and by including high school graduates five and ten years after graduation from high school.

The primary means of collecting data for this study was through semi-structured one-on-one interviews. In this approach, a common list of questions was asked to all participants and follow-up questions were added when it was appropriate to the specific interviewee. For a complete list of questions see appendix A. Most of the participants were contacted using the online social networking sites MySpace (http://www.myspace.com) and Facebook (http://www.facebook.com). Others were identified through peer nomination and contacted by phone. The secondary source of data for this study comes from the participants' high school academic records. At the conclusion of each interview, the participant was asked to sign a waiver so that I could access their academic record for analysis.

Research Questions

The analysis that I did on the raw data was in an effort to answer my research questions, namely:

1. What do high school graduates report about their self-efficacy beliefs regarding mathematics learning during their high school careers?
    A. How do graduates' reports differ across their postsecondary paths?

B. How do the reported differences in self-efficacy beliefs change as time from high school graduation increases?

2. How do graduates describe the influence of their high school social relationships on their postsecondary academic choice; specifically the influence of peers, family, school personnel, and community members?

My first research question is an overview question about self-efficacy beliefs in mathematics learning during high school. The two sub-questions offer a specific framework for answering the overview question by examining post-secondary paths and time from graduation. Thus, I will be answering the first research question by responding to the two sub-questions that identify the two key components of my study. When you get to chapter 4 you will notice that I structure the writing to address the two sub-questions rather than trying to list everything I learned about self-efficacy from the participants in my study.

Participants

Most participants were contacted through the internet-based social networking sites MySpace and Facebook and invited to take part in this study to talk about their high school mathematics experiences. Since I was able to send an e-mail to all potential candidates, I received their replies promptly and was able to assess their willingness to participate. I located the prospective participants by using the search feature on each website to look for Mexican heritage students from the years of interest who graduated from Bayside High School a large high school situated in Southern California near the border with Mexico. Bayside High school is a public school located in a suburban area of southern California. The ethnic make-up of the student population is 82% Hispanic or Latino, mostly Mexican heritage, 7% White,

5% African American, 3% Filipino, 1% Asian and 2% other. Over half of the students at Bayside qualify for free or reduced lunch based on parental income. Approximately one in four students is classified as an English learner.

Once I located potential participants on social networking sites I then searched their self-reported educational profiles to determine if they had attended a 4-year university, 2-year college, or no college. I sent out an e-mail message to graduates from the specific graduating classes I am focusing on. When graduates agreed to participate I scheduled an interview day, time, and place and reserved the room at the public library for the interview.

No college

Initially, I found many possible participants who fit my criteria and I had no trouble scheduling and interviewing participants in the 4-year college and community college categories. However, it grew noticeably more difficult to locate participants in the "no college" category. Moreover, I was not sure that "no college" accurately described the participants I was finding because some of them had been to college but dropped out after a few semesters. I was successful in finding only one graduate who had never been to college. I decided to change my *no college* category to *experimentation* and include in it high school graduates do not have long-term academic goals but are experimenting with college.

Mexican Heritage

When I began this study, I used the term Latina/o to describe the ethnic category of my participants. After conducting most of the interviews and doing some preliminary analysis I noticed that most of my subjects' families had emigrated from

Mexico so I began to question if the broad term Latina/o was the most accurate descriptor. I did some research on ethnic categories and found that Chicana/o or simply Chicano usually describes first generation Mexican Americans and came into favor in the 1960's. Chicano is another way of saying Mexican American for people who maintain their Mexican heritage--language, customs, culture—even though they reside in the US. I was tempted to use that term to describe my participants but few of them self-identified as Chicano. Thus, I am calling my participants Mexican American or Mexican heritage as I feel this is the most acceptable descriptor on the part of the selected participant group.

Most of my participants are first generation Mexican American while one is third generation and two were born in Mexico. It is important to me that all of my participants be of Mexican heritage because Bayside is composed of 85% Latino students, most of whom have ancestors from Mexico. Selecting graduates who are Mexican heritage allows me to narrow the scope of my investigation and thus create conclusions that are more powerful.

Sampling strategy

Study participants were selected using an opportunistic stratified purposeful sampling strategy (Schensul, Schensul, & LeCompte, 1999) in order to gain a wide range of perspectives for analysis. In order to address my research questions, I chose to select participants based on the year of high school graduation (1998, 2003, 2006, and 2007) and their postsecondary academic career path (4-year university, 2-year community college, and experimentation. I selected one student who with qualitities that matched each of the twelve cells in Table 2. Although I experienced some

difficulty locating participants for for the community college and experimentation paths, I eventually interviewed one person for each cell. I will discuss why it was difficult to recruit graduates from these two career paths more in the findings section.

For the purpose of this study, I chose to disaggregate students by their initial enrollment in a postsecondary institution and their goals upon entering that institution. There are inherent problems with treating all students who attended a 4-year university as on the same path. I am aware that there is a difference between the selectivity, rigor, and cost of 4-year universities and so there are bound to be differences in the students attending this range of institutions.

Table 2
Sample Selection for my Study Based on Specific Criteria

	Graduation Year			
Postsecondary path	2007	2006	2003	1998
4-year university	Alejandra	Daniella	Gregorio	Juan
Community college	Benito	Esteban	Hilda	Karina
Experimentation	Cristina	Fernanda	Ignacio	Lupito

I chose the specific graduation years because I wanted to know what graduates felt at benchmark years out of high school. Graduates who are one year out of high school are likely to have had some common experiences transitioning to their postsecondary careers. Those who are two years out of high school are likely to be a more confident with their choices and better able to understand how their experiences have influenced their academic choice. Graduates five years out of high school may be transitioning into the workforce, or they may have moved into a leadership position in their job. I was curious what insightful comments they may have at this point in their career about how their high school mathematics experience may have played a

role in their postsecondary careers, and transition to work. Ten years after their high school graduation, I assumed that nearly all the graduates would be working and several may have experienced significant milestones such as buying a car or home, and house, and getting married, and/or having children. I was interested in whether their perspectives about the impact of their high school mathematics leaning on their lives had changed over time, and what elements of their academic careers most impacted their successes and challenges in life.

Measures and Procedures

People who responded favorably to my initial inquiry participated in one-on-one semi-structured interviews designed to elicit information about their high school mathematics experiences and relationships.

Semi-Structured interview

I conducted interviews in the summer and fall of 2008 at a time and location convenient to the participant. All interviews took place at one of three branches of the city's public library system. I considered holding the interviews at the school but after I conducted a pilot interview at the school I realized that it is not an ideal interview environment. Some interviews took place in the morning while other interviews took place in the afternoon. All interviews took place in "study rooms" that are within the library but offer privacy because they have a door that closes. All interviews were recorded using a digital audio recorder.

A couple of interviews began on time but many participants were late between 10 and 30 minutes. The typical reason for tardiness was that they were dependent on someone else to drive them and that person was running late. One person did not

show up to his interview but when I called him on the public phone in the library he informed me that he had an emergency and he had left a message on my cell phone so fortunately we were able to reschedule his interview for another day.

I began all of the interviews by greeting the subjects and trying to make them comfortable. Next, I gave the participant time to read the consent forms and answered any questions about the study. When the interviewee was satisfied with the information about the study and was ready to begin the interview, I started the audio recorder and we talked for about one more minute before I asked the first question. Because I used open-ended questions, the time length of each interview varied from one hour fifteen minutes to two hours forty-five minutes.

I did my best to elicit complete answers from my participants without asking leading questions that would unduly influence their responses. I also wrote during the entire interview so that the participant would feel I was interested in their responses. I also offered the participants a lot of time to answer questions and allowed them to go back to an earlier question if they thought of something to add later in the interview. I imagined that my role was as an active listener and solicitor of the participants' experiences. You will find the complete list of interview questions is included in Appendix A.

High School Transcripts and Analysis

At the conclusion of each interview I asked participants for permission to acquire their high school record from the school registrar for review. Every person agreed to this request so I was able to order the transcripts and collect them for analysis. The academic records contain grades, scholarship and citizenship, test scores,

class ranking, and courses that students took. Initially I charted each graduates' high school mathematics courses to look for patterns between the postsecondary levels. I also examined the overall high school experience for the participants to look for patterns in course-taking between or among the groups.

Interview Analysis

From my review of the literature, I expected to hear about participants' development of self-efficacy through their talk about identity formation and mathematics course expectations. I also expected participants to mention influential relationships that they had during their life in high school and the way trust played a role in those relationships. These were my initial analytic categories. Participants' answers to my interview questions were not as straightforward in addressing these categories. When I asked about mathematical experiences some participants spoke about their changing identity while others did not. Some participants spoke about their grades for mathematics courses while others spoke about the knowledge they gained. I needed a new categories to describe what I heard in the interviews so I modified the analysis to reflect the earlier categories but I also allowed new categories to emerge out of the participants' words. I then tried to incorporate the participants ideas into my analysis. In the end I analyzed the interviews using a modified grounded theory approach (Strauss & Corbin, 1990) by looking for patterns and themes in my notes on the interviews. The approach was modified because I began with a set of categories that I thought would appear in the interviews and I also allowed new categories to emerge from the data. Second, I grouped my codes together and collapsed categories to form my main codes. Finally, I chose the code that was most

relevant to answering my questions and used it to tell the story of my participants' high school mathematics experiences.

Positionality

Mertens (2005) stresses the importance of the researcher clarifying his position in the project in terms of the closeness to the topic and values that may influence the research findings. As a high school mathematics teacher for seven years, I have had a personal connection to the work that I do in the classroom. I have seen the social and economic stratification that takes place with each graduating class. I have often asked myself why 90% of my advanced placement calculus students enroll at 4-year colleges, while 90% of my senior mathematics students enroll in community college. Researchers have explored the importance of socio-economic status, parental education, high school achievement, and peer influences on the college choice of high school graduates, and in particular Latino students (Gibson, Gandara, & Koyama, 2004; Perez & McDonough, 2008; Walpole, 2003). Recall that even though I am primarily interested in Mexican heritage high school graduates, much of the research that has already been conducted used the umbrella ethnic categories of Latino or Hispanic. Although each of these factors has proven to be important in the college choice of Latino high school graduates there have not been satisfactory suggestions made to improve the situation for this group. Moreover, I seek solutions that mathematics teachers can implement in their classrooms to provide more opportunities for college access.

As a mathematics teacher, coach and tutor at Bayside High for eight of the last ten years I have met many students. I previously knew or taught some of the students

who participated in interviews with me. My position as a researcher and teacher has privileged me to certain information but also kept me insulated from more intimate aspects of students' education experiences. Most students would probably feel more comfortable talking to a stranger, who has guaranteed them confidentiality, about cheating, feelings of incompetence, and the relative usefulness of mathematics in their later academic careers. I was the math teacher for five of the twelve participants during their first year in high school. Since they were ninth graders when I was their teacher, the course that I taught them was Algebra I or Formal Geometry. There were giggles at times when I asked participants to tell me about what they thought of my mathematics teaching but I can say that the vast majority of conversations were open, honest, and deeply personal. I have attempted to be objective and unbiased in my interpretation of the data I collect.

Descriptions of Participants

I will now describe each of my participants in order to give the reader some insight into their stories. Each participant has been assigned a pseudonym but I have included information on gender, recruitment story, current academic and work career path, and other demographic factors that may be relevant to the study.

Alejandra

Alejandra is light skinned[1], tall and exudes a positive demeanor. She graduated from high school in 2007 and currently attends a tier-one public university on the west coast as an International Studies—Sociology major. She was initially located and

[1]I follow Gandara (1995) as a model for describing participants physically as well as characteristically.

contacted through *FaceBook.* Alejandra was my student in my ninth-grade formal geometry course but she never considered herself a good mathematics student. Her current academic goals include finishing her baccalaureate degree and continuing on to graduate school at the International Relations and Pacific Studies (IRPS) program at her university.

Benito

Benito is a svelte, light brown skinned, man with an athletic build. His years of cross-country training, mid-distance endurance running, are apparent from his lean build. Benito graduated from high school in 2007 and currently attends a local community college just a few miles from Bayside High. He was located through a student contact and later contacted through MySpace. I did not know Benito before the interview. Although Benito is currently attending the local community college, he has the academic goal of transferring to a 4-year school on an athletic scholarship. Benito is undecided about his major but at the moment, he is on track to complete a rigorous program of classes for transfer to a 4-year university.

Cristina

Cristina is very light skinned with freckles and dark hair. She could pass for a high school sophomore because of her dancer's build and young appearance. Cristina graduated from high school in 2007. After spending a year at a community college in northwestern United States, she is currently attending the same community college as Benito. This community is popular for graduates of our district because of its convenient location and solid reputation. I contacted Cristina by phone because she does not use an online social-networking website. She was my student in my ninth-

grade formal geometry class as well, and she currently aspires to pursue a career in art therapy.

Cristina wanted to get away from Bayside after she graduated so she went to live with her extended family in the northwestern United States and she attended the local community college there. Cristina has not decided what direction her life will take but she is happy to be out of high school because she wants to be "out there, doing something" (personal communication via phone conversation, 10/31/2008). Cristina belongs to the experimentation group because she remains undecided about her academic career plans.

Daniella

Daniella is even more petite than Cristina with a naturally high-pitched voice. She has used her voice to her advantage by singing in several groups in high school and college. Daniella graduated from high school in 2006. I located and contacted Daniella through Facebook. Daniella was also a student in my ninth-grade formal geometry class and she is currently attending a tier-one, public university in the west, majoring in Chicano Studies. Her current academic goals include applying to the McNair Scholar program—an intensive undergraduate research preparation program--at her university. In the summer of 2009, Daniella worked on a research project in Mexico with a professor from her university in order to satisfy the McNair research "rookies" program.

Esteban

Esteban is a medium-framed, light skinned man with wavy dark hair. He graduated from high school in 2006 and he is currently attending a community

college, located 17 miles from Bayside High, as a geography major and vocal music minor. Esteban was also a student in my ninth-grade formal geometry class and he currently uses mathematics in his job as a customer service representative for an industrial supply company. His goal after high school was to attend a 4-year university but after he failed both semesters of Mathematical Analysis in his junior year of high school, he decided to attend a community college. He considers mathematics to be one of his strongest subjects and initially wanted to go into aerospace engineering. He changed his mind when he visited a local aerospace company and saw the work environment. Esteban disapproved of the cubicle environment and what he perceived as a lack of social interaction.

Fernanda

Fernanda has a medium-sized frame and caramel colored skin that complements her dark hair and eyes. She graduated from high school in 2006 and currently works as a customer service agent for a large airline company. However, at the time of the interview, she had just learned that she would be transferring to the operations department. Currently she works in customer service, collecting tickets and assisting customers with their flight. Her new duties will include checking the weight and balance of the plane prior to take off to ensure a safe flight. Fernanda was a student in my ninth-grade algebra class and she never considered mathematics to be her strongest subject.

Gregorio

Gregorio has the presence of an educated, handsome and charismatic man. He uses a wheelchair as the result of an accident that left him paralyzed from the waist

down. I knew Gregorio before his accident so seeing him in his chair was a difficult experience for me but it appears he has made the best of a very tragic situation. He graduated from high school in 2003 and after five years at a prestigious Ivy League school, he earned a baccalaureate degree in aerospace engineering. Gregorio recently took a job as a financial consultant in the San Francisco Bay area where he is developing mathematical models for complex financial systems. Gregorio always considered mathematics to be his strongest subject and he has plans to continue his employment in a mathematics-related field.

Ignacio

Ignacio is a heavy-set, stylish man with a trendy haircut and sophisticated glasses. He has a darker complexion that complements his black hair and dark chocolate eyes. Because Ignacio was falling behind in the number of course credits at Bayside High, he was sent to the learning center as a way to accelerate his course-taking in an individualized, self-paced study environment. The learning center is an alternative to the traditional school in that all of the work is done individually rather than in a formal class setting. Students who are deficient in credits and lack the motivation to catch-up at Bayside are sent here as a last ditch effort to help them complete high school. Although the center is located on the edge of campus, it is actually a separate school and once students are enrolled, they are no longer allowed to participate in activities on the Bayside High School campus.

Ignacio was successful in completing the necessary requirements to earn his high school diploma . After he graduated from the learning center division of Bayside High School in 2003 he quickly enrolled at the local community college. Ignacio

enrolled in a few courses at a time at the college for three semesters but after a few weeks into each semester he did not stay up with his coursework because he had to work, or, as he reported, because he wanted to go out with his friends. Ever since he graduated from high school, Ignacio has worked one or two jobs continuously because he needed to support himself financially. Subsequently, Ignacio did not finish any college courses and decided to drop out of school altogether after three semesters.

Juan

Juan is a large, jovial, light-skinned man with a contagious laugh and positive disposition. He graduated from high school in 1998 and soon after he enrolled at a state university on the west coast. He was required to take remedial mathematics and English courses before he was allowed to continue his studies at the university. In four years, Juan completed his baccalaureate degree in Geography. Juan is currently a high school social science teacher. He has a positive self-image of his mathematics ability but it is not his strongest subject.

Karina

Karina is a fair-skinned and articulate woman with a genuine interest in knowledge about her heritage. She graduated from high school in 1998 and was accepted to a state university but for financial reasons she went to a community college instead. She started her postsecondary education at the local community college and later transferred to the state university where she was initially accepted. She earned a baccalaureate degree in Chicano studies. One of the most significant events in Karina's in high school career was getting her first failing grade ever, and it was in calculus. Karina is currently enrolled in a Master's degree program where she

she received a baccalaureate degree in Chicano studies, and she has plans to pursue her doctorate as well. She would like to be a professor so that she can teach the history of Mexican and Chicano music.

Lupito

Lupito is a big-hearted, straight-talking man, a little on the heavy side, with a medium complexion. He graduated from high school in 1998 and began his college career at the local community college right away. Even though he liked his mathematics classes, Lupito was frustrated with the way professors would review the content towards the end of the semester, so he ended up enrolling in and dropping the same algebra class for three semesters. Lupito told me that each semester in math class was the same: the professor would instruct the students in new concepts for the first 16 weeks and then review those concepts for the last two weeks. During the time the professor was reviewing the material Lupito told me that he started forgetting everything and eventually dropped the class out of frustration. After the third time he dropped the class, Lupito decided to go to work full-time for a pretzel company where he began working just after high school graduation. Lupito has always been a practical, hands-on type of person who liked to participate in activities rather than read about them. He enjoys his current job as a mobile crane operator and truck driver.

Chapter 4

High School Mathematics Experiences and College Choice

I have organized Chapter 4 and 5 as the answers to my research questions as stated previously. Rather than presenting all of my data in Chapter 4 and discussing it in Chapter 5 I decided to answer each question separately in its own chapter. My main foci in Chapter 4 are self-efficacy beliefs regarding mathematics learning during high school, specifically differences across postsecondary paths and changes over time. In order to answer my first research question I explore how self-efficacy beliefs differ for students on different postsecondary paths and how those beliefs change over time. In Chapter 5 I focus on the influences of high school social relationships on the postsecondary choice. I discuss how each relationship category (e.g. family, peers) factors in to the postsecondary decision. Each chapter has main sections that are in direct response to my research questions and subheadings as required for explanation and deviation from the original answer.

Introduction

Data for this study were collected from twelve purposefully selected high school graduates from Bayside High. The participants graduated from high school between one year and ten years prior to my interviews. Three graduates were selected from each of the classes of 1998 (ten years since high school graduation), 2003 (five years since high school graduation), 2006 (two years since high school graduation), and 2007 (one year since high school graduation). In this chapter, I will use a cross-sectional analysis to compare the contents of structured interviews of recent graduates with those who graduated several years ago.

The other stratifying characteristic of the participants in this study is their postsecondary academic careers. One participant from each of the four graduating classes were selected according to their university, community college, or experimentation postsecondary academic career. Recall that experimentation graduates did not have long-term goals for their education or employment and so they were experimenting with various goals for college and/or work.

Both research questions in this study focused on the postsecondary outcomes of high school graduates. I wanted to understand the relationship between self-efficacy beliefs and postsecondary academic choice as well as the relationship between high school relationships with school personnel, parents, peers and postsecondary academic choice. In the following chapters I address what I have learned about how self-efficacy beliefs during high school and high school relationships affect graduates postsecondary academic choices.

Few studies of high school include people who have been out of high school for five or more years. I was concerned that the participants who had graduated years ago might have limited memories of their teachers or classes from high school. Also, it seems socially acceptable in our society to claim, “I am not very good at mathematics.” whenever the topic is brought up, providing another reason to put those experiences in the past and not recall them. Surprisingly, every one of the twelve high school graduates in this study was able to construct, or in some cases co-construct, specific recollections of their mathematics courses, mathematics teachers, and mathematics experiences from all four years of high school. Sometimes mathematics classes were memorable because they were challenging and fulfilling, and other times

they evoked passionate feelings of helplessness and rage. This suggests that the often academically extreme experiences that accompany learning mathematics have long-lasting effects on people's memory of school, for better or worse.

I begin my analysis of high school mathematical experiences by examining the high school academic records of participants in this study. Even though the research questions for this study do not focus on course-taking and tracking both practices play a significant role in the success of high school students, as evidenced in the literature review. The presentation of course-taking and tracking also serves as a backdrop for the analysis of interview data where different courses are mentioned and various paths are followed.

Academic Records

The participants in this study consented to releasing their high school academic record for analysis. I entered their high school mathematics courses and grades into a spreadsheet for analysis. Each student receives two grades per year in their mathematics classes for a total of eight mathematics grades during the four high school years.

When I examined the grades by postsecondary path I noticed a trend among most of the students. Early struggles in mathematics may be related to students' postsecondary academic choice. University students' transcripts had high mathematics grades in the early years and first showed C, D, or F grades in 11^{th} grade. For the community college students, low grades began to appear in the 10^{th} grade. Experimentation students had many C, D, or F mathematics grades in 9^{th} grade. According to Bandura (1986), the failure to accomplish a task helps to shape students'

sense of self-efficacy. In the cases of my study participants, their difficulties with mathematics constitute their failures to accomplish the task of doing well in mathematics. The pattern in my data suggests that problems in mathematics may keep students from developing self-efficacy, and the earlier these problems surface, the less likely they are to build a sense of self-efficacy in mathematics as the attempt to continue their mathematics education. Like a domino effect, early failure in mathematics with a low degree of self-efficacy leads to subsequent problems in the subject.

University-path students succeeded in Algebra and geometry but struggled in 11^{th} grade when taking Mathematical Analysis, a pre-calculus course with advanced mathematical topics. Community college students began to show serious difficulties with Intermediate Algebra in 10^{th} grade, a second year of algebra with advanced exploration of the conic sections. The experimentation students had a hard time right from the beginning of high school with their first year of Algebra in which they transition from concrete calculations, to abstract expressions and equations. In summary, the earlier a high school student earns a C or less in a mathematics class, the lower the likelihood that the student will go to a 4-year university. An interesting contrast is that the university path participants, who experienced failure later on in their schooling, were generally able to maintain a high degree of self-efficacy for their next course. This finding would indicate that early intervention for struggling students in middle school to increase their facility with fraction and integer computation would improve their self-efficacy and enable them to do better in freshman Algebra. Students who fail in Algebra are not likely to be successful even in community college.

Course-taking

There are several high school course options in mathematics that students may choose to suit their needs. The typical mathematics course pathways for the high school graduates in this study reveal that the major differences in course taking are between the experimentation path and the other two paths. In fact, the courses taken by the community college path and the university path are almost identical until 12th grade when the community college students opt for probability and statistics. For the sake of clarity, Figure 3 shows the normative mathematics course pathways for the experimentation, community college and university path graduates in this study. Several additional mathematics classes were available as well so in fact, no two students in this study took the exactly the same mathematics course sequence during grades 8-12. It is important to note that although only three years are required for high school graduation in California, four years of mathematics are recommended for any student planning to attend a college or university.

	Experimentation Path	Community College and University paths	
8th	Mathematics 8	Algebra 1	
9th	Pre-Algebra	Formal Geometry	
10th	Algebra 1	Intermediate Algebra	
11th	Formal Geometry	Mathematical Analysis	
		Community college ↙	↘ University
12th	Intermediate Algebra	Probability and Statistics	Mathematical Analysis

Figure 3. Examples of representative mathematics course pathways for the high school graduates in this study.

Table 3 shows the high school mathematics courses of the three students graduating in 2006. Notice the similarity between the university and community college students.

Table 3.
Academic records for mathematics classes

Name	9th	marks	10th	marks	11th	marks	12th	marks
University Daniella	GEO	A/A	ALG2	A/A	ANALYSIS	C/D	ANALYSIS	A/B
Comm.C. Esteban	GEO	B/B	ALG2	C/D	ANALYSIS	F/F	PROB	B/C
Exper. Fernanda	ALG1	C/D	GEO	C/A	ALG2	F/F	PROB	C/F

ALG1- Algebra, GEO- Formal Geometry, ALG2- Intermediate Algebra, ANALYSIS- Pre-Calculus, PROB- Probability, Statistics and Trigonometry

The National Council of Teachers of Mathematics (NCTM) reports (1990) that successful completion of the first year of algebra is the most important predictor of future academic success. I found that three out of four university and community college participants in this study completed algebra during the eighth grade with a C or better. This allowed them to enroll in geometry during ninth grade, which they all passed. On the other hand, only one experimentation path student took algebra in the eighth grade, and as noted earlier, three of the experimentation path students got C's or less in their ninth grade mathematics class.

Over the past few years, it has become the norm for all 8th graders to take Algebra so it isn't surprising the 2007 participants all took algebra during their eighth grade year. This is compared to only one student taking eighth grade algebra from the class of 1998. Alejandra, the 2007 graduate on the university path, earned C's both semesters of eighth grade algebra. Benito, the 2007 graduate on the community college path, earned a B and an A in his two semesters of eighth grade algebra, respectively. Cristina, the 2007 graduate on the experimentation path, earned a C and a B in her two semesters of eighth grade algebra, respectively. As students in eighth grade are increasingly being required to take algebra, it seems that successful

completion of the course is not as good a predictor for college success as it was in the past. More research is necessary to determine if success in algebra is really the most important factor in determining success in college.

During the analysis of the interview transcripts I coded the data and synthesized the various elements into major codes: math student identity, math course expectations, locus of control, institutional agents, and interdependent groups. These codes are aligned with the current research I present in the literature review. In chapter 4 I examine the answers to my first research questions about graduates' recollections of self-efficacy during high school. In chapter 5 I examine the answer to my second research question about graduates' recollections of influential relationships during high school. The complete analysis is not included in the dissertation in order to provide the reader clarity in my answers to the research questions. To give the reader an idea of the strength of each finding I provide basic statistics and salient quotations for each. Often, the interview comments are representative of a larger group of feelings expressed by participants but I chose the best comments for each finding.

Self-Efficacy Beliefs Regarding Mathematics Learning During High School

Research Question #1: What do high school graduates report about their self-efficacy beliefs regarding mathematics learning during their high school careers?

In order to answer the first research question, I have broken it up into two specific parts: differences in reports of self-efficacy across post-secondary paths and changes in self-efficacy beliefs over time. These two sub-questions outline the

remainder of this chapter. Although some findings are the same across postsecondary paths or do not change over time I included them in the most appropriate category.

How do graduates' reports differ across their postsecondary paths?

I found that graduates' reports of self-efficacy varied with respect to their reported mathematics student identity, mathematics course expectations, and locus of control, specifically in their reports about who was responsible for their success or failure in high school mathematics.

Mathematics Student Identity

Mathematical identity is shaped early on in education, by eighth grade or sooner, by several factors: experiences, grades, feedback, and self-evaluation. Identity is subject to change when the aforementioned factors are re-invoked and updated by new experiences.

Four out of twelve graduates reported a relatively positive mathematical identity while the other eight reported a relatively negative mathematical identity. Some statements that reflect a positive mathematical identity include: "I have been good at math since elementary school" (Gregorio, 2003, U), and "I have always liked math and wanted to take math classes" (Ignacio, 2003, E). Statements that reflect a negative mathematical identity include: "Math was never my strongest thing" (Fernanda, 2006, E), "[Math] is a necessary evil" (Hilda, 2003, CC), and "I am still bad at math" (Juan, 1998).

Table 4.

Justification for the Formation of Mathematical Identity across Postsecondary Paths

University	Community College	Experimentation
3 negative/1 positive Good grade but little learning(2/4)	2 negative/2 positive Bad Habits (2/4) Bad Interpersonal relationship (2/4)	3 negative/1 positive Teacher at fault (3/4)

Table 4 shows the distribution of mathematical identities and the reported causes by post-secondary path. It appears that mathematical identity is unrelated to post-secondary path but the reasons graduates gave for how they feel about themselves in mathematics does differs across postsecondary path. University path graduates cited their innate ability or a situation in which they passed their mathematics class without actually learning much content as the main culprit for the formation of their mathematical identities. Community college path graduates cited their acquired bad habits (e.g. not doing homework, skipping class) or a bad relationship with a teacher as the main reason for their formation of their mathematical identities. Experimentation path graduates responded that their teacher's actions were the root causes for their formation of mathematical identity.

Alejandra, a 2007 university graduate, was well aware of her lack of ability in mathematics since seventh grade, but it did not catch up to her until her junior year in high school:

> Interviewer: In math Analysis, was that the first time you got an 'F' in math?
> Alejandra: Yeah, but it wasn't the first time I struggled. I always knew I wasn't good but that just made me think I am not going to make it in math.

Alejandra's statement highlights her low sense of self-efficacy in mathematics and the point at which she gave up her pursuit of mathematical success. Alejandra did

not give up until she had experienced several setbacks in her education. She later explained that she was not always a poor student of mathematics but that an event in middle school may have pushed her in that direction. She said:

> Maybe this ruined my math career forever. In seventh grade I was like all shy, all quiet, and all the students were all messy, they wouldn't behave, and the teacher never focused on the good people, I guess, because the other people he would always be yelling at them. So, "you guys you get an A, you were good." I didn't have the skills. So, that messed up my whole basic skills forever. And I was in seventh grade so I didn't know how math was going to get better or worse. And in eighth grade I got a C but I didn't get it.

It is not hard to imagine a student experiencing a temporary academic setback during school, but an entire school year lost could be impossible for some students to make-up. Alejandra's belief that she was unable to recover from this setback is probably the result of her placement in advanced mathematics courses. Once she fell behind, Alejandra describes not being able to recover. She told me that as the oldest child in her family she did not have older siblings she could rely on for academic support. Moreover, her small group of friends during middle school was enrolled in the same mathematics course so she could not turn to them for help. Alejandra's identity as the girl who could not understand mathematics was shaped early.

In Alejandra's situation she was given a grade that was supposed to represent her knowledge of the subject, but it was an inaccurate representation of her ability in mathematics. At the time of our interview it had been six years since that experience and she was still confident that she would never take another mathematics class or pursue any career related to mathematics.

When I asked informants to tell me about the most significant things that happened during their life while attending high school many chose to talk about clubs,

sports, family matters, or a special teacher but few mentioned events relating to mathematics. The one instance where mathematics was the most significant event during high school was when Karina got her first failing grade. Considering she graduated high school ten years prior to our meeting and had accomplished many worthy academic and social feats in the meantime, getting her first F was probably very traumatic. Given that Karina recalls this event and that it is near the top of her memories supports my assertion that the events surrounding mathematics are memorable. Karina spent two years at a community college before transferring to a university and completing her BA. She was enrolled in a MA program in Chicano Studies at the time of the interview and was on track to complete her thesis within the year. In her own words, she said:

> The most significant thing I had was I had my first F and it was in calculus, of course. And my mother had gotten me one of those graphing calculators and she said "but, I got you the calculator" and I had to tell her that it didn't really make a difference. That's one thing that stands out in high school, not many things do though.

In the ten years between high school graduation and her interview for this study, Karina had many opportunities to reflect on her schooling. In an almost frustrated but matter of fact way she stated:

> You're setting the students up for failure if you're giving them these A's that, I mean I got all these A's but did it really mean anything? It didn't really. I wasn't up to the standard that I really should have been.

Karina's statement suggests that people's opinions of their self-efficacy change over time. When she was in high school Karina believed that she was capable of doing well academically, as evidenced by "I got all these A's." However, her further studies demonstrated the weaknesses she had as a student, as evidenced by "I was not

up to the standard I should have been." Lile Gregorio, Karina realized once she got to college that education has more to do with really understanding ideas and concepts and that grades only indicate performance relative to the other students in the class.

I asked Karina later if her bad experience with mathematics pushed her to attend a community college and she was unsure. She told me that her social isolation and a lack of guidance were probably the major contributors to her decision to attend a community college rather than applying to a 4-year college or university. The lack of social capital in Karina's case prohibited her from gaining access to advanced classes and information about 4-year universities. In Chapter 5, I address these social aspects of education that influence students' postsecondary choices and academic outcomes.

Mathematics Course Expectations

Mathematics course expectations are an indication of self-efficacy for mathematics, as discussed in the literature review. Nine out of twelve participants, three in each postsecondary path, reported that they expected mathematics courses to be beyond their ability. Conversely, three out of twelve participants, one from each postsecondary path, reported that they expected mathematics courses to be within their ability. Statements that reflect the opinion that mathematics courses will be beyond their ability are: "I avoided math and science classes" (Alejandra, 2007, U), "The new topics were built upon a foundation I didn't have" (Karina, 1998, CC), and "I never really enjoyed math" (Cristina, 2007, E). Since there was no variety in the expectations for mathematics courses across post-secondary paths I looked for differences in the reported reasons for their reservations about mathematics. Table 5 shows the common reasons for expecting mathematics courses will be difficult.

Table 5.

Common Reasons for Mathematics Course Expectations across Postsecondary Paths

University	Community College	Experimentation
Mathematics is procedural (3/4)	Mathematics is sequential (4/4)	School mathematics is not useful (3/4)

University path students generally felt that mathematics courses were procedural so if they had a hard time following procedures then mathematics courses would be difficult for them. Community college path students all felt that mathematics courses build on each other so difficulty in one course will lead to problems in the next course. Even the community college path student who felt that mathematics courses would be easy expressed the sentiment that the courses are sequential. Experimentation path graduates, by and large, told me that school mathematics courses were not useful to them. The lack of utility diminished their motivation to work hard in the courses so they ended up experiencing difficulty.

Daniella, a 2006 university-path graduate, described an experience during her 10th grade year of high school:

> [That math class] was just an easy-A class. I remember not really trying as hard and getting an A still, which is very, very terrible. So, I didn't get a lot out of that class, actually I didn't learn very much in that class.

The expectation that her mathematics course would be an easy-A lowered Daniella's level of effort and resulted in a diminished amount of learning. I find her characterization that the situation was "very, very terrible" to be rather interesting. In hindsight, Daniella understands the consequences of her experience in this class but at the time she was unable or unwilling to do anything about it. Not only had she not learned very much in that class content-wise, but the bad study habits she was used to

caught up to her the following year. She reported getting a D in the first semester of pre-calculus that caused her to retake the entire year of pre-calculus in her senior year. Because Daniella had a high degree of self-efficacy for mathematics, she rebounded and earned an A in the class by repeating it during her senior year. Despite her later success, Daniella told me that she was not interested in furthering her study of mathematics. She speculated that she felt more comfortable and confident in the realm of the social sciences. She is currently majoring in Chicano studies at her university.

Alejandra told me that she is not able to understand mathematics concepts because of a bad year that she had in mathematics class during seventh grade. During high school she admitted to struggling with mathematics, expecting that each class would be difficult for her. When she had a chance to reflect on her feelings about mathematics she told me "I am avoiding any mathematics because of high school and especially because of Math Analysis." It is clear that she expects mathematics will be too demanding for her and that her self-efficacy for mathematics is very low.

Gregorio reported that he was always good at mathematics and he always liked mathematics implying that he expected to do very well in his mathematics courses in high school. His expectations turned out to be correct as he earned straight A's in his mathematics classes up through AP Calculus BC (second semester college calculus). As noted, he reported a high degree of self-efficacy in mathematics.

Esteban told me that he, too, enjoyed mathematics in the first two years of high school. During his 11th grade year Esteban failed Mathematical Analysis. He reported that he started skipping class to be with his girlfriend and he did not understand any of

the concepts. His sense of self-efficacy in mathematics was crushed by this experience. Esteban told me "If I got an F in (Mathematical Analysis) then maybe I am not going to move up as fast as I wanted to (in a mathematics related field)." While Daniella looked at her bad experience as an opportunity to improve, Esteban convinced himself that he was no longer a good student in mathematics.

When Hilda told me that mathematics is an evil necessity I knew that she expected challenges in her mathematics courses. Hilda told me that she mostly struggled in mathematics class and the only time she felt a high degree of self-efficacy was with a specific teacher. Her shaky sense of self-efficacy did not last, however and the next year she returned to a low degree of self-efficacy for mathematics. Although Hilda uses mathematics successfully in her jobs and personal life she does not feel comfortable with school-based mathematics. That raises an interesting topic that is beyond the scope of this study, the differences that students perceive between academic mathematics and job-related mathematics.

Fernanda always wanted to do well in school but with the influence of her peers she maintained an anti-school attitude. She did not expect that her mathematics classes would be too difficult for her but did not perform as well as she would have liked. Fernanda has a medium level of self-efficacy in mathematics but she did not continue her studies after high school, which I will discuss below.

Ignacio reported liking his mathematics classes in high school even though he did not attend class very often. He has a high degree of self-efficacy in mathematics, in that he believes he can learn the material, but he lacks the commitment that would make him a successful student. Ignacio informed me that the content of his

mathematics courses was easy and he understood the material. Ignacio's lack of social capital helps account for his poor performance as a student, specifically he had a cousin who encouraged him to ditch school and he did not have significant positive relationships with peers who had pro-school attitudes.

Locus of Control

Locus of control is an important addition to self-efficacy since an internal orientation can help students take ownership for their school experiences and respond to set-backs. Four out of four university path high school graduates reported an internal locus of control. Seven out of eight community college and experimentation graduates reported an external locus of control.

In general, participants from the university path attributed their success or failure in high school mathematics classes to internal factors like their aptitude or lack thereof. For example, they commented "I always had to work hard to understand mathematics" or "I was always good at mathematics." The community college and experimentation path students tended to attribute their success or failure in high school mathematics classes to external events beyond their control. For example, they might comment that they did poorly because the class "met too early" or "My cousin would ask me to ditch with him." In summary, when comments about locus of control were compared they tended to differ along the postsecondary pathways, with university students reporting internal controls.

As I was analyzing the interview transcripts for mathematics experiences, I noted that most participants had at least one negative experience with mathematics. In an attempt to possible differences in impact on future academic success among the

three postsecondary groups, I compared the ways each level of participant spoke about their successes and failures. Mostly, university-bound students placed the locus of control internally, in their aptitude and effort. In other words, they act on the belief that success in mathematics learning is a combination of natural ability and a commitment to work hard. Hard work in mathematics class means attending class, asking questions when appropriate, and doing the assignments. Their comments about performance in mathematics, as a discipline, reflect their predetermined positive or negative view of themselves as mathematicians. Community college and experimentation path high school graduates place the locus of control in external factors like the social aspects of their educational experience, or their teachers' attitudes. They tend to believe that if they got the right teacher who motivated them to come to class and do their homework they would have success in mathematics class.

Recall that Alejandra had a poor experience in mathematics in seventh grade and she blamed her subsequent struggles on her lack of a solid mathematics foundation. When I asked her if she would take any mathematics classes in college, she replied:

> So, now I am not taking any mathematics in college…mathematics is my worst subject. Cause I don't know anything. I see the example and I don't even know how to put numbers into the example. You just explained it to me and, just seconds later, I don't even know how to do it.

It is apparent that her identity as a successful mathematics learner has almost vanished, although she still considers herself a good student. She was not alone among the university attendees who felt that success or failure in mathematics classes was due to aptitude. Interestingly, this seems to contradict her prior statement that her

mathematics career was ruined by her seventh grade experience. However, when I examined the transcript of her interview the evidence strongly suggested that Alejandra now sees herself as someone deficient in the ability to understand advanced topics in mathematics. However, up until seventh grade she viewed herself as someone who was competent to learn mathematics. Her explanation that her failure to understand the concepts and skills in her 7^{th} grade mathematics class led to her limited success in learning mathematics in high school and later, she now believes that her *aptitude* prevents her from understanding advanced mathematics concepts now.

Gregorio attributed his success to his belief that mathematics was just something he was good at. He illustrated his positive self-efficacy in mathematics by saying: "I have been good at math since elementary school, I liked math and science, and I used to think about how airplanes worked." On the other hand, Juan felt that he was always bad at mathematics and he had a low sense of self-efficacy in mathematics. He was unashamed to admit that even simple arithmetic was a challenge that he needed to overcome: "I always needed to use my fingers to add/subtract…I memorized procedures but I didn't know how to do math." Juan's candid evaluation of his performance suggests that his teachers did not recognize his limited understanding of basic arithmetic concepts and the obvious need for improved assessment and instructional methods, but these interventions are beyond the scope of this discussion.

In contrast, Daniella attributed her success to an increased amount of effort in the discipline, which is a factor internal to the individual. When she experienced a setback in her pre-calculus course, Daniella put all of her effort into repeating the class

in her senior year and was successful. From her comments it is apparent that she is also aware of the systematic tracking of students its effects on performance. In response to the same question about taking mathematics classes in the future Daniella said:

> I always had to try really hard in math. Even in elementary school I remember not being very good at math, it was something that I always had to really, really try hard to get. I wouldn't consider myself good at math, no, I never considered myself very good at math. I think I just kept trying. I mean, I think I got B's in middle school, I think I was just tracked in that direction, with the… higher level students.

In contrast to the university students' conception that mathematics performance is generally based on internal factors, community college attendees attributed their success or failure in mathematics to external factors. Some interviewees believed that having a positive teacher with the right teaching style determined whether they succeeded or failed a mathematics course. Others felt that they were not motivated by their teacher, family, or peers to do their homework or attend class, both of which would have led to their success in mathematics. I consider these to be external factors since they take into account the relationships the student has with teachers, peers, and others school personnel.

One interesting contrast between the university and community college group is how each group explains their failure in their high school mathematics class. Community college students generally attribute their failure in mathematics to their actions in the course. On the other hand, university students attribute their failure in mathematics to some innate inability to do mathematics.

Benito, a 2007 graduate on the community college path, complained that he did not learn very much in his 10th grade mathematics class because the teacher could not keep the class under control. Even though he ended up passing the class Benito reported that he had picked up some bad study habits in addition to not learning very much in the class. Still, Benito considers himself to be very good at mathematics but he stated:

> The lack of one good year I was kind of caught off-guard at first so my grade suffered homework-wise, but not test-wise. I had a hard time catching on in terms of doing the homework.

Therefore, for Benito it was not his ability that kept him back but his behaviors. His poor study habit of not doing his homework, which he picked up the year earlier, was the behavior that prevented Benito from earning a better grade in Mathematical Analysis in 11th grade.

Esteban reported a similar issue with his mathematics class in 11th grade. He even made a comment at the end of his statement as if to say that he might have failed even if he had put forth his maximum effort. This is an example of his lowered self-efficacy for mathematics. Possibly as a way of getting back at his teacher, Esteban said that he remembers many people who went to class a lot also failed the class. He seemed to imply that even if he had cared enough to attend class every day, he still probably would have failed the class.

> Math analysis was first period, that was when I started to ditch, and I missed a lot of class. I failed both semesters, I didn't care. Although, I do remember a lot of people failing that went [to class] a lot too.

Esteban was not the only student who claimed outside influences as a factor in his performance in class. He reported that his girlfriend encouraged him to ditch class and

hang out with her during the day. Esteban made it clear that he regretted his high school relationship with her because she was a negative influence on his schooling.

Hilda attributed her successful events in mathematics class to an encounter she had with a strict teacher who told her what she needed to hear:

> [My math teacher] really talked to me as an adult. He looked at me dead in the eye and he said "You are too old for this. You need this class." Ever since then I started doing my homework, I started doing everything. He was the only teacher who got a B out of me in a math class.

Could Hilda have been successful if she was not encouraged by her teacher? She certainly felt that it was an important part of her triumph. Nevertheless, what happens when that teacher does not step in to fill the void and encourage excellence?

Karina never had that teacher who inspired her as Hilda's teacher had. She did not feel like asking for help was an option and that feeling led to her failure in her senior year. Karina said:

> I didn't really feel that there was a teaching style that appealed to me. A lot of the time, like in a higher level math, you kind of feel like that if you ask a question there's almost like a, this outgoing feeling that if you ask a question that I am the only one who has a question. I didn't feel comfortable asking for help…I guess I have experienced that now, going through college, that there are certain teaching styles that I will be successful with and other styles that I may not be, as successful.

Karina's reflection is very helpful in understanding her mindset going into a class, but it could not have come from a recent high school graduate. She shows a depth of understanding that has taken many years to develop so that it could be articulated so clearly. Essentially, Karina concluded that if there is a match between her teacher's teaching-style and her learning-style then she will be more successful.

Again, she is pointing out that the locus of control lies in the external social processes that occur between the teacher and students.

It is hard to differentiate between community college attendees and experimentation graduates in terms of their explanations for success and failure because they tend to overlap. Both groups identify the locus of control for their performance outside the self but there are distinctions that can be made. While community college students attributed their success or failure to actions, they took ownership for their performance. In contrast, three out of four experimentation students reported that their failure was largely due to their teacher's inability to motivate them. Cristina, a graduate from the class of 2007, had this to say when asked about her high school mathematics classes:

> I hated that [math] class, I hated [him]. He was not meant to be a teacher; he was always frustrated with his students. I never cared about school. I think I did like C's in all my math classes.

From the way Cristina spoke about her high school experience I could tell that she expected her teachers to behave in a specific way. When they did not fulfill her expectations she used it as an excuse for poor performance in that class.

Fernanda also blamed her teacher's lack of effort for her bad experience in a mathematics class. She told me:

> I don't remember learning anything in that class, it was just a go through the motions and get out of there as soon as possible. It was just very boring and we had reading right before that. I love reading so that was fine it was just the class was monotone, like everything just seemed the same thing. It is sad to say but it was one of my worst math classes. I passed it and I graduated…I felt like he didn't want to be there, so why did I want to be there?

Not all experimentation path students had bad experiences with their teachers, Ignacio reported liking some mathematics classes. As he points out, his problem was that he was not motivated to attend class or do his homework. He said:

> [The class] was fun, he was a really good teacher and I would get it, I would get everything he said. My problem was never comprehension it was showing up to class and doing the work.

Lupito liked his mathematics classes and he liked his mathematics teachers. In fact, he mentioned two of them as being significant positive influences in his life. His reason for earning C's in his mathematics classes was that he never really pushed himself to get better grades. This indicates that Lupito had a low sense of self-efficacy for mathematics because he did not expect to get a good grade even if he put forth extra effort. Again, the control for his achievement is not internal, since he claims to have understood the material, but in the external forces relating to motivation.

> I love learning math; it has always been my best subject. I never really pushed myself to get A's. I was always just glad to be able to pass the class, that was it. I mean, I do love math, but I was always just barely passing, like B or a C. I knew I could have gotten an A but then I had to take the placement test when I went to college and I was placed into Intermediate Algebra, so that was pretty good.

It is not my intent to belittle the feelings of the experimentation group by pointing out that their statements reflect a general feeling that their teacher's attitude had a perceived big impact on their performance in class. In fact, I am aware of the tremendous impact that the teacher has on the learning of his or her students. I am interested in articulating the way students account for their success or failure mainly because the students' attitudes may help us understand how to help all students achieve more.

An analysis of participant interviews indicates that eleven out of twelve participants struggled with the content of mathematics classes at least once during their high school career.

Juan, a 4-year university path student who graduated in 1998, concluded, "I wasn't, like, the greatest mathematics student, I think I did well with Ms. H. The rest were like B's and C's in mathematics." He begins by qualifying his perceived ability, or self-efficacy, in mathematics with a general disclaimer, and then reports that he was an average student in his mathematics classes.

Daniella, a university-path student who graduated from high school in 2006, summarized her experience as follows:

> And then junior year I had pre-calculus and I did not do well in that class. Actually, I got a D first semester and I think I got a C, probably second semester, I can't remember. So, I re-took [the class] senior year and I did really well.

She starts her statement with a specific instance in which she performed poorly in mathematics but immediately clarifies that she made up for it by excelling when she took the course again in her senior year. Given the specific nature of her comment, it seems that she may have an internal locus of control orientation that allows her to take ownership of her failures, and accomplishments.

Ten participants noted that at least one (out of a total of four) of their mathematics teachers was the root cause of their problems with the mathematics class. They cited teachers who were intimidating, unorganized, mean, had negative attitudes, and showed a lack of classroom control as well as a lack of commitment.

However, some students reported that they had been able to overcome difficulties caused by teachers. Overcoming obstacles indicates that the students have a level of self-efficacy that permits them to persist in the face of uninspiring teachers. All twelve participants noted that they had at least one mathematics teacher who made a positive impact on their schooling experience. Positive teachers were described as fun to be around, very clear and good explainers, who maintained a fast-paced class, who were disciplined, patient, committed, friendly, and had a sense of humor. In this chapter I explore my participants' mathematics experiences through data from their academic records and their responses to interview questions. In regards to the interviews, responses vary by year of graduation for some questions and by postsecondary level for others.

How do the reported differences in self-efficacy beliefs change as time from high school graduation increases?

As graduates moved further away from high school they reported differences in the way they spoke about mathematics course grades and knowledge. Six out of eight members of the 2003 and 1998 graduating classes, three from each class, reported the difference between knowledge and grades. None of the more recent graduates reported the difference between their grades and the knowledge they gained in mathematics courses.

The belief in one's ability to accomplish a task is developed over time through a series of actions. Life during high school is a formative period in which children develop independence, adapt to new rules, and create beliefs about themselves. Living in poverty often hampers school achievement and can make the shift to adulthood a

challenge. As Gregorio, a university graduate from the high school class of 2003, remarked:

> At Bayside, given that it is a low performing school, that kind of mentality isn't there. Overall, Bayside just doesn't give you the. . . Just that culture isn't there to go above and beyond, and really understand a concept in its essence. As far as what education means, it doesn't mean to get an 'A' but it means the knowledge and from there and beyond, what you can do with that.

Gregorio's statement implies that that students are influenced by each other and by tacit pattern of beliefs and expectations school and the local community impose on all members. Moreover, he suggests that having a large enough group of people, with similar aspirations and expectations, can motivate other people in group to advance in the same direction. Gregorio's belief in his ability to accomplish academic strongly suggests that he has developed a high degree of self-efficacy. However, his self-efficacy did not happen by accident. Access to significant sources of social capital, which will be presented in chapter 5, enabled Gregorio to build his belief in himself during his life in high school.

In addressing this question I analyzed comments about grades, specifically 'A' grades. I found that representatives from different graduating classes talk about the meaning of an 'A' grade differently. While some students interpret their report card grades quite literally, as the amount of knowledge gained in a course, other students have come to the realization that grades are not necessarily representative of their knowledge gained. I found that the longer students had been out of high school, the greater the likelihood that their comments will indicate that they realize the difference between grades and knowledge.

I found that as graduates get older and increase the amount of life experience they have, their self-efficacy beliefs in mathematics are founded more on their knowledge of the subject and less on external assessments of their ability. When I say knowledge of the subject I mean a self-assessment of skills related to mathematics. The graduates I interviewed have held various types of employment, most with some mathematical aspects associated with their work responsibilities. Some examples of their current and past jobs that involve mathematics are park ranger, researcher, crane operator, financial consultant, nurse, insurance agent, clerk, machine operator, airline representative, and salesperson. Some of the people I interviewed have held several jobs and most of those jobs required some amount of mathematics knowledge. As people use mathematics outside of the classroom, they gain an appreciation for the necessity and usefulness of the subject.

Self-efficacy beliefs evolve over time and do not seem to be dependent on post-secondary path. As graduates gained postsecondary education and work experience, their comments reflected a more nuanced opinion of what education means. Graduates who had five or ten years to reflect on their high school experiences realized the importance of the knowledge gained in high school, at least that knowledge that they used in their work. They told me that education is the process of gaining knowledge and that academic standards meant more than grades. More recent high school graduates looked at school as a requirement to live in society, and a place where grades were of primary concern. There is a noticeable gap in the existing research of longitudinal data to substantiate some of the trends I noticed in this study.

Future studies may examine high school graduates' beliefs about self-efficacy longitudinally over time to help substantiate my findings.

Summary

I expected the university students to place the locus of control for their performance in their internal abilities like aptitude and effort. My experience tells me that high-achieving students work very hard, so logically I thought they would feel that their success was due to hard work. They verified my assumption and revealed that they also felt aptitude was important to their success or failure. On the other hand, I thought community college students would claim that external factors like their teachers were responsible for their success or failure. I reasoned this way because I have overheard many of these students blame their teachers for their lack of knowledge. They fulfilled my expectations and added that their peers, family members, and others also had an effect on their performance in class.

The existing research on locus of control tells us that higher-achieving students generally feel that they are responsible for the good or bad things that happen to them. Similarly, lower-achieving students feel that external forces are responsible for the good or bad things in their lives. I cannot help but notice the irony that results from these two orientations in a practical sense. The finding that community college and experimentation students believe their failure is linked to external factors like their social actions (e.g. going to class, doing homework, caring about school) is unexpected because it implies that they can correct their poor behaviors and subsequently succeed in mathematics class. Likewise, it would seem that university students generally believe they cannot overcome their failure in mathematics. Since

their locus of control resides in internal factors like their aptitude (e.g. natural ability to do mathematics), which is not easily changed; and the amount of effort they put forth, which can be seen as a habit they get into, university students should have a hard time being successful if either of those factors faltered. Somehow, academic success for the university students transcends what would seem logically unachievable while community college and experimentation students are sometimes academically stunted by forces that appear reversible. On the other hand, it could be that societal forces are much stronger than they appear and thus, perceiving the locus of control to be in the social realm makes recovering from a setback even more challenging.

To understand this conundrum better I looked at the data to find examples of community college and experimentation students trying to change their behaviors. When Benito, a community college path student, had his poor experience in 9th grade where he claims he was treated like a bad kid, he was moved to another geometry class. Benito told me that the teacher could not control the class and he subsequently got a B grade without doing any work. The following year he tried to change his habits but said that he could not make himself start doing homework again. Karina's story is similar to Benito's story. She claims that in 11th grade she reached her limit, in pre-calculus, and despite having always been a good mathematics student she started struggling in mathematics. Karina told me that when she got to calculus in 12th grade she was too intimidated to ask questions. During our interview she admitted that her failure in mathematics was probably her fault because she was not very outgoing in school. Even though Karina claims her problem with school was social she did not successfully change her ways.

Daniella, a university path student, also struggled in pre-calculus in eleventh grade. She also told me that her teacher was intimidating and she was afraid of asking questions. When Daniella was placed back into pre-calculus in her senior year she told me about the transformation she went through. She explained that she spent many hours after school studying with her classmates to improve her situation. In fact, Daniella earned an A and B grade in the pre-calculus course during her 12th grade year. Another university path student who struggled in pre-calculus in eleventh grade was Alejandra. She admitted to me that she did not understand anything in that course. Even though Alejandra had struggled with mathematics previously she had not received a failing grade prior to eleventh grade. Alejandra was successful in passing her finite mathematics class in 12th grade and she attributed that success to an easier curriculum and different teaching style. She told me that her teacher in finite mathematics made the content more applied and gave assignments that were project-based. Alejandra has a deep-rooted belief that she is not a mathematics person but she was able to overcome her failure in 11th grade.

University-bound students may need to realize that they can affect change in their mathematics ability by remediating their gaps in learning, maintaining a positive attitude, and working with others to improve their performance. Community college-bound students may need to explore what motivates them and then use that as a stimulus in their mathematics classes. Experimentation path students may need to take control of their education by working with the teacher to make the class more interesting rather than disconnecting or under-achieving.

Discussion: What do High School Graduates Report about Their Self-efficacy Beliefs in Mathematics During High School?

The postsecondary academic choice is complicated by many factors but I hope to make the influence of self-efficacy in the high school mathematics experience clearer. I have found that high school mathematics experiences affect postsecondary academic choices in large part through shaping the students' self-efficacy. Some of the ways self-efficacy is developed are through performing a task, watching someone else perform a task, talking to someone about a task, and experiencing difficult emotional states that teach people about their limits. I argue that high school mathematics courses can be an important factor in the development of self-efficacy beliefs through forming mathematics student identity, verifying or reversing expectations about mathematics courses, building trust or creating betrayal, and permitting students to assign locus of control as part of their explanations of their successes or failures in mathematics.

When students form their mathematics student identities they are using their beliefs about their self-efficacy. As students have positive experiences with mathematics they tend to feel that they are capable of performing mathematics tasks and their self-efficacy for mathematics is increased. If students have negative experiences then their self-efficacy is decreased. I found that grades were an important validation of students' self-efficacy beliefs but that students' self-evaluations of their ability often override their course grades. This happened in the cases of several students who received grades they did not earn. Those students

presented low degrees of self-efficacy in mathematics in spite of their good academic records.

Students' self-efficacy beliefs combined with social interactions allow them to form opinions about the difficulty of their mathematics courses. When students predict mathematics courses will be too difficult for them then they often have a bad experience in the course. On the other hand, when students realize that their mathematics courses are too easy for them then they can end up with a lack of knowledge that may eventually catch-up with them as it did with Daniella.

Locus of control orientation differs across postsecondary path. Students who attend a 4-year university after high school usually place the locus of control internally while community college and experimentation path students have an external placement. This type of orientation is important because it determines how difficult it will be for students to overcome obstacles in their education. Students who have an internal locus of control are more resilient when it comes to setbacks.

Students who report a high degree of self-efficacy through the factors of mathematics student identity, mathematics course expectations, and locus of control usually end up attending 4-year university. When one or more of the factors is weak, the student may end up at a community college. If a student has a low-degree of self-efficacy then he may end up in the experimentation path.

Chapter 5

The Impact of High School Relationships on College Choice

Research Question #2: How do graduates describe the influence of their high school peers, family, school personnel, and community members on their postsecondary academic choice?

To gather data to answer this question I asked participants to tell me about the people who were positive and negative influences in their lives while they were attending high school. I have analyzed informants' responses to that question, as well as the relevant statements made elsewhere during the interviews, in an effort to answer my research question. I will start by describing my informants' high school relationships.

High School Relationships

Social networks are the basis for the transmission of social capital, as described in the SCT framework. In this study the networks described are actually the reported influential relationships between the students during high school and the people they describe. In many studies social networks look like interconnected webs of people but here I am focusing on the individual and his or her relationships to specific people; I am not examining the relationships that the influential people have with each other.

In order to understand how high school relationships affect postsecondary academic choices I asked participants to name the people were positive and negative influences in their life during high school. For my study, I mapped the influential people in the lives of my informants during high school. I started with the informant in the center and then connected the people they told me were influential in their lives. The kinds of people who were mentioned by the participants were friends, teachers,

parents, siblings, counselors (e.g. school, university, and outreach), extended family and coaches. I indicated the level of significance by using thicker connecting lines to mean more influential. I determined the significance of a relationship through listening to the participants' answers and ranking their list of contacts from most significant to least significant. When participants spoke about an individual for a long time relative to the other people they mentioned (significant individuals were spoken about for usually between one and five minutes), I interpreted this emphasis as a significant relationship. On the other hand, when my informant merely mentioned someone in passing and did not emphasize his or her importance, then I interpreted that to mean the person was not very significant.

I asked a colleague to listen to the digitally recorded interviews of four participants and to rank the individuals mentioned in order of significance. I used these results to judge the reliability of my approach to identifying significant relationships. My colleague came up with the exact same list of people in the same order of significance that I had. This gave me confidence that my identification method was reliable. I included a social network diagram specifying the significant relationships for each participatn in Appendix D.

In the following section, I examine the relationships across levels of postsecondary achievement and within each category of relationship. This analysis serves as a summary of the social lives of these twelve high school students.

The most striking difference between the university, community college, and experimentation participants is the number of the high school relationships each reported. As you can see in Table 6, university attendees have the highest number of

high school relationships (8.25) with a ratio of positive to negative influences of 4.5 to1. Community college attendees have a smaller number of relationships (6.75) and a ratio of 2.37 to 1 positive to negative influences. Finally, experimentation graduates have the smallest number of relationships (4.5) and the smallest ratio of positive to negative influences of 2 to 1. This means that graduates who went to university had about twice as many positive influences compared to negative ones than community college or experimentation graduates.

Table 6
Descriptive statistics for the high school relationships

	Avg. Network Size	Average Positive Influences	Average Negative Influences
University	8.25	6.75	1.5
Community College	6.75	4.75	2
Experimentation	4.5	3	1.5

For a graphical visualization of the relationships of the participants in this study see Figure 4. Note that the university group reported more positive influences and fewer negative ones than their peers during their lives in high school. The community college group reported more negative influences than the university group, on average, but still identified many positive influences during their lives in high school. The experimentation group reported fewer negative influences than the community college group but they also reported fewer positive ones. In general, the experimentation group reported a smaller number of relationships and the negative influences are more prominent than with the other two groups.

When we account for the *strength* of influence that each person or group had on the informant during high school the results are even more convincing. For this analysis I calculated a positive network quotient for each of the three postsecondary

paths. I ranked the informants' social networks, 1 to n, based on their perceived significance to the student, 1 being the least significant, and n being the most significant. Summing the rankings, the university group had a total of 141 points for positive influences and 15 points for negative influences. I calculated the ratio of positive to negative influences and derived a positive network ratio of 9.4 for the university group. The community college groups' positive network ratio was 2.7 (87 positive points and 32 negative points) and the experimentation positive network quotient was 2.0 (32 positive points and 16 negative points). Not only do university path students have more positive social influences but the ratio of positive to negative relationships is much higher than the other two groups. The university-bound high school students had more relationships of all types, a larger number of significant positive relationships, and a much higher positive network ratio than their community college and experimentation peers.

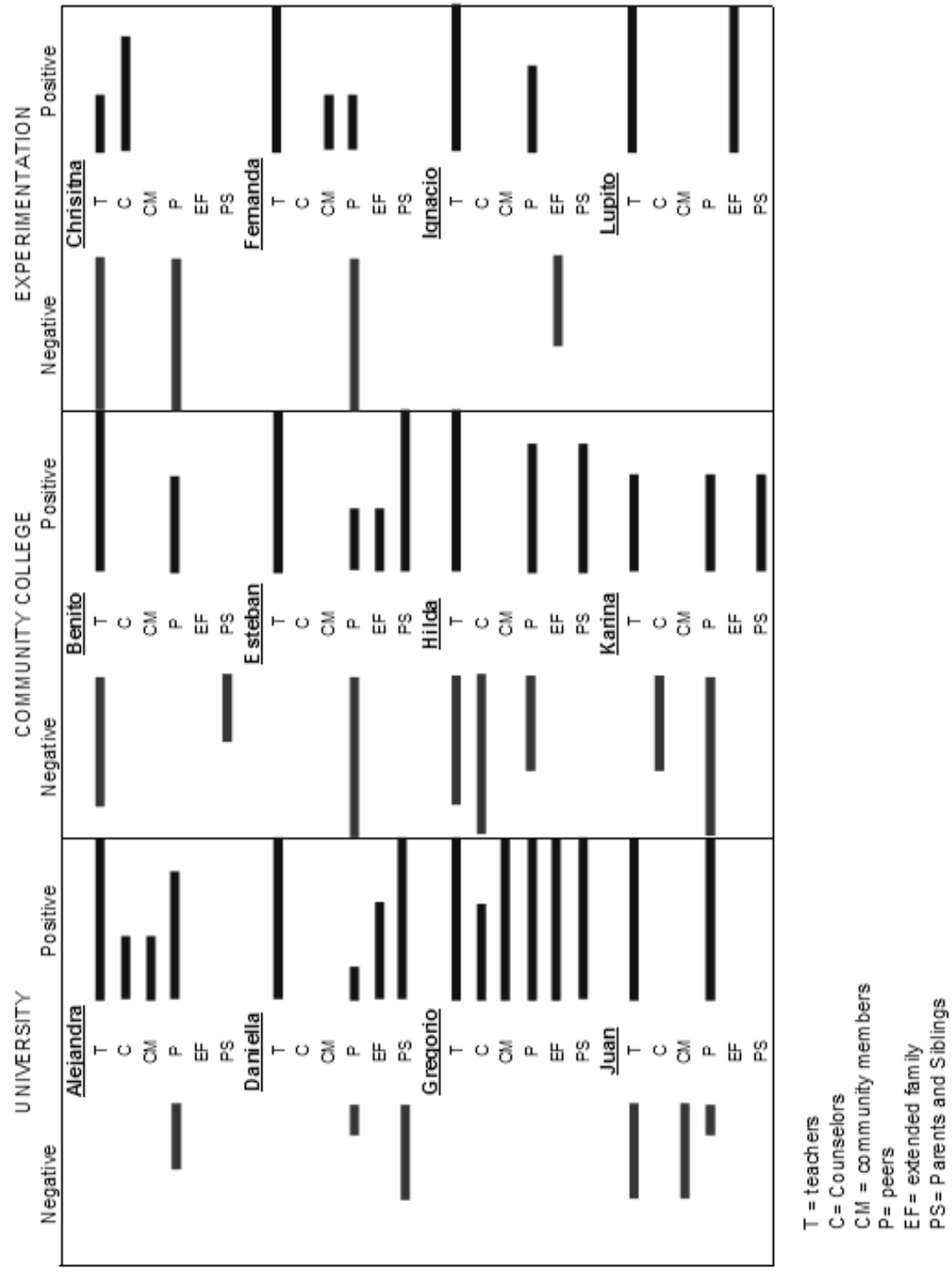


Figure 4. Graphical representation of participants' positive and negative categorical influences during high school.

Trust

Teachers and students in public schools enter into an unwritten contract when they assume their respective roles in the classroom. This contract is based on a mutual trust that each party will do their best to promote learning. Trust is the firm reliance on the integrity, ability, or character of another person. When trust breaks down between a student and teacher it can result lack of learning and subsequent problems in the class. Trust also exists between teachers and parents, students and peers, students and parents, and teachers and administration. Trust is necessary to foster self-efficacy because a student who believes that their teacher's assessments are an accurate representation of their understanding will gain confidence in their own ability to learn.

Since knowledge about trust is the product of successful and unsuccessful relationships, I decided to make it explicit in the data I report in this chapter. In summary, when people in the position of authority are trustworthy, students tend to increase their self-efficacy. Authority figures that breach the trust of students also diminish the students' academic self-efficacy. One example of the breach of trust involved Cristina, a 2007 graduate on the experimentation track, and her high school music teacher. Cristina looked up to her teacher for guidance since he was responsible for the well-being of the group when they traveled for performances. Cristina told me that her teacher advised her not to care so much about her grades as long as she was eligible for the group (minimum C average). After Cristina started receiving failing grades she reflected on the advice of her teacher and realized that their relationship was for the betterment of the group at the Cristina's expense. In addition, Cristina told

me about a lack of supervision when the group went on trips that resulted in underage drinking and regrettable actions on Cristina's part. Again, Cristina's trust for her teacher was eroding due to what Cristina perceived as a selfish attitude on the part of her teacher.

Benito, a 2007 community college path student, described the incident in which he lost trust in his teachers and the school. During math class Benito was given a notebook filled with hateful comments by his friend. Before Benito had a chance to look at the book his math teacher confiscated the book. Benito told me that he and his friend were sent to speak with the principal and both students were accused of writing in the notebook. The teacher and principal did not believe Benito when he proclaimed his innocence and he was given a three-day suspension from school. Benito's friend was expelled from school and had to enroll at a different high school. After that incident Benito told me that he lost trust in the school system and he never looked at education in the same way.

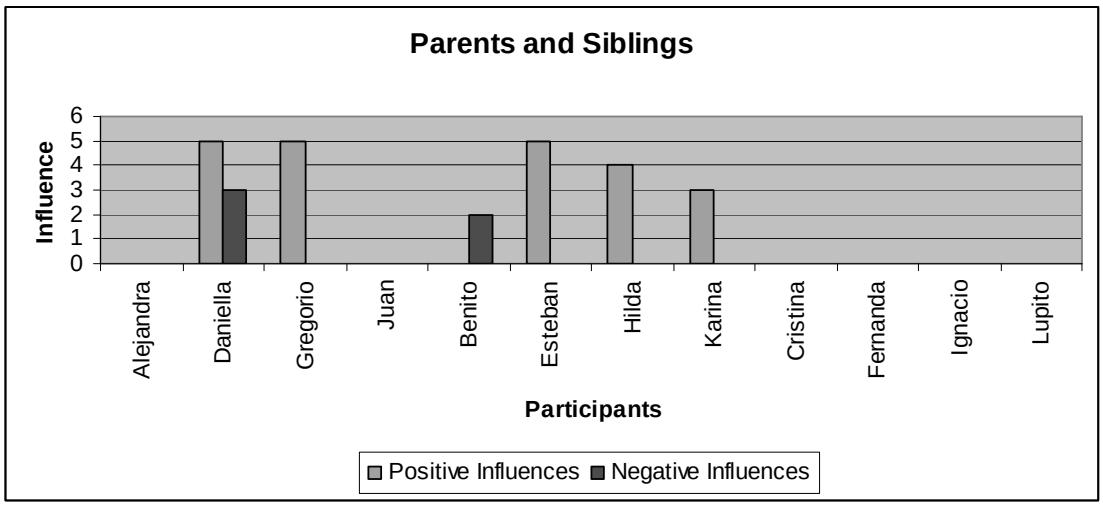


Figure 5. Parents and Siblings

During the interviews, four high school graduates mentioned parents and siblings as having a positive influence on them during high school, one graduate mentioned both a positive and negative parent and sibling influence, one graduate mentioned only a negative influence, and six graduates did not mention parents and siblings. Parents were positive influences by being emotionally and financially supportive of the students' school-related activities, encouraging positive behavior, and being honest in their interactions with them. When speaking about his mother Esteban said, "She was always at every [singing and dancing] performance we would go to. When we went to New York my senior year, she followed me…If I ever needed money for something, to travel, she was always there." It meant a lot to Esteban to have his mother be so excited about his singing and performances. It is important to note that Esteban's mom provided support during his high school years, but could not provide access to resources about applying to college.

Parents who cannot afford to fly to New York with their children can still be supportive in their child's education. Hilda talked about coming from a working-class home were it was hard to make ends meet, but her parents always had a positive impact on her life. She said, "My mom always supported me, even in my personal life with my first boyfriend…Me and my dad have always been connected and to this day they help me with everything that I do, they have supported me." What she really values about her parents is their honesty and openness. Again, Hilda's parents provided much parental support but could not provide access to resources about applying and attending college.

When parents lack knowledge about selecting and applying for college admission, they are still able to provide a general supportive environment where their children feel safe and encouraged. Even though Karina's parents had never been to college, they still encouraged her to do well in school as a way to get a good job. When speaking about her parents Karina said "my parents were always encouraging and my brother had gone to community college but didn't follow-through, didn't finish…I was the first in my family to attend a four-year [college]." Even though her brother, who is ten years older, dropped out of college to pursue work in the restaurant business, he still played a vital role in introducing Karina to college. He told her how to apply and what to expect of the classes. Since Karina did not get much support from counselors and teachers in applying to college, her brother was her main source of information. Karina's brother guided her through the process of filling out the application form, applying for financial aid and registering for classes.

Siblings were also mentioned by Gregorio, the 2003 graduate who went to a 4-year university, as being a positive influence. He has two older sisters who both went to 4-year universities, so his doing well in school was not new for his family. Gregorio's sisters acted as institutional agents who provided him with access to information resources about college. When speaking of his sisters, Gregorio stated, "…one went to UCLA, and my oldest sister she went to UC Berkeley, so, in a sense, I kind of followed their lead." When speaking of his family Gregorio said, "My family has always been, you know, the base of everything, they always supported me and they were always there…going to the soccer games or band performances, or whatever it may be." Gregorio recognized how important the support of his family was in his

life during high school. Not only were they positive role models for him, they also took the time to attend his extracurricular activities.

In contrast, other participants reported that their parents got divorced and fought in front of their children. Parents also got involved in taking drugs, joining gangs, and some went to jail. Benito, who lives with his mom and sees his dad occasionally, spoke about the stress that his parents' arguing brought into his life,

> Even though my parents were already split during the time (I was in high school), they would struggle every now and then. So, any extracurricular activities I could get into during high school would actually help me out a lot. (My parents) were constantly arguing, usually over financial stuff.

Benito found that his grades improved and his quality of life was better when he spent more time with school-related activities. Since his home life was disruptive and distracting he tended to hang out with his friends as a way to bring some stability back into his life.

Daniella also faced adversity in her home life so when she was very young her grandparents took custody of her. Her parents were in and out of jail because of their drug use and gang membership. Daniella's most significant high school event was the loss of her older brother to an accidental heroin overdose. Her brother had been a gang member the majority of his adolescent years but she was unaware of his drug use. In Daniella's words:

> A lot of the things I am pursuing now stem from that event. So, I want to go into maybe counseling youth or you know, youth intervention and so I think that has had a big impact in my life and it has really guided me to what I want to do in the future.

Daniella has used the challenges in her life to become a better and stronger person. When I asked her to describe the people who were negative influences in her life

during high school she said, “That’s a tough one. Negative influences make you stronger.” This statement reflects Daniella’s high degree of self-efficacy for school. Daniella believes that she will be able to accomplish school related tasks if she puts forth enough effort. Daniella is determined to do well in school despite obstacles and set-backs, so she views challenges as experiences for personal growth. Her current work on intergenerational gang membership is a result of her desire to help others who are going through what she has been through.

Parents and siblings were mentioned as significant influences for all of the community college participants and half of the university participants. Interestingly, none of the experimentation group reported that parents and siblings were a significant influence on them during high school. This may be an indication that in order to form long-term educational goals it helps to have guidance from parents or siblings. Parents and siblings may act as institutional agents who provide information about college. More research is needed to determine the extent to which parent or sibling involvement contributes to long-term educational goals, and the characteristics of experimentation path students that may keep others from providing support.

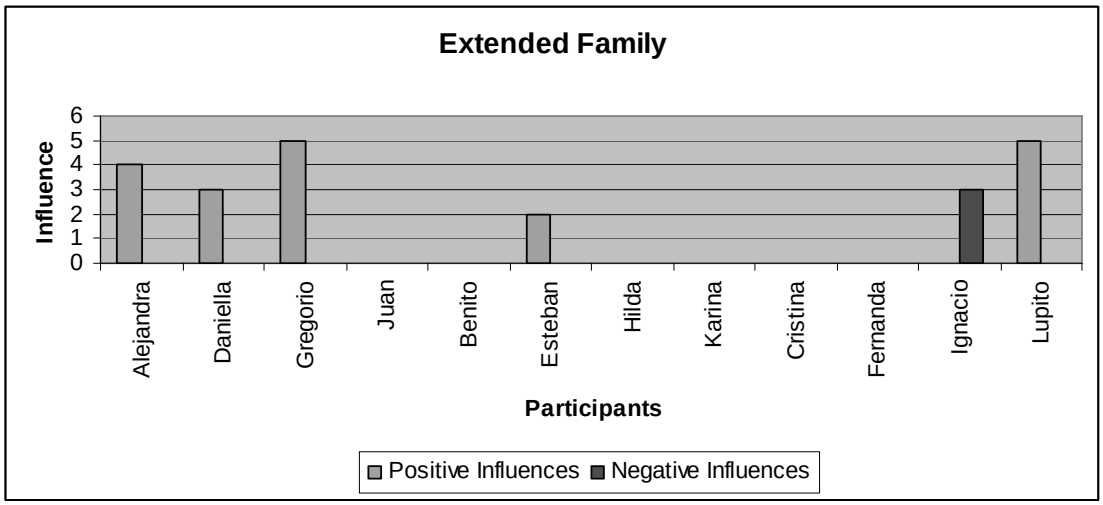


Figure 6. Extended Family

Uncles, aunts, cousins, and grandparents were mentioned as playing a significant positive or negative role in the lives of some of the participants in this study. Sometimes extended family played an important role in transmitting information about college but more often than not they played a secondary role in encouraging their relative to do well in school. Figure 6 gives a summary of the influences of extended family for each participant. Five participants mentioned extended family as having a positive influence, one participant mentioned a negative influence, and six participants did not mention extended family.

For Alejandra, her cousin was an essential source of advice about college since she had attended a 4-year university. Alejandra relied on this information channel to gain access to information about college. Whenever Alejandra had a question, she could turn to her cousin and have it answered.

Daniella's *tias* (aunts) provided a different kind of support. Since Daniella's parents were absent from her life for periods of time her *tias* provided moral support

and a consistent presence. One aunt in particular would recite *consejos* (quotes of encouragement like "we know you feel stress because of your parents but you can do this, you can keep going, we are proud of you") to inspire Daniella. Delgado-Gaitan (1994) defines *consejos* as nurturing advice that is imparted from adults to children as a means to empower them to be self-sufficient individuals. Daniella's aunt would help take the problems in Daniella's life and make them into learning experiences that she could grow from.

Gregorio's uncles and cousins also provided *consejos* to encourage Gregorio to do his best and succeed in school. Although Gregorio admits to being rather disciplined and hard working in school, he did have classes where the teacher did not challenge him to do his best. It was at that time that Gregorio looked to his uncles' *consejos* to keep him working hard. Similarly, Esteban's uncles, aunts and cousins gave him words of encouragement to do well in school. His aunts and uncles would provide *consejos* about the importance of going to a 4-year university even though he ended up at a community college. Esteban validated his decision to attend a community college with financial reasons. He does not qualify for financial aid so it less expensive to attend a community college for two years and then transfer to a 4-year university.

Lupito's cousin is an electrician and close friend. He served as a role model for Lupito as he grew up and decided what he wanted to do with his life. Lupito's cousin had graduated from a trade school and had experience with jobs in construction, digital music, as well as an electrician. In contrast, Ignacio's cousin was the only significant extended family member who had a negative influence on

someone in this study. His cousin encouraged Ignacio to ditch school and go to parties late at night. Ignacio partly blames himself for giving in to the pressure but still admits that his cousin had a negative influence on him.

Extended family can fill a niche in helping to make the decision to attend college. The support they provide may be as simple as offering a supportive word to specifically providing access to resources about college.

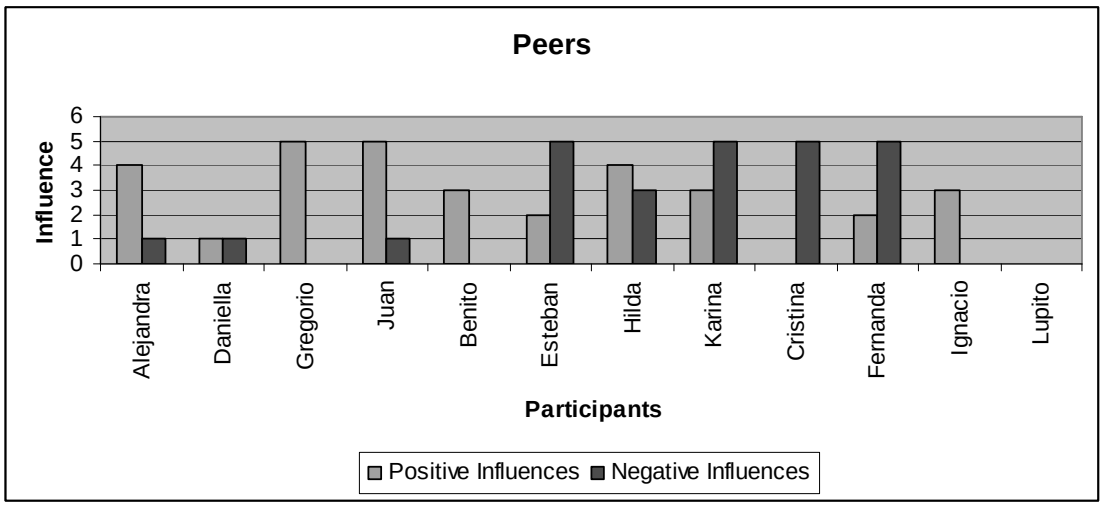


Figure 7. Peers

The research literature says that low-income Mexican heritage adolescents are more likely to be influenced by their peers when determining their postsecondary choice than are their white and Asian peers (Gibson, Gandara, & Koyama, 2004). For better or worse, eleven out of twelve participants mentioned their friends as being a significant influence on them during their life in high school. As shown in Figure 7, seven participants mentioned peers who were positive and negative influences, two identified only positive peer influences, one just negative influences, and one did not mention any peer influences.

In general, friends were cited as being a positive influence because they engaged in pro-school behaviors, displayed a unique talent, or shared similar interests. Participants nominated positive peers who helped to make them better in school. In contrast, other friends were described as having a significant negative influence because they engaged in anti-school behaviors or caused emotional distress. Negative peers were generally nominated because they encouraged their friends to perform poorly in school.

Only one person, Lupito, did not mention friends as being a significant influence in his life. When I asked him to describe more of his high school experience he shared that he was very shy and introverted during that time. Some of his teachers understood his need for support and made a special effort to help him feel comfortable in class. It is important to realize that even though most high school students find a clique of peers to spend their time with, there are some students who need help finding social support.

Peer Influences in the Honors Track

Daniella described the influential nature of friends during high school quite well:

> Having people who are serious about school makes you want to be serious in school, and so being around that just reinforces that kind of attitude. Like, for example when I go to the library to study I get more done, in college, but when I am at home in my apartment or my dorm I don't get as much done because I don't have all of these people around me that are really focused. I think it was that kind of similar effect in high school.

Daniella was a high achieving student during high school, and she accurately points out that it is easier to do schoolwork when you are surrounded by people who

are also working on schoolwork. In the traditional tracked high school we could deduce that high achievement among the lowest tracks is more difficult to manage because other students do not work as hard. This has a compounded effect on the postsecondary achievement of many individuals because the students in the lowest track do not have the role models among their peers that high track students see on a regular basis. Later in the interview, Daniella described what she viewed as a regular class:

> *Interviewer*: Did you have a class with other students; I guess you could call it a regular class?
> *Answer*: Yeah, Mr. X's class was a regular class. People typically talked a lot, they didn't go to class, a lot of people ditched, like every day. Our class was never a full class. Yeah, actually I didn't think about that but that really affects your attitude and the way you perform. Because if you see other people who are not taking the class seriously then you are less likely to take the class seriously. I think that's something that happened to me.

To summarize, Daniella was usually placed in the advanced placement and honors track so she was inspired to do better by seeing her peers constantly strive for excellence. Her interdependent group of peers relied on each other to provide motivation to perform at a higher level. By contrast, when the same student was put into a "regular" class she found herself taking the class less seriously and under-achieving simply because many of the other students performed the same way. Social influences are very powerful and play an important role in the psychological motivation of many students.

Alejandra credited her friends in AP classes with influencing her positively. When I asked her who was a positive influence in her life, she responded, "Most of my friends were in AP classes so I knew I was going to college, I didn't know where

or how I was going to get into college, I just knew I was going to college." Since both of Alejandra's parents left school after ninth grade when they were living in Mexico, they were not able to provide information about the college application process. Alejandra told me that one teacher in particular provided most of the information about the college application and financial aid process to her, and several other students. This teacher acted as an institutional agent by providing accurate and timely information about college to several students. In addition, Alejandra's friends were positive influences on her since they had pro-school attitudes and willingly exchanged valuable information about attending college.

Friends as Role Models

Esteban named two friends as having a positive impact on him during high school. The first friend aided Esteban in dancing and mathematics. The two of them would get together after school and study in the school's homework center after dance practice. Esteban did not mention if he had something to offer his friend or if the relationship was one-sided. The other friend was a role-model for him in the realm of community service. Esteban admired his friend for being such a tremendous asset to the school and for always having a positive attitude. This is an example of the development of self-efficacy through seeing a peer perform a task and realizing that you too can perform the task.

Gregorio told me about three friends who had a positive impact on him during high school. Two of his friends were mentioned for their musicianship and mathematics skills, respectively. The friendship Gregorio had with these two students was based on a competitive spirit that pushed all of them to be better at what they did.

It is not surprising that when Gregorio attended an Ivy League university that he had this to say:

> Everyone at [college] played 3 instruments, spoke 5 languages, and had a company. It was really motivating for me to see a lot of that and it was expected.

Gregorio was inspired by his peers in high school and college to be better at school. His competitive nature thrives on knowing that there are other students working harder than he does.

Someone who acted as a role-model for Fernanda was her friend who went to a 4-year university. Even though Fernanda opted not to attend college after high school, she maintains a positive orientation towards education. By associating with college students, Fernanda is building her self-efficacy to attend school. Fernanda said that she may quit her job to attend the police academy.

Romantic Relationships

Alejandra reported having a friend who was a negative impact on her during high school. The friend dropped out of the regular high school and went to the learning center because she got pregnant while in high school. Alejandra's friend was in the tight knit group of college bound students until she started associating more with her boyfriend who was not part of the group. The couple formed an interdependent group where obligations are easier to enforce. Alejandra expressed a feeling of disbelief as she told me about her friend who is now a stay-at-home mom. She said, "We were all together and we were all going to college until she started going out with her boyfriend, and, yeah, now she has a baby and we are all in school."

Although the impact of her friend's pregnancy was not life-altering for Alejandra, I could tell that it hurt her to see her friend stray from the 4-year university path.

Esteban had a girlfriend during high school who he claims caused him a lot of stress. He told me that he regretted being involved in a relationship during high school because of the negative consequences that resulted. Esteban's girlfriend encouraged him to ditch school and to hang out with her instead. Although Esteban admits that he knew it was not the right thing to do, he was unable to resist. The small interdependent group of Esteban and his girlfriend made it easier to enforce negative social obligations. By missing school, he failed his mathematics class during eleventh grade, changed his outlook on postsecondary education, and he claims he wasted a lot of time that could have been spent productively. Esteban diminished the connections to his friends by spending a lot of time with his girlfriend. The two are not a couple anymore. Esteban is currently attending community college with the goal of transferring to a 4-year university. His ex-girlfriend working.

Fernanda's boyfriend had a negative impact on her during high school. Fernanda told me that her boyfriend was emotionally abusive and tried to isolate her from her friends, when she still had them. Fortunately, Fernanda broke it off with her boyfriend when she started working and had little time for anything else. Fernanda told me that she regretted getting involved with a boy during high school because the relationship made her feel badly about herself. She also mentioned that she learned a lot from the relationship, which has made her a stronger and wiser person. She boasted that she is the youngest person employed at her airline and that she was

recently promoted to the operations department where she will be gaining more responsibility.

Peer Conflict

One of the stressful events for Daniella during high school was when her best friend ended their relationship by telling her that Daniella was too happy all the time. They had been best friends since seventh grade but according to Daniella their friendship had always been troubled. Even though this event was minor compared to other obstacles Daniella had to overcome during high school, it still made Daniella question herself at an already stressful point in her life. Daniella's identity was challenged by this event and she told me that she questioned if her friend was right. Eventually Daniella decided that she could not worry about her ex-friend's criticism.

Juan mentioned that some of his friends got into drugs and lost an interest in school during his senior year. He said that it was sad to watch people disappear from high school and move into the learning center. Juan told me that the negative influence of those friends was not a big deal to him and that since he had so many friends there were more positive influences than negative ones.

Benefits of Interdependent Peer Groups

Gregorio's best friend was very close to him as they associated in mathematics class, band, and after school in the school's homework center. In class, the two would push each other to be better so when one person got a 96 on a test the other had to get a 98. The long-term bond that the two developed was mostly by chance although both students were very committed to doing well in school and taking the most challenging

classes. You could say that Gregorio and his friend formed a very small interdependent group where the expectation was academic excellence.

Given that both men had a high degree of self-efficacy for school, the result was an even greater level of achievement. Outside of school the pair left little room for free time because when they were not doing homework they practiced or performed with the band. Juan mentioned that his peers had a positive impact on him during high school. Instead of having a few close friends like Gregorio, Juan was a social butterfly, flitting from group to group. In other words, Juan's peer group had a low degree of closure so they were not able to enforce obligations and expectations as easily as Gregorio's group.

Ignacio was positively influenced by friends he made who were in the Associated Student Body (ASB) and Advanced Placement (AP) classes. Although he did not take AP classes, he met his friends through the ASB. Recall that both of these groups are interdependent with a relatively high degree of closure. Ignacio told me that he often was pulled out of class to work on projects for the ASB but he was never very motivated to do well in school. After three years of high school Ignacio left to the learning center to finish his degree. Even though Ignacio had access to resources and support about college, other factors worked against him doing well in school. The negative influence in Ignacio's life during high school was his cousin, who encouraged him to ditch school and party on weekdays. He informed me that the learning center was more conducive to his learning because the work was self-paced and lacked the formality of regular high school classes.

Consequences of Interdependent Peer Groups

High school was an unpleasant experience for Cristina mostly because her friends outcast her from their social circle for engaging in a romantic relationship that went bad, with a fellow musician. Cristina reported that her high school music teacher had a significant negative impact on her and that Cristina was already isolated from her non-music friends. When Cristina's fellow musicians turned on her, she sank into a serious depression. Cristina told me about the problems she had in high school:

> It was with friends. When you are in a confined group, like [music group] you are practically living with these people cause you're with them almost 24-7. We'd practice all week and weekends we'd be out gigging. You know, just people and egos and relationships and all those things just do not mesh. And when you look like you could be prey, that's tough…During high school I really distanced myself from family and friends and I was mostly with the [music group].

Cristina actually points out that her musical group has a high degree of closure and is interdependent. Because the musical group made up Cristina's entire friendship group their influence was substantial. Thanks to Cristina's therapist, she was able to make it through high school and go away to community college. She is starting to get her life back together and without the added stress of her high school peer group she is recovering.

Fernanda's friends during high school also had a negative influence on her. She did not enroll in honors or AP classes and she told me that doing well in school was not acceptable among her friends. In fact, when Fernanda did her assignments and studied for her classes her friends made fun of her. Their teasing was so severe that Fernanda decided not to engage in pro-school behaviors for fear that she might

lose her friends. Fernanda's peer group was also interdependent with a high degree of closure. They were able to get Fernanda to stop doing her school work in favor of associating with them. Interestingly, when Fernanda started working in eleventh grade to make money for her family she stopped hanging out with her friends. Since her time was so limited by work and school, Fernanda went to the library during lunch time to do her homework for the next day. Fernanda had no time to spend with her friends but she still managed to talk to two people who had a pro-school attitude. The two friends Fernanda made while she was busy with work and school are the only two people from high school who she still talks to.

Non-Interdependent Peer Groups

Juan made friends with people in ASB, art, band and guitar classes. Since he never enrolled in honors or AP classes he only knew those students through the arts classes. During our interview, Juan told me that making friends was easy for him because of his positive disposition and extraverted nature. He had a high degree of self-efficacy for social interactions that served him well. Even today, Juan is a charismatic and proven leader at the school where he teaches social science.

Benito also made friends in a variety of groups across the high school campus. He informed me that most of his friends were in the orchestra but other friends were in track and field, ASB, and cross-country running. Benito told me that he preferred not to make friends with students in his regular classes because they did not have similar interests in school. Students in regular classes could not provide the same access to resources and support that his friends offered. He would rather associate with students from the orchestra because they got along better. The reason Benito got along better

with his orchestra friends is that they provided an important source for the development of self-efficacy since they performed tasks that Benito thought he could also perform. Benito communicated to me that he was very confident in his abilities as a mathematics student even though his high school grades did not reflect mastery. I attribute his increased level of self-efficacy to Benito's friends telling him he was good at mathematics as well as Benito's observation of his friends' inferior performance.

Isolation

Lupito was the only participant in the study who did not report friends as a negative or positive influence in his life during high school. Lupito told me that he was very shy in high school so it makes sense that he did not associate with many of his peers. Instead, he relied on his family, teachers, and his cousin for social support during high school. Lupito explained that he has always been the type of person who does things by himself and he feels more comfortable working alone.

Karina reported that most of her friends during high school applied to college but because she was isolated economically, she did not feel that she had the means to do the same. Karina mentioned that she did not take many advanced courses during high school mainly because counselors did not encourage her to do so. The lack of an institutional agent in Karina's case is a startling example about the importance of social capital in the postsecondary decision making process. Karina was adequately prepared to attend a 4-year university, as evidenced by her eventual transfer and completion of a baccalaureate degree. Despite her preparation Karina told me that she did not feel encouraged to take honors classes or apply to college. Although Karina's

parents were encouraging, they did not know about college and financial aid application procedures so Karina ended up enrolling in a community college.

Peers were positively and negatively influential to the participants in this study during high school. More often than not peers were seen as a positive influence when they had a pro-school attitude or shared similar interests. All paths of high school graduates mentioned positive peers who applied to 4-year universities and did well in high school. On the other hand, negatively influential peers were stereotyped by an anti-school attitude or causing emotional distress. Small interdependent groups have the potential to influence a student's self-efficacy through the enforcement of social obligations and expectations. Peers can provide access to information and support regarding college. Peers can also prohibit access to information and support regarding college by encouraging anti-school behaviors. It is evident that peer relationships are an important part of shaping the postsecondary decision making process during high school.

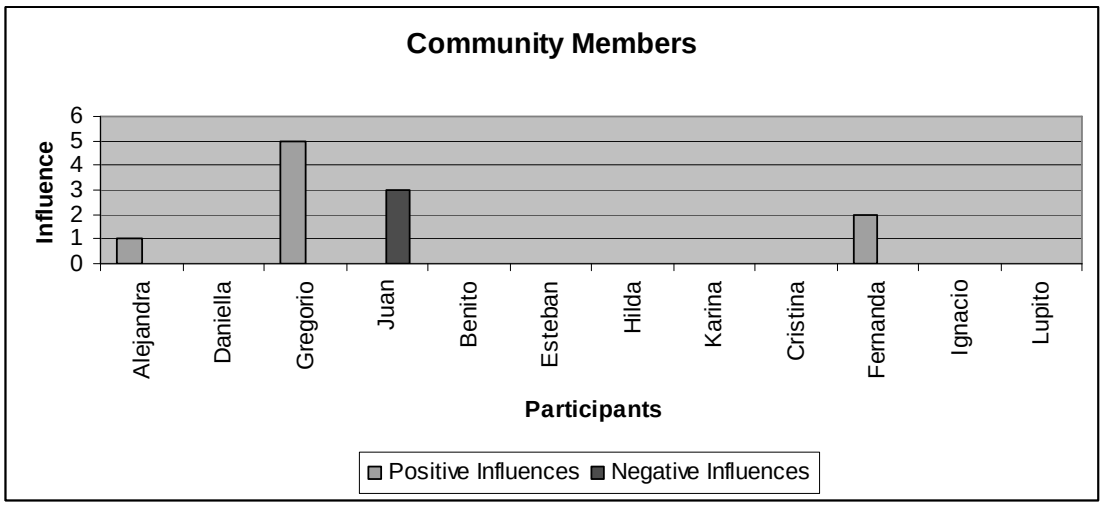


Figure 8. Community Members

As shown in Figure 8, four students mentioned community members that had a significant impact on their high school careers. The types of community members mentioned were religious leaders, a university student and a psychologist. Three out of four community members had a positive influence and one was negative.

Alejandra mentioned an encounter she had with a university student that helped her make the decision to attend a university. He told her about life at the university, which helped her to make the transition from high school easier. The university student acted as an institutional agent who provided access to resources and support for the university.

Gregorio and Juan spoke about the influence of religion in their lives during high school. Gregorio told me that his religion was the foundation of everything he did in his life. Spirituality and a belief that everything happens for a reason helped Gregorio to stay centered during his high school career. In contrast, Juan informed me that it was during high school that he discovered the business of religion, which caused him to doubt his faith. He had grown up in the church, serving as an altar boy, and attending regularly. When he passed through adolescence, Juan realized that some priests were not as altruistic as he had hoped. He told me that when he saw the business of religion, specifically the way the church handled its finances, he became disengaged. This event caused him stress during high school but he seems to have resolved this tragic event as an adult.

Fernanda's therapist, a Latina female like herself, was a significant positive impact on her during high school. As Fernanda battled her depression and tried to

deal with her problems with friends, she visited her therapist frequently. Fernanda told me that she respected her therapist, a single mom, for her down to earth nature and persistence. When Fernanda could not talk to her friends or her family she had an outlet in her therapist that probably helped bring her out of a depression.

Community members have the potential to influence high school students positively and negatively. Most students in this study did not mention community members as being influential but future studies that focus on the ways society influences high school students may ask more specifically about members of the community.

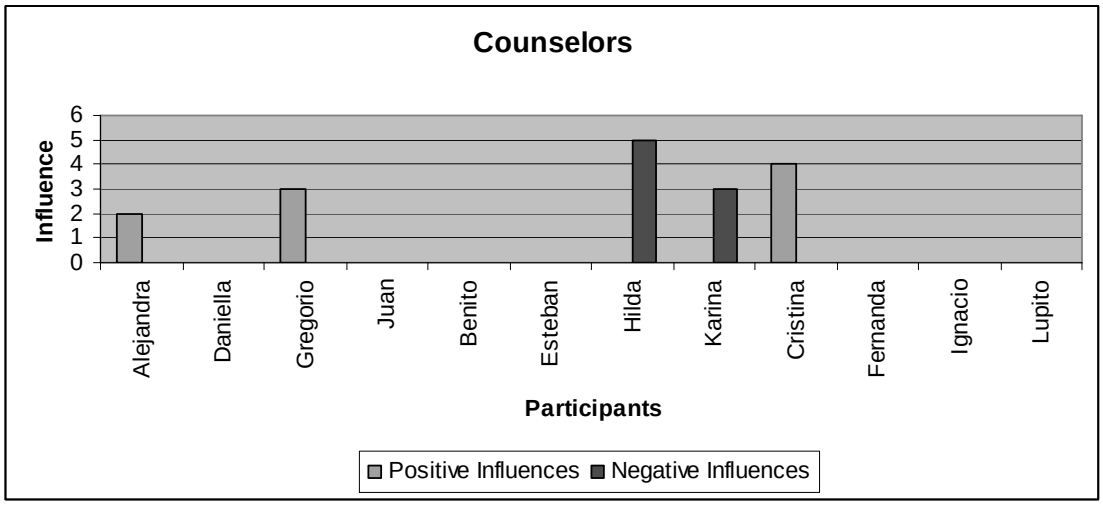


Figure 9. Counselors

Sometimes it is easy for a student to get lost in the crowd and it is a counselor who often finds them and provides much needed advice and information. There are a variety of outreach programs from various schools and organizations in addition to the high school counseling staff that made an impact on the people in this study. Figure 9 shows that five out of twelve participants mentioned counselors as having a significant

positive or negative impact on their life during high school. Three participants reported a positive influence while two participants reported a negative influence. I did not ask specifically about counselors in any of my interview questions but one-third of the participants mentioned them as having a significant positive or negative impact.

Gregorio, the university path graduate of 2003, reported that school counselors had a significant positive impact in his life during high school. Some of the things counselors did to make such an impact were recommending he apply for scholarships, helping with college applications and providing encouragement throughout high school. The counselors provided access to resources, informational and financial, for college. Gregorio built a strong bond with one counselor in particular who had counseled his two older sisters. This counselor knew Gregorio's family and made sure he stayed apprised of Gregorio's progress throughout high school. Regrettably, this kind of involvement is not possible for each of the 500 students each counselor oversees at the high school level.

A counselor from a talent search organization informed Alejandra about the financial aid resources available for postsecondary education. Alejandra told me that she did not meet with her high school counselor very often and even when she did, the counselor was not very helpful. Alejandra credited her talent search counselor for providing her with the necessary information to get into and afford the university.

Some participants reported a negative experience with the school counselors. When Hilda told her counselor that she finally found her passion to be a teacher her counselor asked told her, "Wouldn't you rather just go to beauty school. It's

quick…it's not that hard, you can finish in a year, that way you will be able to start working and help your family." Hilda told me that she had never expressed an interest in beauty school and she thinks her illegal immigrant status prompted the response from her counselor. That meeting left an indelible mark on her memory of high school as she told me what she was thinking when the counselor was talking to her:

> How is this coming from a Latina female? You know? To another…instead of trying to encourage me to "oh, you want to be a teacher, that's good." I understand I have flaws and in high school I wasn't the best student but I also understand that I know that I can better myself. I knew at that point, even though I didn't know what subject I wanted to teach, I wanted to be a teacher and help. I could expect it from someone in a higher position who tends to look down on minorities, but not from someone who is supposed to be your counselor.

Hilda went on to elaborate how hurt she was by the incident but she told me that she had learned a powerful lesson: not to limit her aspirations just because someone else told her to lower them. This can be interpreted as a high degree of self-efficacy that stemmed from a negative emotional state. It was obvious to me that Hilda's meeting with her counselor during her junior year will have a lasting impact on her memory of high school. Although Hilda was on a break from community college when I spoke with her she told me that she intends to enroll in a specific college program to become an ASL teacher.

Karina also started her postsecondary career at a community college but when I spoke with her, she had already earned her BA and she was working on her MA. Karina blamed her counselors for the lack of college outreach when she was in high school. Karina lacked the resources that would provide her information about college. She admitted to not signing up for advanced classes despite earning mostly A's and

B's in her classes. The only subject Karina was advanced in during high school was mathematics, having taken AP calculus AB during her senior year. Karina also blamed herself for being introverted during high school because she felt there was a class division at the school. According to Karina, there were students who had money and those who did not have money and the two groups did not mix very much. Because she came from a home where her father was a kitchen helper for a restaurant and her mother worked two jobs in food service she did not have a lot of money. Still, Karina said that she probably would have applied to college if someone had encouraged her and provided her with the information about financial aid. Instead, Karina navigated her way through the community college system and eventually transferred to a 4-year university where she was the first person in her family to successfully complete a baccalaureate degree.

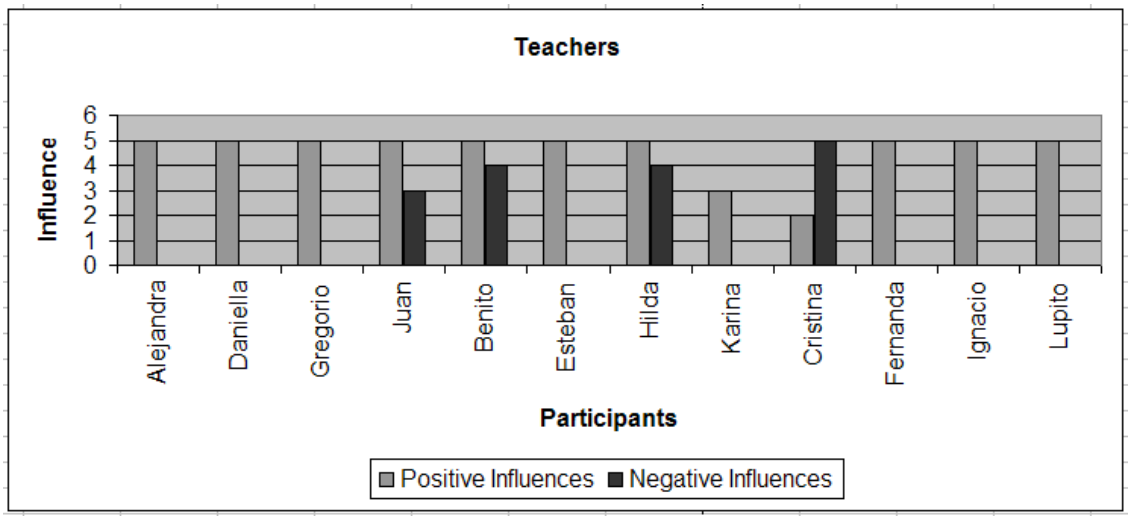


Figure 10. Teachers

As shown in Figure 10, all twelve participants in this study mentioned at least one teacher as having a negative and/or positive impact on their high school careers.

This is not a surprising finding because teachers interact with students on a daily basis. This also serves as a reminder that teachers generally have a lasting impact on their students. Furthermore, when I asked participants to list their high school mathematics classes and teachers, each participant was able to reconstruct or co-construct, meaning the participant described the teacher physically and I suggested names until we found the right teacher, their course-taking from memory. I interpret this to mean that while some memories fade quickly, the high school mathematics experience is not one of them.

Teachers were mentioned a total of 28 times by the 12 participants as having a positive impact on their lives, and 5 times as having a negative impact. While the participants mentioned teachers in various disciplines from English, history, mathematics, and music, one teacher in particular was mentioned by five students as having a significant positive impact on their lives.

The teacher who was mentioned by five participants, all members of the class of 2007 and two members of the class of 2006, will be called Mrs. X. Four out of five graduates told me that Mrs. X had a significant positive impact on their lives while attending high school. The other graduate told me that Mrs. X had only a minor positive impact on life during high school. The reasons Mrs. X was nominated as having a positive impact were: “She was always on my back about college” (Alejandra, 2007, U), “She was somewhat harsh but she believed in me” (Benito, 2007, CC), “She called me stupid and allowed me to get a lot of frustration out” (Cristina, 2007, E), “She got me thinking about college and gave me the tools to get there” (Daniella, 2006, U), and “She counseled me” (Esteban, 2006, CC). The fact

that Mrs. X was nominated by students from each postsecondary path tells me that she was doing something extraordinary. As you will see in chapter 5, most teachers were only nominated once and for specific characteristics that appealed to them. I cannot divulge any more information about Mrs. X without giving away her identity except to say that she is not a mathematics teacher, unfortunately.

Table 7 summarized the categories of positive teacher qualities that the participants identified. These included a positive demeanor, content knowledge, classroom management, character, and a sense of humor. Participants used the adjectives *approachable, helpful, available, friendly, encouraging,* and *supportive* when they described their teachers. When speaking about teachers' content knowledge some people mentioned that the teachers were knowledgeable or specifically that they were a resource for information about college. Other participants preferred a teacher with good classroom management, which they described as challenging in their coursework, strict, disciplined, or harsh. The teacher's character was mentioned as being a positive influence when they were clear, sincere, genuine, or a father figure. Last, but not least, a sense of humor was mentioned as leaving a positive impression with the descriptors humorous and fun. Teachers often act as institutional agents for their students as they have experience with the education system, have attended college themselves, and are in a position to share their knowledge with their students.

Table 7
Students' post-secondary path by positive teacher nomination characteristics

		positive demeanor	content knowledge	classroom management	character	sense of humor
University	Alejandra			Mrs. X- Disciplined		
	Daniella			Mrs. X-Serious	Mr. Y –father figure	
	Gregorio		Mr. B- knowledgeable Mr. C – High level discussions	Mr. Z- strict		
	Juan		Mrs. D- challenging essays			Mr. F, Mr. G - fun
Community College	Benito				Mrs. X- Harsh	Mr. H- friendly
	Esteban	Mr. K- encouraging, Mrs. L- supportive	Mr. M- Projects, favorite subject		Mrs. X- gave direction	
	Hilda	Mr.P-counseled	Mrs. N and Mrs. O-favorite subject			
	Karina	Mr. Q-helpful				
Experimentation	Cristina				Mrs. X- Blunt	
	Fernanda				Mrs. S – genuine person	
	Ignacio	Mr. P-counseled Mr. U-counseled			Mr. T-grades first	
	Lupito	Mr. W, Mrs. W- helpful				Mr. V- joked around

I found noticeable differences in the characteristics of teachers nominated by the three post-secondary paths. Three out of four university-path students nominated a teacher with good classroom management skills. These teachers made a positive impact on the students by being disciplined, serious and strict. Three out of four community college-path students nominated a teacher with a positive demeanor. The adjectives used to describe these teachers were encouraging, supportive, counseled, and helpful. Three out of four experimentation path students nominated a teacher with a strong sense of character. These teachers were described as being a blunt, genuine person, who put grades first.

Not all teachers were remembered fondly and the reasons teachers made a negative impression varied from teaching style to personal qualities. While the students' perceptions of teacher quality are only half the story, I want to use the participants words to describe the perceived attributes of teachers that they felt lead to a poor teaching.

When students do not feel that a teacher is concerned with their learning, a negative classroom dynamic can develop. Attributes of perceived teacher apathy included using a monotonous tone, refusing to answer questions in class, and not maintaining control of the classroom. Juan, who later became a teacher, attributed his career decision to some of his teachers who were just "going through the motions and not caring about kids." Juan wants to make his students aware that he cares about them and their learning.

The participants told me about the people who negatively influenced their high school career in question two of the interview. Generally, apathetic teachers did not make it into the list of people who had a negative influence on the student. Later in the interview when I asked about specific mathematics classes and probed more deeply, teacher apathy would emerge as a negative attribute. Sometimes the teachers were mathematics teachers and other times they tought other subjects. Apathy is a relatively passive attribute, but its negative effects remain apparent to this group of high school graduates.

More serious complaints about teachers involved falsely accusing a student of misconduct, ignoring bad behavior on supervised trips, and being openly abrasive and disrespectful to students. In response to a question about a specific class Hilda

replied, “Just like Mr. V challenged me to be better, Mr. W challenged me to be as bad as he wanted me to be.” Hilda told me that every night she would be assigned a homework problem for the next day. She explained that one day she did her homework after not doing it for some time only to be taunted with a sarcastic, “Wow, Hilda, you took the time out of your busy day to do the problem.” Hilda admitted that she eventually gave up in that class and just went to class to fill a seat. Her self-efficacy in mathematics had been diminished to an all-time low for her. She told me, “I knew that he wouldn’t care if we passed or not.” As she spoke about this teacher, Hilda was passionate in her report that everything her former teachers had instilled in her about perseverance, confidence, and self-efficacy her new teacher was able to take away in one year.

Cristina summarized her experiences in high school by repeating the phrase “high school was hell.” In elementary school Cristina boasted that she had been selected from her sixth grade class as the recipient of the outstanding student scholarship, given only to the top student in the whole school. When she arrived in middle school she joined a musical group that required a lot of her time. Cristina claims that her commitment to the group alienated the friends she had who were not in this tight-knit circle. Again, the musical group had a high degree of closure (Coleman, 1988). The group was so close that romantic relationships developed among the members of the group, which spanned seventh through twelfth grades. Cristina explained that the relationships caused conflicts and when rumors started to circulate that she was dating someone else’s boyfriend, her group mates terrorized her.

According to Cristina, the teacher who was responsible for the group cared more about the music they played than the negative feelings the group members had towards her. Cristina told me she reported the problem to her advisor but the teasing did not stop. Cristina's parents got involved but to no avail because the other students' parents did not believe them. She put up with verbal abuse and being ostracized by the people who were supposed to be her friends. Cristina reported that when new students joined the group they were immediately told to avoid her. Cristina stated that she had no one else to turn to for support because she had already lost her friends who were not in the music group. Now her only friends had turned on her and she was left to deal with it by herself. Cristina put up with the abuse for three years of her high school career before finally quitting the group in her junior year. She decided that she could not take it anymore and she was determined to break away.

When the music group would go on trips, Cristina said that the supervision was lax and the students would frequently engage in underage drinking and partying. The group would attend conferences with adult musicians where partying was normal. Cristina blamed her teacher for not interceding when he was aware that something was going on. Cristina told me that as a 14 year old she did not feel empowered to stop her only friends from doing illegal things like getting older musicians to buy them alcohol. She also insinuated that males and females would share hotel rooms while on these trips. Cristina admitted to currently having a drinking problem that stemmed from her childhood and adolescent issues.

As far as grades were concerned Cristina said that her teacher told her not to worry about grades as long as she maintained the 2.0 GPA necessary for academic

eligibility. She bitterly recalled that she started not caring about school when her teacher first told her that he did not care. Teachers are in a position of authority in a school setting as role models so when Cristina's teacher failed to provide a pro-school attitude she followed suit. Cristina lost trust in her teacher and the school because the two had not worked to protect her against her peers. Her previous academic success and her high school mediocrity validated her claim that she could have done much better in school if she had tried to do well.[2]

Benito told me about a specific event that had negative consequences for him in high school. He claimed to be reading his friend's slam book (filled with negative comments about other students) in mathematics class when his teacher confiscated it. Although he claimed innocence, Benito was accused of writing in the book and was subsequently suspended from school for three days. Benito reported always being a well-behaved student and avoiding trouble so the suspension was a shock to him and his family. Benito told me that he lost his faith in the school system when no one would listen to his claims of innocence. I could tell by talking to Benito that he still had strong feelings about this incident even though it had happened five years before our interview.

Benito claims that the negative influence of his teachers began well before the slam book incident. He reported that his teachers had typecast him as a problem child and they never gave him a fair chance to prove he was a good student. Their verbal accusations and misplaced comments lowered Benito's trust in the school system.

[2] After my interview with Cristina, I felt it important to discuss the issue with the administration at the school. I was relieved to find out that supervision had been increased and the Principal was actively maintaining stricter supervision standards on trips. In fact, a female chaperone now accompanies the group to maintain order and prevent incidents like the ones that Cristina was a part of.

Benito stated that his teachers did not like him so they always picked on him in class. After the slam book incident, Benito was transferred to a different class. Since the classes were not aligned, he had missed a lot of instruction and was unable to catch up in time and he earned his first C grade. Benito thinks of himself as a very competent student, so getting a C was a major blow to his self-esteem.

Bad experiences in mathematics often result from bad interpersonal dynamics. Interestingly, the students who reported such an experience found themselves struggling the following year even though they reported that their new teachers were much better. This was especially the case in mathematics were the courses build on each other. I account for this in two ways. First, bad experiences in mathematics result in a diminished sense of self-efficacy. Second, because mathematics is cyclic and builds on itself the knowledge that was lost during the bad experience creates gaps that disrupt the new learning experience. For example, after Benito earned a C grade in his new mathematics class, he went on to earn another C in his mathematics class the following year. He claimed that even though he got along with the teacher he picked up a bad habit of not doing his homework so his grade suffered. The habit of homework was mentioned by several high school graduates for the reason they did not do well in a mathematics class. This may be an interesting topic of research for a future study.

Discussion: How Do High School Relationships Influence Postsecondary Academic Choices?

I have examined the social relationships of twelve high school graduates during high school, spanning ten years since their high school graduation, who

traveled on three distinct postsecondary paths. The analysis reveals that there are at least six categories of people who are influential towards high school students: parents and siblings, extended family, peers, community members, counselors, and teachers. I hope to elaborate on the ways each group is influential in the postsecondary decision making process.

Overall, I found that university path students experienced more social relationships with a much higher ratio of positive influences. Community college path students had fewer social relationships with slightly more negative influences than university path students. Experimentation path students had the fewest number of social relationships, on average, and the highest number of negative influences. The number and type of social relationships stratified across postsecondary path indicates that this is an important characteristic in determing college choice. High school students who aspire to attend a 4-year university but have parents who have not been to college and may not be able to provide college-going information at home, can benefit greatly from particular types of social relationships at school that can help to make their dream attending college come true.

Parents and siblings play a foundational role in shaping high school students decision for postsecondary education. Even though they are just one piece of a larger social network, parents and siblings can make a big difference in the decision. All the study participants who cited parents and siblings as a positive influence were community college and university path students. None of the experimentation path students mentioned parents or siblings as making a significant positive or negative impact in their lives during high school. When parents and siblings were not

mentioned as being a significant influence, it did not mean that they were not pro-school. In fact, several experimentation path students talked about their immediate family as being supportive of them at later points in their careers. As far as I can tell, there is no notable difference in the way families spoke to the participants in the experimentation path and the way the families of students from the other two paths spoke to them. My interpretation of the reason the families were not mentioned as being significant positive or negative influences is that compared to other people in the lives of the experimentation path students, they did not stand out. Some of the high school graduates from the experimentation path faced major obstacles in their education so the positive family influence did not seem significant at the time.

Extended family played a significant role in the postsecondary decision making process for university path students. Three out of four of them mentioned extended family as being positively influential. I found that the *consejos* offered by the uncles and aunts as well as the information about college that cousins were able to provide made a difference in the lives of the university path students. The saying that it takes a village to raise a child could be applied in the decision to attend a 4-year university.

Peers are arguably the most influential group of people in the postsecondary decision making process of Mexican American high school students. When peers have a significant positive impact and little or no negative impact, students tend to go to a 4-year university. When peers have a significant positive and negative impact students tend to attend community college. Peers who have just a significant negative impact or no impact at all tend to push students into the experimentation path.

Involvement in school is not enough to guarantee a positive experience with peers as we see with Cristina who was terrorized by her peers. Involvement in school clubs and activities is important for getting information about college as long as students leave themselves open to making new friends.

Members of the community can influence high school students but it remains to be seen if they influence the postsecondary decision to attend college. Only one of the participants in this study stated that her encounter with a college student actually had an impact on her decision to attend university. Other community members were influential in spiritual or emotional well-being. As students are asked to do more in school it will be interesting to see how the community adapts. Will they make an effort to reach out to over-burdened high school students or will they place their outreach at the adult level?

In this study counselors were mentioned as having a significant positive or negative impact about as often as extended family. Unlike the impact extended family had on the postsecondary decision, the impact counselors had seems to be more random. I attribute the diminished impact of counselors on their massive caseload and overwhelming working conditions. While most high school teachers see 170 students every day, counselors are supposed to keep track of 500 students. Most of the time, when counselors are not programming schedules, they are committed to a few students who regularly visit them. If a student does not actively seek out the advice of a counselor chances are the two will meet once a year to plan for the following year. As I discussed earlier, career planning can be traumatic for students if the counselor and student do not have similar aspirations. Counselors who work for college outreach

programs are a positive addition to the student body, since they lighten the load for school counselors and provide valuable information about college to high school students.

Trust is an essential part of the relationship between teachers and students. When trust is present it aids in the fulfillment of social obligations and expectations within the classroom. Students do what is asked of them by the teacher and the teacher provides instruction that promotes learning in the classroom.

Teachers are arguably the second most influential people in the postsecondary decision of Mexican American high school students after peers. Participants mentioned at least one teacher as having a significant positive or negative influence in their life.

I anticipated correctly that the advanced placement or honors teachers would be mentioned more often than their colleagues as having a positive impact. The experiences the participants had in their classes were closely related to their track placement (i.e. high, middle, or low). Although, sometimes students had negative experiences in high-track classes (e.g. Benito's slam book experience) and vice versa most of the accounts were closely aligned. All three paths reported positive and negative experiences with teachers although university path students had fewer negative experiences than the other two paths. It would seem that in order to gain access to teachers who are active in promoting pro-university attitudes high school students should enroll in high-track courses. This is not to say that those same teachers do not also teach low-track courses, rather I am reporting that low-track classes are often burdened by more discipline problems, less time on task, and students

who have anti-school attitudes. It is also possible that teachers working with students who are already perceived as college bound are more likely to actively offer effective college going advice to their students than teachers working with students struggling with math, English and other basic subjects. Those students who get started with good grades in Algebra in ninth grade, or more recently eighth grade, are those with good social resources and supportive families (whatever the level of education of the parents, they are supportive of school work at home and see the value in education).

Conclusion

A number of patterns have emerged from the data to help explain how the accumulation of social capital among Mexican American youth builds self-efficacy, a strong belief in themselves, which in turn help them make better postsecondary academic choices.

Recall that the purpose of this study is to understand how graduates reports of self-efficacy beliefs in the learning of mathematics differ across postsecondary paths and change over time. In addition, I was seeking to find out how high school graduates describe the influence of their high school social networks on their postsecondary choice. The remainder of this chapter will focus on summarizing the findings of my study and interpreting the implications for schools.

Self-efficacy in High School

High school mathematics experiences affect postsecondary academic choices, in large part, through shaping students' self-efficacy. Some of the ways self-efficacy is developed are through performing a task, watching someone else perform a task, talking to someone about a task, and experiencing difficult emotional states that teach people about their limits. High school graduates with more life experience generally have a higher rate of accuracy when it comes to assessing self-efficacy. I argue that high school mathematics courses can be an important factor in the development of self-efficacy beliefs through forming: mathematics student identity, verifying or

reversing expectations about mathematics courses, building trust or creating betrayal, and permitting students to assign locus of control as part of their explanations of their successes or failures in mathematics.

Mathematical Identities

In college preparatory and regular track courses, mathematics teachers contribute more feedback to students than anyone else does which students use to create their identity as mathematicians (Lopez, 2001). Lopez (2001) also found that remedial-track students presented an inverse relationship between teacher feedback and overall performance. Thus, more feedback resulted in the creation of negative student identities in mathematics.

Experiences also help students form their mathematical identities. As students have positive experiences with mathematics they tend to feel that they are capable of performing mathematics tasks and their self-efficacy for mathematics is increased. If students have negative experiences then their self-efficacy is decreased.

I found that grades were an important validation of students' self-efficacy beliefs but that students' self-evaluations of their ability often ignore their course grades. This happened in the cases of several students who received grades they did not earn. Those students presented low degrees of self-efficacy in mathematics in spite of their good academic records.

Mathematics Course Expectations

The self-fulfilling prophecy often plays out in the mathematics classroom with negative results. Telese (1999) found that students' attitudes towards mathematics are not favorable to begin with. Society seems to accept incompetency in mathematics as

the norm so mathematics teachers have an exceedingly difficult job to perform. Not only do the teachers need to be content experts but they also have the added responsibility of making mathematics interesting.

Students form opinions about the difficulty of mathematics courses through self-efficacy beliefs combined with social interactions. When students predict mathematics courses will be too difficult for them then they often have a bad experience in the course. On the other hand, if students perceive that their course is not challenging enough they often lose interest, which can result in a negative experience.

Locus of Control

Rotter (1954) first conceived of locus of control as a way to explain how people account for the outcomes of their actions. I found that the locus of control orientation differs across postsecondary path. Students who attend a 4-year university after high school usually place the locus of control internally while community college and experimentation path students have an external placement. This type of orientation is important because it determines, in part, the perceived difficulty students will encounter when faced with a task. Students who have an internal locus of control are more resilient when it comes to setbacks. An internal locus of control without a high degree of self-efficacy can be just as damaging as an external locus of control. If a student believes that his individual effort will bring him success on an exam but he is not willing to commit to preparing for the test, because he has a low level of self-efficacy, he may still perform poorly.

Students who report a high degree of self-efficacy through the factors of mathematics student identity, mathematics course expectations, and locus of control usually end up attending 4-year university. When one or more of the factors is weak, the student may end up at a community college. If a student has a low-degree of self-efficacy then he may end up in the experimentation path.

Social Relationships in High School

Social capital in this study is defined as the relationships between individuals and networks that can provide access to resources and forms of support that facilitate the accomplishment of goals (Stanton-Salazar, 2004). Institutional agents and interdependent groups may serve as information channels to high school students seeking advice for the postsecondary decision. Gonzalez et al. (2003) identified specific agents of social capital as the family, high school, and college. Building on their work, I have examined the social relationships of twelve high school graduates during high school, spanning ten years since their high school graduation, who traveled on three distinct postsecondary paths. The analysis reveals that there are at least six categories of people who are influential towards high school students: parents and siblings, extended family, peers, community members, counselors, and teachers. Peers played the major role in influencing high school graduates to make their postsecondary choice while teachers were second in importance. The level of intensity of each positive or negative relationship affects the impact that it will have on the overall high school career.

Parents and Siblings

Ceja (2006) tells us that although Mexican American parents value education, they are not very helpful in providing information about college. On the other hand, older siblings can play a foundational role in shaping high school students decision for postsecondary education. Even though they are just one piece of a larger puzzle, parents and siblings can make a difference in the decision. Notice that the students who cited parents and siblings as a positive influence were community college and university path students. None of the experimentation path students mentioned parents or siblings as making a significant positive or negative impact in their lives during high school. When parents and siblings were not mentioned as being a significant influence it did not mean that they were not pro-school. In fact, several experimentation track students talked about their immediate family as being supportive of them at later points during the interview. My findings are consistent with previous research (e.g. Ceja, 2006) that says parents who themselves have not attend college can provide emotional support but often are unable to offer advice about the college choice and the application process. Siblings who had attended college were able to offer useful advice about college and to act as role models to their brothers and sisters.

Extended Family

Extended family played a significant role in the postsecondary decision making process for university path students. Three out of four of them mentioned extended family as being positively influential. I found that the *consejos* (Delgado-Gaitan, 1994) offered by the uncles and aunts, as well as the information about college cousins were able to provide, made a difference in the lives of the university path

students. The saying that it takes a village to raise a child could be applied in the decision to attend a 4-year university.

Peers

Schneider and Stevenson (1999) report that Mexican American youth spend more time with their peers than with anyone else. Thus, peers are arguably the most influential group of people in the postsecondary decision making process of Mexican American high school students. Positive encouragement and role modeling can result in a benefit to a student while negative peer-pressure and ostracizing can result in a consequence to a student. We explored several examples where peers acted as role models, inspiring their friends. However, as we saw with Cristina, involvement in school is not enough to guarantee a positive experience. Being tracked in the college prep track offers significant advantages, in the form of social capital, to students.

Community Members

Members of the community can influence high school students but it remains to be seen if they influence the postsecondary decision to attend college. Only one of the participants in this study stated that her encounter with a college student actually had an impact on her decision to attend university. Other community members were influential in spiritual or emotional well-being. As students are asked to do more in school, it will be interesting to see how the community adapts. Will they make an effort to reach out to over-burdened high school students or will they place their outreach at the adult level?

Counselors

Counselors are often regarded as the source of information about college but, as we saw, students have a reason to be wary of misinformation or a lack of individual attention from their school counselor. The high staffing ratios of counselors, which lead to the lack of personal relationships with students, are not acceptable excuses for inaction, but this issue remains to be addressed at most urban high schools. In this study, counselors were mentioned as having a significant positive and/or negative impact about as often as extended family. Unlike the impact extended family had on the postsecondary decision, the impact of counselors seems to be more random. If students do not actively seek out the advice of a counselor, chances are they will only meet their counselor once each year to plan their schedule for the following year. Counselors affiliated with colleges and universities are an asset to students because they have been shown to provide accurate information and do not have the same caseloads as high school counselors. Outreach programs from the local community college and the local university met with some participants of this study regularly throughout their final two years of high school.

Trust

Goddard (2003) found that when there was a high degree of trust between students and teacher both sides were more likely to act reliably and competently. Trust is an essential part of the relationship between teachers and students. When trust is present, it aids in the fulfillment of social obligations and expectations within the classroom. Students do what is asked of them by the teacher and the teacher provides instruction that promotes learning in the classroom.

Teachers

Lopez (2001) reported that mathematics teachers provide the most feedback, assistance and instruction in mathematics to their students. In other disciplines, it appears that teachers also make a significant impact on students' performance. Participants mentioned at least one teacher as having a significant positive or negative influence in their life. The characteristics of teachers that made them significantly influential varied across postsecondary pathways. University-path students nominated teachers who had good classroom management, community college-path students nominated teachers with a positive demeanor, and experimentation path students nominated teachers with a strong character.

Honors track teachers were nominated more often than their colleagues as having a positive impact. In addition, the experiences the participants had in their classes were closely related to their track placement (i.e. high, middle, or low). Although, sometimes students had negative experiences in high-track classes (e.g. Benito's slam book experience) and vice versa most of the accounts were closely aligned. All three paths reported positive and negative experiences with teachers although university path students had fewer negative experiences than the other two paths. It would seem that in order to gain access to teachers who are active in promoting pro-university attitudes high school students should enroll in high-track courses. This is not to say that those same teachers do not also teach low-track courses, rather I am reporting that low-track classes are often burdened by more discipline problems, less time on task, and students who have anti-school attitudes.

Final Thoughts

As the Mexican American population continues to grow, especially in California and Texas, our educational system needs to find ways to adapt to meet the needs of our students. The sign of a successful secondary educational experience is enrollment in a postsecondary institution of higher learning. We know that there are many reasons Latino students are found in high concentration at community colleges and this study offers one perspective on how to change that. By increasing the social capital of Mexican American youth, we can contribute to the development of their self-efficacy that will lead to higher numbers of students enrolling directly in 4-year schools. More studies need to be conducted with larger samples to verify the findings of this study in addition to exploring alternative ways of addressing the educational needs of Mexican American youth, they are our future.

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Appendix A

Interview Questions: **Students' high school math experiences**

1. Think back to your life when you were attending high school and tell me about the most significant things that happened. You can mention social events, certain classes you took, or anything else that was significant for you in high school or outside of school.

1a. Follow-up with questions to elicit information about participation in school (clubs, sports, extracurricular activities) and Latino identity(family, language).

2. High School is an important time in a person's life. We meet others who affect our actions, thoughts and language within and outside of school.

2a. Thinking about your life while you were in high school, who had a positive impact on you? (If non-school people not mentioned then prompt)

2b. Some people have a negative impact on our lives. During your life while you were in high school, who had a negative impact on you?

2c. Follow-up with clarifying questions that elicit more detail about relationships with institutional agents and peers.

2d. If peers are not mentioned ask, "What about your peers, did they affect your attitude towards school?"

3. Students in high school take a variety of different courses while completing their degree. What was your high school math experience? Let's start in ninth grade and go to your senior year.

3a. If homework is not mentioned, say "Describe a typical homework assignment. Did you learn from your homework?"

3b. To clarify teachers' roles ask, "Tell me about your teachers. How did they talk to you?"

4. Some people think that future opportunities are built on our prior experiences while other people think that the future occurs by chance. Do you think your school math experiences contributed to your decision to (attend/**not attend)** (university/community college/**college)**? How so?

4a. If respondent is unsure ask, "Did your math ability open or close doors of opportunity? How so?"or "Did you pass the High School Exit Exam?" or If the interviewee went to college, "Did you have to take a math placement exam? How did you do?"

4b. Clarify by asking, "How do you currently use math? Talk about your "degree requirements" (for community college and university students) / "job" (working graduates)/military.

5. What kinds of things did you do in math class? (use the book, listen to lecture, discuss with classmates, work in groups, hands-on activities, use technology,anything else) What kinds of things did your teacher do in class? (lecture, use an overhead projector, use technology, anything else)

6. What advice would you give to current students?

7. What were the names of your math teachers? What did you do after high school? Do you think you will go back to school? What school/company

did/do you attend/work for? What has your career path been since high school, include schools attended and jobs held?

Thank you

Appendix B

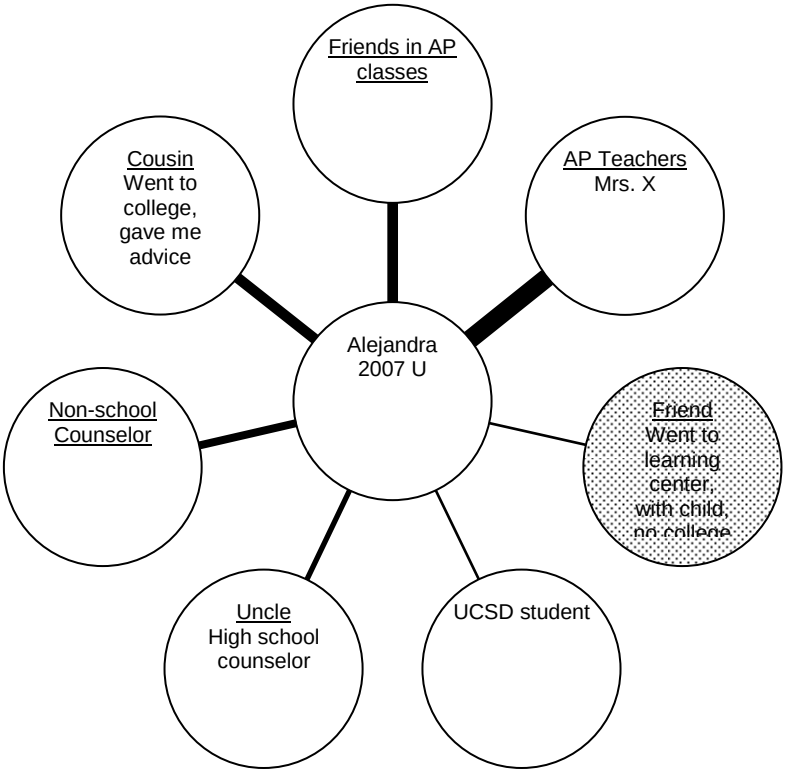
The e-mail recruitment text was:

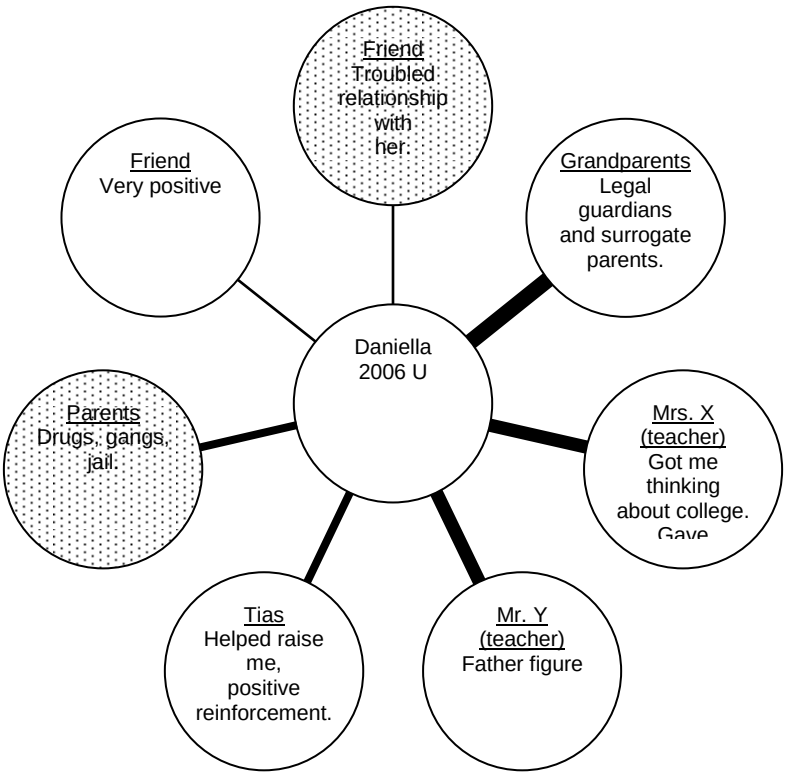
Hello _____,

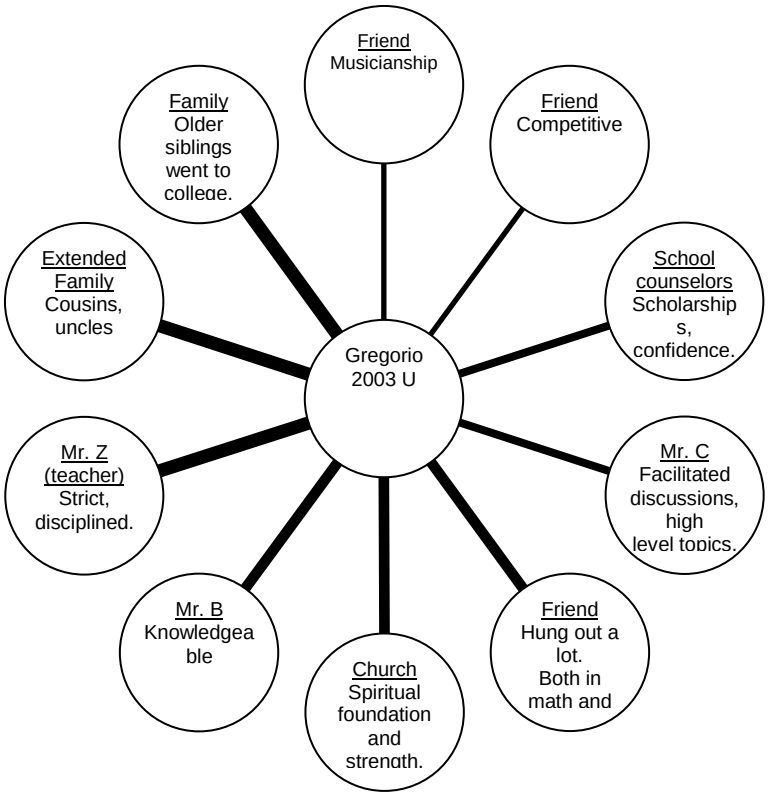
My name is Daniel Cohen and I am a teacher at Chula Vista High School. I am also a UCSD graduate student in Education Studies who is interested in finding out about high school graduates' math experiences, career goals, and peer and familial networks. I hope to discover what teachers and schools can do to ensure equitable access to higher education careers, specifically in math and science. I am recruiting people from your high school graduating class who have chosen different post-high school paths (university, community college, and non-college) for an interview/document based study that will answer my questions. The time commitment for this study will be approximately 1 -2 hours and could potentially help current and future students. If you would like to learn more about this study or how you can participate please respond and I will send you more information. Thank you for your time and I look forward to hearing from you,

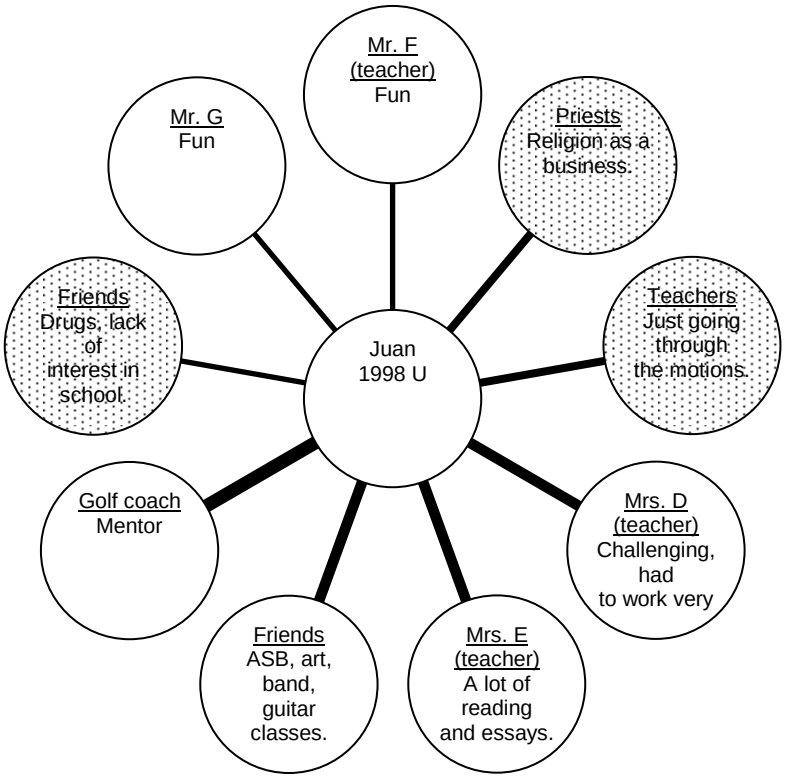
Daniel Cohen

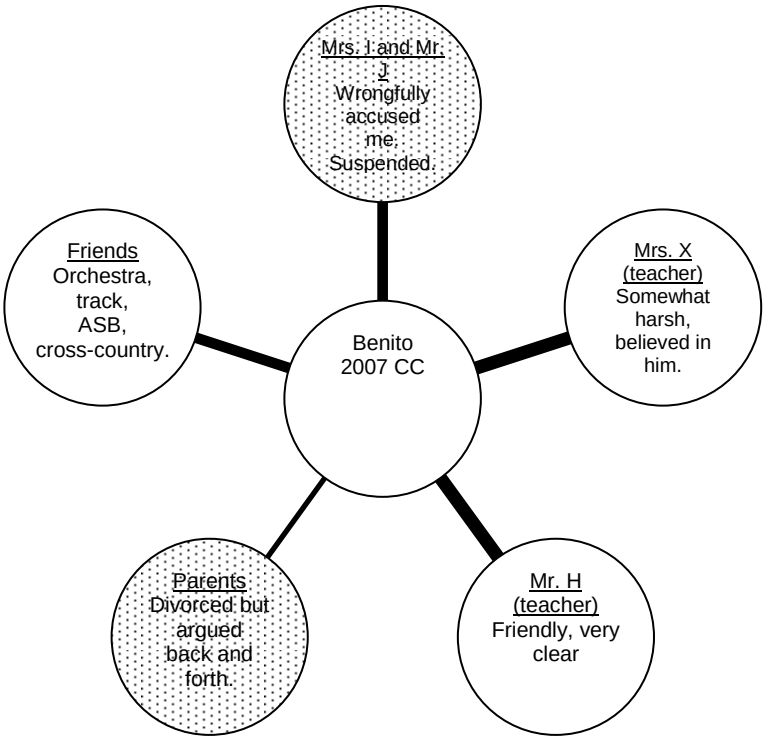
Appendix C
Social Relationship Diagrams

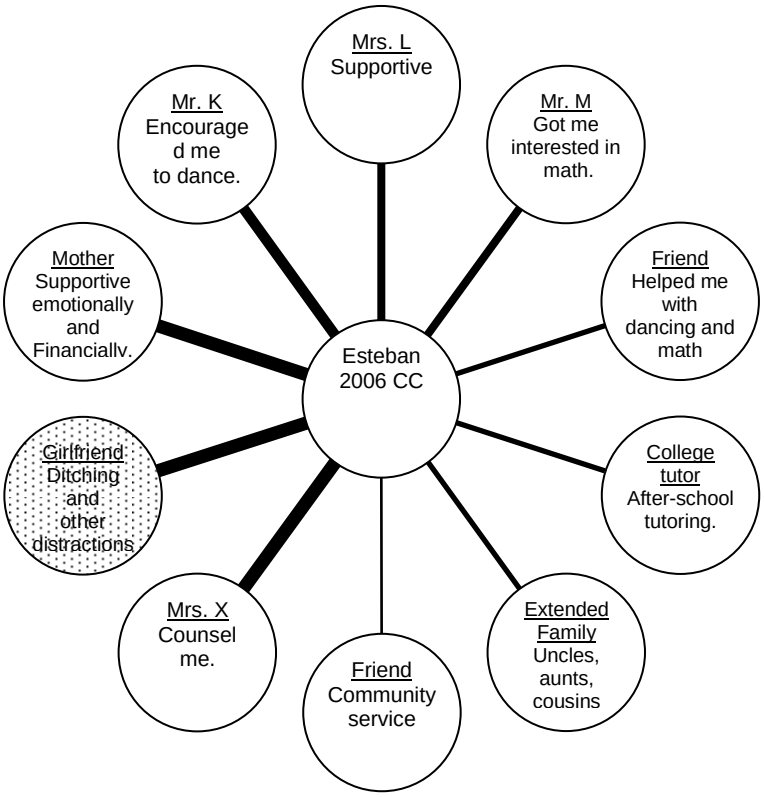


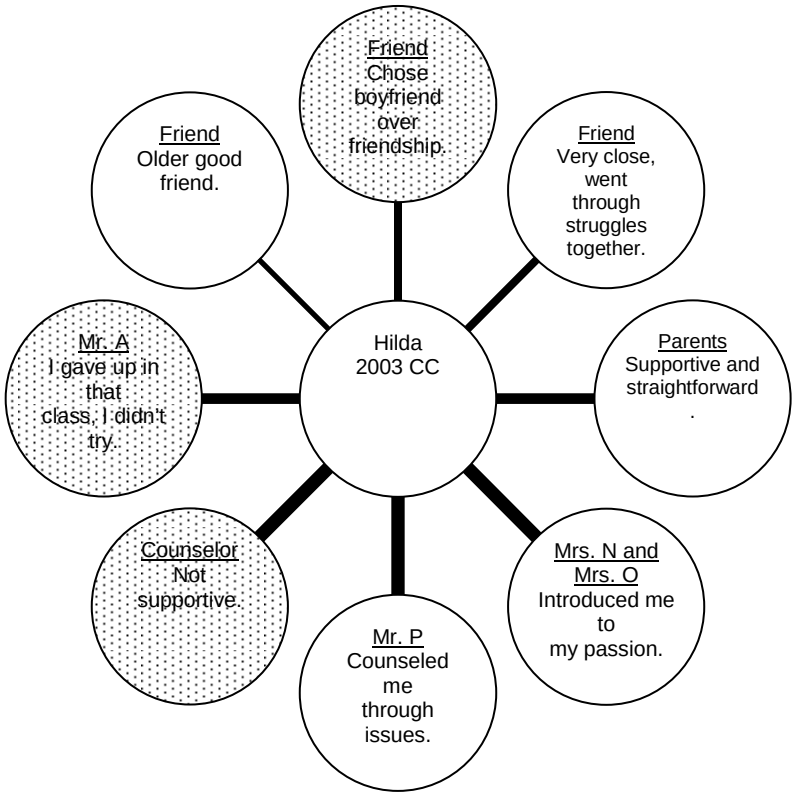


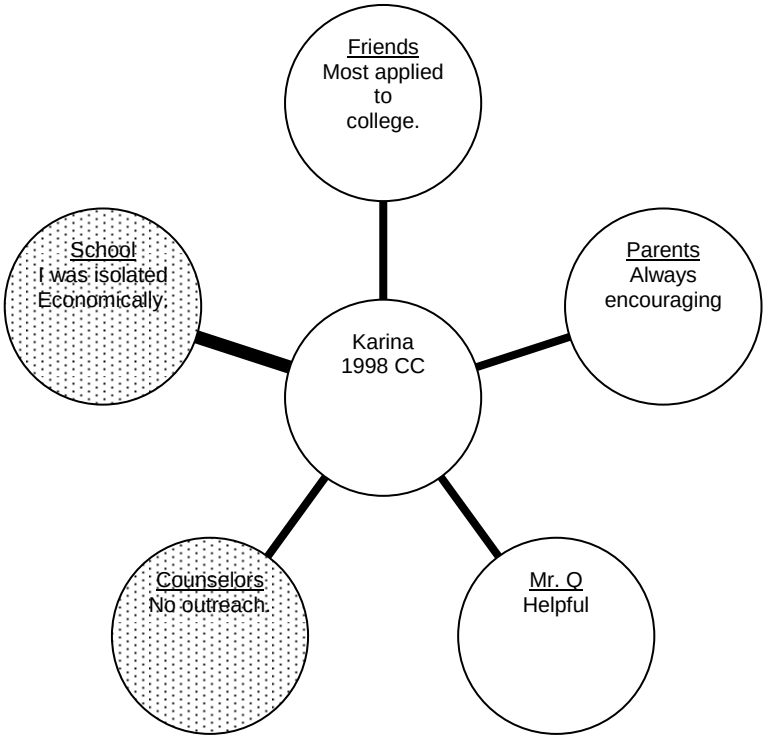

Gregorio
2003 U
Friend
Musicianship
Friend
Competitive
School counselors
Scholarships, confidence.
Mr. C
Facilitated discussions, high level topics.
Friend
Hung out a lot.
Both in math and
Church
Spiritual foundation and strength.
Mr. B
Knowledgeable
Mr. Z (teacher)
Strict, disciplined.
Extended Family
Cousins, uncles
Family
Older siblings went to college.

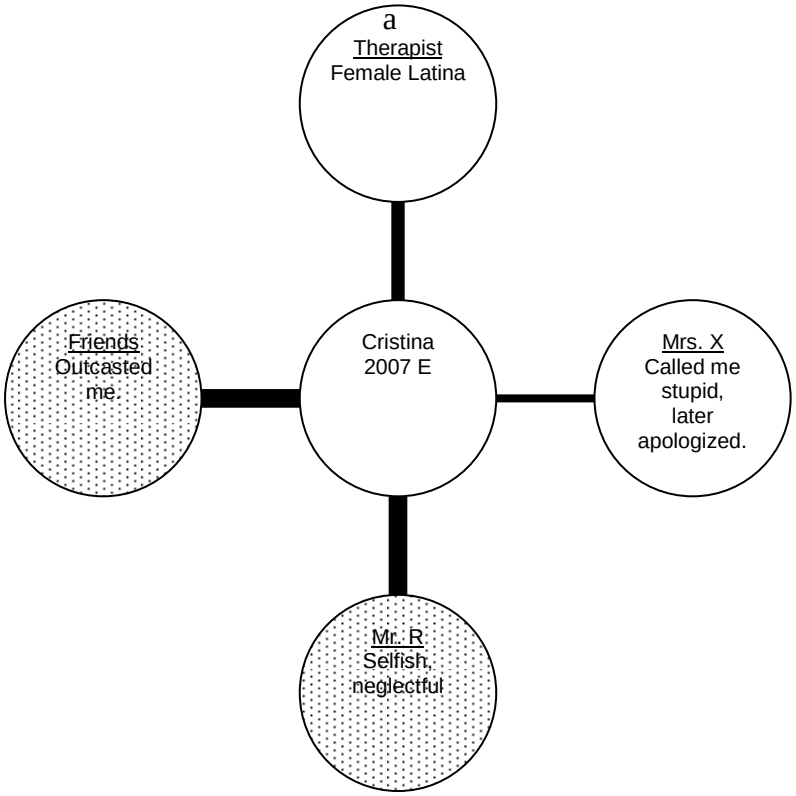

Juan
1998 U
Mr. F (teacher)
Fun
Priests
Religion as a business.
Teachers
Just going through the motions.
Mrs. D (teacher)
Challenging, had to work very
Mrs. E (teacher)
A lot of reading and essays.
Friends
ASB, art, band, guitar classes.
Golf coach
Mentor
Friends
Drugs, lack of interest in school.
Mr. G
Fun

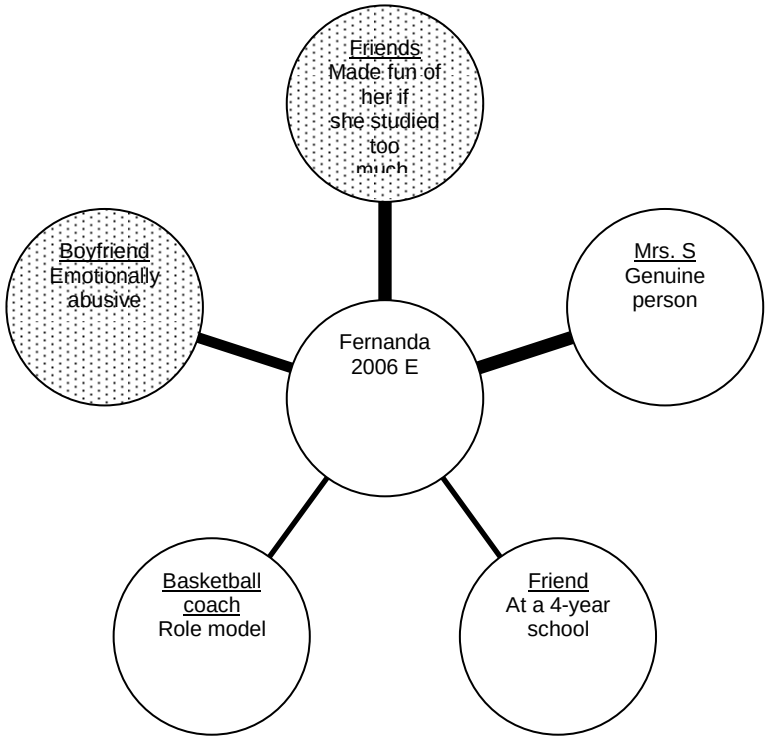

Mrs. I and Mr. J
Wrongfully accused me.
Suspended.
Friends
Orchestra, track, ASB, cross-country.
Mrs. X
(teacher)
Somewhat harsh, believed in him.
Benito
2007 CC
Parents
Divorced but argued back and forth.
Mr. H
(teacher)
Friendly, very clear

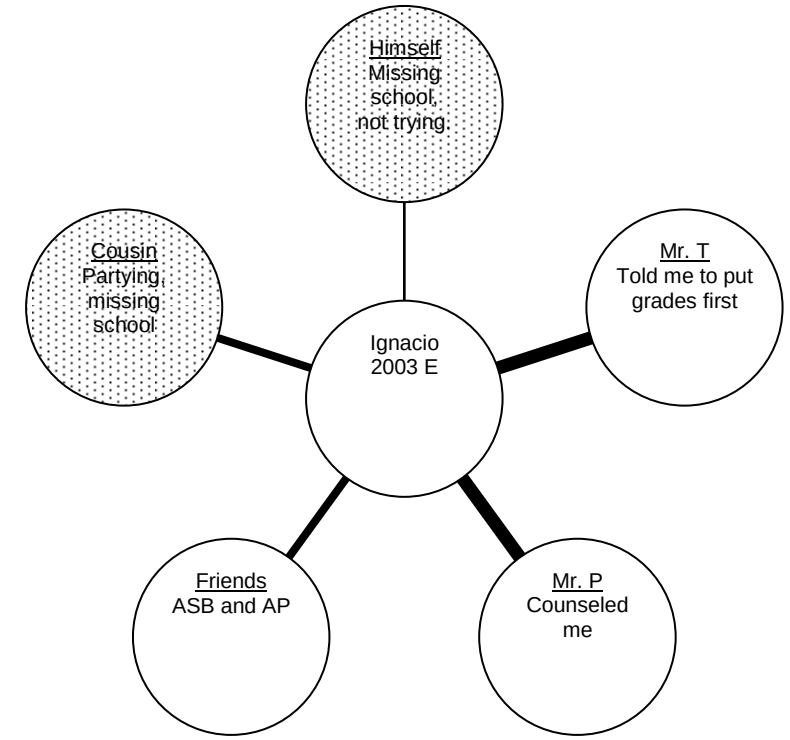

Mrs. L
Supportive
Mr. K
Encouraged me to dance.
Mr. M
Got me interested in math.
Mother
Supportive emotionally and Financiallv.
Friend
Helped me with dancing and math
Esteban
2006 CC
Girlfriend
Ditching and other distractions
College tutor
After-school tutoring.
Mrs. X
Counsel me.
Friend
Community service
Extended Family
Uncles, aunts, cousins

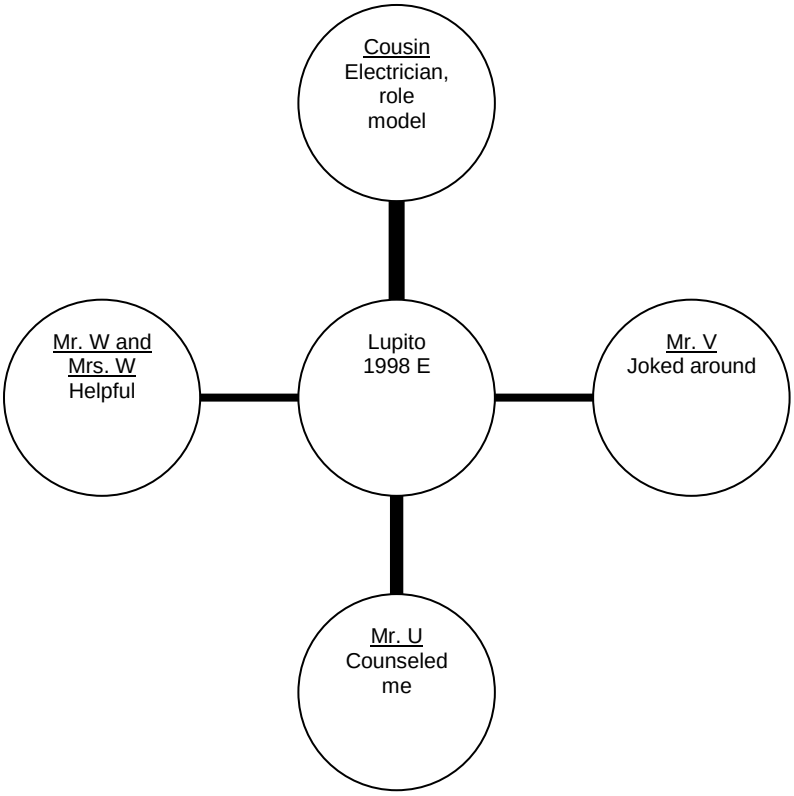

Friend
Chose boyfriend over friendship.
Friend
Older good friend.
Friend
Very close, went through struggles together.
Mr. A
I gave up in that class, I didn't try.
Hilda
2003 CC
Parents
Supportive and straightforward .
Counselor
Not supportive.
Mrs. N and Mrs. O
Introduced me to my passion.
Mr. P
Counseled me through issues.


Friends
Most applied to college.
School
I was isolated Economically.
Parents
Always encouraging
Karina
1998 CC
Counselors
No outreach.
Mr. Q
Helpful


a
Therapist
Female Latina
Friends
Outcasted
me.
Cristina
2007 E
Mrs. X
Called me
stupid,
later
apologized.
Mr. R
Selfish,
neglectful


Friends
Made fun of
her if
she studied
too
much
Boyfriend
Emotionally
abusive
Mrs. S
Genuine
person
Fernanda
2006 E
Basketball
coach
Role model
Friend
At a 4-year
school


Himself
Missing school, not trying.
Cousin
Partying, missing school
Mr. T
Told me to put grades first
Ignacio
2003 E
Friends
ASB and AP
Mr. P
Counseled me


Cousin
Electrician, role model
Mr. W and Mrs. W
Helpful
Lupito
1998 E
Mr. V
Joked around
Mr. U
Counseled me