

ABSTRACT

Title of Thesis: VARIATIONS IN BACKGROUND CHARACTERISTICS
AMONG ASIAN AMERICAN STUDENTS OF DIFFERENT
COLLEGE MAJORS

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This study explored how Asian American college students with different majors vary by gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental educational expectation using data from the National Educational Longitudinal Study of 1988 (NELS:88). Significant differences were found between students' gender, ethnicity, home resources, perceived parental educational expectations and students' choice of major. Students' socioeconomic composite quartile score and generational status were not significant. The number of non-English proficient students was too small to test the null hypothesis.

The findings provide a glimpse of the contextual elements that could be shaping the major choices of Asian American students. Educators need to be aware of the heterogeneity of the Asian American community and develop culturally sensitive

interventions when working with this population (Leong & Gim-Chung, 1995). The inability to establish a causal connection and the small cell size of Pacific Islander students was a limitation for this study.

VARIATIONS IN BACKGROUND CHARACTERISTICS AMONG ASIAN
AMERICAN STUDENTS OF DIFFERENT COLLEGE MAJORS

by

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DEDICATION

For the loving memory of my grandparents who dedicated their lives to the field of education and for Don Mendoza, whose love and support has helped me get through graduate school.

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CHAPTER ONE: INTRODUCTION

Research has found that Asian American college students tend to pursue math, science or engineering majors versus the humanities or social sciences (Chiang, 1994; Evans, 1990; Hsia, 1988; Sue & Abe, 1995; Takeuchi, 1975). Asian Americans are also more interested in pursuing careers that are logical, technical and require very little social interaction (Leung, Ivey & Suzuki, 1994; Park & Harrison, 1995).

Scholars point to various factors to explain why Asian American students choose to major in science and technical fields; these factors include: academic abilities, particularly higher mathematical achievement (Chu, 1991; Greenfield, 1996); superior quantitative skills but poor verbal skills in standardized tests (Escueta & O'Brien, 1995; Hsia & Hirano-Nakanishi, 1995; Kirk, 1975); academic tracking in courses where language is of secondary importance (Bagasao, 1983; Chiang, 1994); vocational personality (Park & Harrison, 1995; Sue & Kirk, 1972); and preference for careers that are prestigious, profitable and pragmatic (Leong, 1991; Leung, Ivey & Suzuki, 1994).

Other scholars have pointed to sociological and economic explanations of this trend, including the idea that majors in math, science and engineering would warrant job security and therefore upward mobility (Bagasao, 1983). Factors like family influence and the idea that pursuing a career in science would mean less interaction with other English speakers have also been hypothesized (Bagasao). However, factors affecting Asian American students' decision to pursue humanities or social sciences remain unclear.

Additionally, attributes such as socioeconomic status (SES), parental expectations and degree of acculturation have been linked to educational aspirations, but few

researchers have looked at the role of SES, parental expectations and degree of acculturation in Asian American students' choice of major. Researchers have especially noted the need to study the effects of acculturation on the career development of Asian Americans (Leong & Serafica, 1995; Leung, Ivey & Suzuki, 1994; Park & Harrison, 1995) and the effects of SES on their occupational values (Leong & Tata, 1990).

This study added to the research that has linked SES (Chiang, 1994; Kirk, 1975), family (Kirk, 1975), degree of acculturation (Bagasao, 1983; Goyette & Xie, 1999; Park & Harrison, 1995) and language proficiency (Bagasao, 1983; Chiang, 1994; Park & Harrison, 1995) as influential factors in Asian American students' choice of major.

Purpose of the Study

This study explored the characteristics of Asian American college students who choose to study arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies. Asian American college students' gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental expectations were analyzed across eight major categories using the National Educational Longitudinal Study of 1988 (NELS:88).

NELS:88 is a survey sponsored by the U.S. Department of Education, National Center for Educational Statistics (NCES) that began in 1988 with a nationally representative sample of eighth graders who were followed every two years until many reached their fourth year in college. Students were surveyed in 1990, 1992, 1994, 2000 and 2002.

The specific research questions guiding this study were:

1. Are there differences in the gender breakdown of Asian American students who choose to study arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies?
2. Are there differences in the ethnic background of Asian American students who choose to study arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies?
3. Are there differences in the socioeconomic background of Asian American students who choose to study arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies?
4. Are there differences in the degree of acculturation of Asian American students who choose to study arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies?
5. Are there differences in the perceived parental expectations of Asian American male and female students who choose to study arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies?

Operational Definitions

The following section outlines the key terms used in this study.

1. *Asian Americans*: This term refers to a diverse group of Americans who trace their origins to the Asian continent. Although NELS:88 also sampled Pacific Islanders, the cell size was so small that it was inaccurate for this study to adopt the title Asian Pacific Islander. Therefore this study used the term Asian Americans.
2. *Major field of study* (MAJCODE): This refers to the major field of study that a student reported at the institution with his or her longest enrollment period. NELS:88 identified 111 majors that this study grouped into eight categories: arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies. The author identified these eight categories after reviewing the majors listed in NELS.
3. *Socioeconomic status* (SES): SES was defined in two ways: first, by parents' education, occupation and family income; and second, by the family's home resources.
4. *Perceived parental expectations* (PE): This refers to how far students think their parents/guardian expect them to pursue their education.
5. *Degree of acculturation*: This refers to the degree of assimilation and adaptation into mainstream culture. In this study, degree of acculturation was identified by generational status and English proficiency.

a. *Generational status*: This refers to students' and parents' place of birth. Similar to Kaufman, Chavez and Lauen's (1998) study, students were classified according to the following criteria:

First-generation: Students born outside of the 50 states or the District of Columbia.

Second-generation: U.S. born students, at least one of two parents was born outside of the 50 states or the District of Columbia.

Third-generation or more: U.S. born students whose parents were also U.S. born.

b. *English proficiency*: This refers to whether students had Limited English Proficiency (LEP), constructed from student self- evaluations and teacher evaluations for English language proficiency.

Significance of the Study

According to Leong and Gim-Chung (1995), theories of career choice and development have traditionally focused on individual factors such as the values, attitudes, and abilities of individuals without taking into account the social, cultural, and historical variables that may impinge upon students' career choice and development. This study provides a glimpse of the contextual elements that could be shaping the major choices of Asian American students.

Asian Americans are one of the fastest growing racial groups in higher education. In 1997, Asian Americans made up nearly six percent of all students enrolled in higher education, but only four percent of the U. S. population (Hune, 2002). As the number of

Asian Americans enrolling in higher education increases, it is vital for administrators to understand and meet the needs of this population. The results of this study would help educators, career counselors and academic advisors provide culturally relevant and effective services for Asian American students.

This study had enough cell sizes to analyze different Asian American ethnic groups including Chinese, Filipino, Korean, Southeast Asian and South Asian students. Results of this study highlighted the relationship of ethnicity and students' choice of major and underscored the importance of recognizing the heterogeneity of the Asian American community. A limitation of previous research on Asian American students' career development has been its small sample sizes across ethnic groups (Leong, 1991; Leung, Ivey & Suzuki, 1994; Park & Harrison, 1995).

Previous research on Asian American students' majors was only able to analyze high school seniors and their projected course of study (Bagasao, 1983). This study examined data collected from college sophomores who had already declared their majors. The measures in NELS:88 also enabled this study to measure socioeconomic status in two ways, by socioeconomic composite score quartile and students' home resources.

Finally, it is commonly held that Asian Americans are primarily interested in science and technical occupations (Leung, Ivey & Suzuki, 1994; Park & Harrison, 1995). This study showed that Asian American students have career aspirations in both technical and social areas; therefore career counselors need to encourage this population to explore both traditional and nontraditional career options (Leung, Ivey & Suzuki, 1994).

Overview of Subsequent Chapters

The next chapter reviews literature relevant to the purpose of this study followed by a detailed description of the study's methodology, results, and findings. The limitations of the study, implications for practice, and recommendations for future research are discussed in the final chapter.

CHAPTER TWO: REVIEW OF LITERATURE

This study explored how Asian American college students with different majors vary by gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental educational expectations. This chapter begins with an overview of career choice and development theories followed by a review of studies on college students' choice of major. The third section discusses unique issues influencing Asian American students' career and vocational interests, followed by a discussion of the role of socioeconomic background and acculturation on career and vocational interests. The last section describes parental involvement in Asian American students' educational aspiration and vocational choice. The role of gender and ethnicity will be highlighted throughout these discussions.

Theories of Career Choice and Development

Choosing one's major is an initial step towards developing one's career (White, 1981). A discussion of career choice and development theories provides insight into students' academic and career choice behavior. Given the lack of theories that look at how students come to choose their majors, this section summarizes career choice and development theories by Holland (1973), Super (1996), Gottfredson (1981, 1996) and Lent, Brown and Hackett (1994, 1996).

Holland's theory is considered the most influential model of vocational choice currently in existence (Brown, Brooks & Associates, 1996). The basic tenet of Holland's theory (1973) is that people fall into six personality/interest types and the interaction of certain types with specific environments predicts the behavior and interactions that occur

in those environments (Spokane, 1996). The six types are: Realistic, Investigative, Artistic, Social, Enterprising and Conventional. Following Holland's theory, Realistic people might enjoy courses that are very practical and make use of their mechanical or physical skills. They tend to value money, power and status versus human relationships. The Investigative person would thrive in physical or biological science courses and value analyzing or searching for solutions to unanswered questions. An Artistic person would enjoy courses in creative writing, music, and art and take pleasure in expressing him or herself freely. The Social person tends to pursue education and counseling courses or any field where discussion and teamwork is valued. The Enterprising person would thrive in business or marketing as he or she enjoys selling or persuading others. The Conventional person values being dependable, straightforward and organized and would prefer to be in control of situations. Park and Harrison (1995) found that Asian American students showed higher interest in the Investigative and Conventional vocational categories, but lower interest in the Social category.

Holland's typology theory may be valuable in understanding how college students choose their majors (White, 1981). According to Osipow (1990), Holland in recent years has also emphasized parental influence in typological development. Osipow noted that this influence is largely seen not only in biological terms, but also through the reinforcements and resources parents provide for their children. However, Leong and Serafica (1995) have pointed out that Holland has failed to address the role of culture in creating environments, noting that work environments are more than the sum of individual personality types.

Super's theory is based on the assumption that psychological and social-economic factors combine in the development of the self. At the core of Super's theory is the development and implementation of a self-concept (how individuals view themselves and their situation), which changes over the life span (Sharf, 1997). Super's theory is characterized by five life stages: growth (ages 4-13), exploration (ages 14-24), establishment (about 25-44), maintenance (45-65) and disengagement (over 65). Each life stage is defined by a sequence of three or four major career developmental tasks related to preparing for, engaging in and reflecting on a productive work life (Super, Savickas & Super, 1996). According to Osipow (1990), the mastery of these tasks throughout the life stages describes vocational maturity. During Super's Exploration stage, which describes high school and college students, the career developmental tasks include crystallizing, specifying and implementing an occupational choice (Sharf, 1997). This might include declaring a major prior to securing a career. A limitation when applying Super's theory to Asian Americans is its emphasis on individual choice and implementation of self-concept (Leong & Hardin, 2002).

Gottfredson (1981, 1996) is the only theorist who has tried to link psychological and sociological perspectives with career development. Gottfredson's theory of circumscription and compromise combines the concerns of trait and factor theories (Holland) and developmental theories (Super). However, the theory is distinctive in four ways: career development is viewed as an attempt to implement a social self as primary and a psychological self as secondary; it focuses on how cognitive development affects career development; it treats vocational choice as a process of eliminating options and narrowing one's choices; and it looks at how individuals compromise their goals in

coming to terms with reality as they try to implement their aspirations (Gottfredson, 1996). This means that Gottfredson's theory emphasizes gender, social class and intelligence rather than the personality and values of individuals that are the main focus of other theories.

According to Gottfredson (1996), circumscription is the process of eliminating unacceptable job alternatives to create a social space of acceptable alternatives. The circumscription of aspirations from early childhood through adolescence is described in four stages of development. During the first stage, from ages three to five, children progress from wanting to be fantasy characters to recognizing occupations as adult roles and observing differences in gender. During the second stage, from ages six to eight, children rank everything dichotomously (good or bad) and are concerned about doing what is appropriate for girls or boys. In the third stage, from ages nine to thirteen, young people begin to recognize symbols of social class and rank occupations based on prestige. They also consider their own level of intelligence in their consideration of possible jobs. During this stage, Gottfredson (1996) pointed out that young people from higher social class are subject to higher occupational expectations while those from low social class may have dampened aspirations. In the final stage, from ages fourteen and above, adolescents take into account their personality, values, ability, experiences and family needs as they identify which job choices are most preferred and most accessible to them.

Gottfredson (1996) defined compromise as the process of adjusting one's ideal aspirations to accommodate the reality of the world of work. In other words, it involves balancing different values and interests in order to identify one's best overall option. Gottfredson recognized how an individual's group-based identities and circumstances

influence one's career aspirations. More specifically, she emphasized the important role gender and social class play in making career choices. Leung (1993), who examined Gottfredson's theory with Asian American students, found that they were more likely to compromise sex type (the degree of masculinity and femininity of occupation) than prestige. He pointed out that Asian Americans tend to weigh prestige more heavily than any other factors such as personal interests and aptitudes when making a career-related decision.

Social cognitive career theory (SCCT), developed by Lent, Brown and Hackett (1994), is derived from Bandura's (1986) social cognitive theory and emphasizes the means by which individuals exercise personal agency in developing their careers and the external factors that enhance or constrain this agency. SCCT provides a framework for understanding three aspects of career development: interests, academic and career choices, and performance and persistence in educational and occupational options (Tang, Fouad & Smith, 1999).

SCCT conceptualizes career-related interest, choice and performance within three distinct, but interlocking models. First, SCCT's interest model looks at how basic career interests develop over time. Following this model, people form an enduring interest in an activity when their self-efficacy is strong and when they anticipate that performing it will produce valued outcomes (Lent et al., 1996). Lent et al. noted that contextual variables such as socioeconomic status and gender-role socialization might affect the refinement of self-efficacy and outcome expectations. In their review of literature, Leong and Chou (1994) proposed that less acculturated Asian Americans might exhibit less self-efficacy

in career choice, interest or expectations because of the cultural value of respecting parental authority.

Second, SCCT's career choice model posits that once individuals have developed career-related interests (paths 1 and 2), they select a particular career goal (path 3) and pursue it (path 4). Their involvement with certain activities produces performance attainment (they either succeed or fail, path 5), which helps to modify or strengthen their self-efficacy and outcome expectations (path 6) (Lent et al., 1996). This then determines their career choice behavior.

Leong and Hardin (2003) noted that SCCT appears to have useful implications for Asian Americans because of its explicit focus on how environmental factors may affect self-efficacy. Tang, Fouad and Smith (1999) claimed that Lent et al.'s path model provides a useful theoretical framework for explaining the career choices of Asian American students. They applied the SCCT's contextual factors for self-efficacy and found that acculturation, family background and self-efficacy influenced Asian American students' career decisions. However, interest was not found to bear any significance on Asian American students' career choices.

Summary

The theories discussed in this section provide useful background and insight into students' career development, although only a few theories specifically addressed the processes and motivations involved in choosing a major. The applicability of each theory to Asian American students was also discussed. The next section explores studies on college students' choice of major.

Choice of Major

Dawson-Threat and Huba (1996) examined the relationship between male and female students' sex-role identification, clarity of purpose, and their choice of major. They used the Student Developmental Task and Lifestyle Inventory Revised (SDTLI) to measure clarity of purpose and the Bem Sex Role Inventory (BSRI) to measure sex-role identification. Dawson-Threat and Huba studied 396 college seniors at a large Midwestern land-grant university, 60% of whom were female and 88% were Caucasian students. No additional racial breakdown of the sample was provided, other than 95% of the participants were U.S. citizens and 5% were international students. They found that nearly 60% of the males and 63% of the females identified with nontraditional sex roles, however, most students chose majors traditionally dominated by their gender. Women exhibited a clearer sense of purpose than men and students in female-dominated majors exhibited a clearer sense of purpose than those in male-dominated majors. A few limitations in this study are that it used a predominantly White sample and it excluded students in liberal arts majors.

Thomas (1984) studied factors influencing Black college students' choice of major. The sample consisted of 2,090 college juniors and seniors attending eight four-year colleges that were primarily located in the South Atlantic region (5 of the institutions were predominantly Black and 3 were predominantly White). There were 927 Black students who participated in the study, of which 668 were female and 258 male, and 801 students came from historically Black institutions and 126 were enrolled in predominantly White institutions. Students completed a self-made questionnaire that covered their early childhood, family, elementary and secondary school experiences,

educational and occupational values and expectations, and major field choice and changes in major.

First, Thomas (1984) conducted frequency distributions and cross tabulations to explore the characteristics of Black males and Black females in various major fields within predominantly Black and predominantly White institutions. She grouped college majors into three categories: a) education, social work, nursing, the social and behavioral sciences, and other fields; b) business and economics; and c) biological, natural, and technical sciences. Thomas found that Black females were three times more likely to major in social sciences and education than Black males and Black males were likely to major in biological, natural, and technical sciences than Black females in all institutions analyzed. She also found that social class differences was apparent among Black students in different majors and that the nature of these differences varied on the racial composition of the college they attended. Students in predominantly White and Black private colleges who majored in biological, natural, and technical science majors had higher social class status, while in public Black colleges, business and economic majors had high social class backgrounds than were Black students in other majors.

Second, Thomas (1984) conducted multiple regression analysis to examine the effects of early childhood, family, elementary and secondary school experiences, educational and occupational values and expectations on students' college major choice. She found that sex roles, students' occupational expectations (the job they expected to obtain after graduation) and career interests were the most important factors affecting Black students' choice of major.

Leppel, Williams and Waldauer (2001) examined the effects of socioeconomic status and parental occupation on choice of college major, focusing on gender differences. They used data from the 1990 Survey of Beginning Postsecondary Students (BPS) from the National Center for Education Statistics (NCES). The sample consisted of 4,161 students who were enrolled in courses leading to a bachelor's degree. No descriptive statistics were provided of the demographic variables including gender and race. They grouped major field of study into business, education, health, humanities and social sciences, and science and engineering. Using multinomial logit analysis, Leppel, Williams and Waldauer found that as socioeconomic status increased, women became less likely to choose to major in business, while men became more likely to do so. They also found that male and female students whose fathers were in professional or executive positions were more likely to choose to major in engineering and the sciences. Female students whose mothers were in professional or executive occupations were less likely to major in education than were other female students. This study did not examine the effects of racial and ethnic variables, which was a limitation.

Summary

The studies discussed in this section provide an overview of possible factors that may be influencing students' choice of major, although none of them specifically examined Asian American students. The following section addresses unique issues influencing Asian American career and vocational interests.

Asian American Career and Vocational Interests

Background

The 1965 Immigration Act ended immigration quotas that were in place for more than a century (Hsia, 1988). As a result, increasing numbers of Asians immigrated to the United States, including Southeast Asians who were granted refugee status since 1975 (Hsia). Asians currently make up approximately four percent of the population (U.S. Census Bureau, 2000). Unlike the unskilled contract laborers who made up the majority of Asian immigrants in the 19th and early 20th centuries, post-1965 immigrants were college-educated professionals who had working knowledge of English and were skilled workers (Hsia). Certainly this has affected the educational and occupational achievement of the next generation of Asian Americans.

This section will review research on Asian American career and vocational interests beginning with early studies that looked primarily at Chinese and Japanese students. The section will conclude with more current research on this population.

Early Studies

Sue and Kirk (1972) studied 3,503 freshmen from UC Berkeley who participated in a testing program that included the School and College Ability Test (SCAT), the Strong Vocational Interest Blank (SVIB), and the Omnibus Personality Test (OPI). They compared Chinese Americans (born in the U.S.) with all other students (the comparison group). The SVIB profiles revealed that Chinese American men tended to be more interested in the sciences, skilled technical trades and business than in social science. Chinese American women were more likely than other women to express interest in

technical-applied fields, physical sciences and business than in social science and verbal-linguistic occupations. Overall, OPI scores revealed that Chinese Americans had greater tendency to be practical, somewhat introverted and impersonal. Some of the limitations of Sue and Kirk's study include that they did not look at actual or proposed major fields, their findings say nothing about the relationship between interests and actual behavior, and no causal connection was established between abilities and interests (Bagasao, 1983).

Sue and Kirk (1973) used the same data as the 1972 study and compared the original Chinese American sample with a sub group of 106 Japanese Americans (also born in the U.S.), and a group of non-Asian Americans. They found that Japanese Americans had higher interest in skilled-technical trades than verbal-linguistic fields but were also more interested in social sciences than Chinese Americans. Sue and Kirk attributed this finding to Japanese Americans' greater acculturation to mainstream society. It is clear from these early studies that intra-group differences, probably due to immigration history, existed for Asian American students.

Takeuchi (1975) studied the abilities and college majors of 160 Asian Pacific American students in the Asian American Educational Opportunity Program (AA-EOP) at the University of Colorado. He found that almost two-thirds of the AA-EOP sample was majoring in natural sciences, business and engineering, while fewer than seven percent were majoring in the humanities. A limitation in this study is in its sample. According to Bagasao (1983), Takeuchi failed to define his sample by ethnicity and length of residence.

Kirk (as cited in Bagasao, 1983) studied 500 young women beginning their senior year in a number of San Francisco high schools. Ninety-eight Asian Pacific American

women seniors (72 Chinese, 23 Japanese and 3 Filipinas) were compared with 380 female White students. Kirk looked at the factors influencing mathematically inclined high school students' choice of a science career. She found that a larger proportion of APA women were taking science bound courses and that APA women had significantly lower mean scores on the verbal section of the PSAT. This finding is consistent with Sue and Kirk's (1972, 1973) and Takeuchi's (1975) studies. APA women also indicated that they felt strongly influenced by their fathers and teachers, reading about occupations, financial considerations, and grades (coursework and achievement). However, Kirk failed to establish a causal connection between PSAT scores, coursework and achievement in high school and interest in a science career. Additionally the sample was composed predominantly of Chinese women, which limits its generalizability to other ethnic groups.

Recent Studies

Leung, Ivey and Suzuki (1994) compared the career aspirations of 149 Asian American college students with a comparison group of 234 Caucasian students using the Occupations List, consisting of 155 occupational titles developed by Leung and Harmon. Interestingly, they found no difference between the two racial groups' consideration of Social occupations, which involve a high level of interpersonal activities, and in their consideration of Realistic and Artistic occupations. According to Leung et al., this is contrary to research findings that claim Asian Americans are more interested in concrete and practical situations (Sue & Kirk, 1972, 1973; Sue & Frank, 1973).

Leung et al. (1994) also found that Asian and Asian American women students were more likely than their Caucasian counterparts to consider nontraditional occupations

for women. This finding is contrary to the general impression that Asian and Asian American women are confined by traditional sex roles (Sue & Sue, 1990; Sue & Morishima, 1982). Perhaps Asian American women had been empowered by the women's movement and influenced by parental encouragement to pursue occupations with high prestige and social recognition (Leung et al.). A limitation in this study is that the Asian American and Caucasian samples were collected from two different geographic locations, which could have confounded the effects of race (Leung et al.). For example, the fact that the Asian American sample was from the west coast while the Caucasian comparison group was from the Midwest could have affected students' responses.

Brandon (1991) looked at the gender differences in the educational attainment of Asian American youth and examined the role of immigrant status and ethnicity in these differences. He used the High School and Beyond (HS&B) 1986 follow-up data sponsored by the National Center for Educational Statistics (NCES). Brandon found that young Asian American women reached high levels of attainment more quickly than men and these differences were especially noteworthy among immigrants (or children of immigrants) and Chinese Americans. He speculated that HS&B Asian American women may show higher levels of educational attainment because Asian American men have been found to have higher levels of employment in the years following high school.

Role of Socioeconomic Status

Walpole (2003) compared the cocurricular and academic activities, income, educational aspirations, educational attainment and graduate school attendance of students from low SES backgrounds to those from high SES backgrounds. Walpole used

longitudinal data from the national study of college students, part of the Cooperative Institutional Research Program (CIRP) sponsored by UCLA's Higher Education Research Institute and the American Council on Education. She analyzed surveys that were collected in 1985 (base year study), 1989 (fourth year follow-up) and 1994 (ninth year follow-up). Walpole yielded a final sample of 2,417 low SES and 2,475 high SES students. She found that 52% of low SES students either reported working 16+ hours per week or were working full time, compared with 37% of high SES students. Walpole also found that low SES students spent less time studying or getting involved in student clubs. Walpole discovered that nine years after entering college, students from low SES backgrounds had lower levels of income, graduate school attendance and educational attainment than their peers from high SES backgrounds. Walpole's study supports the notion that students from low SES backgrounds possess different cultural capitals than do high SES students. According to Walpole, cultural capital refers to insider knowledge, such as knowledge of educational credentials, which is not taught in schools. Since the sample was restricted to traditional-aged students from four-year colleges and universities, many low SES students who are older and attend community colleges were not represented in this study.

Paulsen and St. John (2002) examined the ways college costs affected the college-choice and persistence decisions of students in four different income groups (low-income or poor, lower-middle income or working class, upper-middle income or middle class and upper income or the elite). They used the National Postsecondary Study Aid Survey of 1987 (NPSAS87), sponsored by the National Center for Educational Statistics. Paulsen and St. John found that low-income Asian American students were less likely to persist

than White students. This finding is inconsistent with the widely held perception that Asian Americans have higher educational attainment than other racial groups (Escueta & O'Brien, 1995). Given this finding, Paulsen and St. John suggest that future research needs to consider race within class, rather than treating race and class separately within broad, universalistic models.

Socioeconomic Status and Parental Involvement

Lareau (1987) examined how class-related cultural factors shape parents' participation in their children's schooling. She participated and observed two first-grade classrooms and conducted in-depth interviews with parents, teachers and principals at two predominantly White working class and middle class communities. Although Lareau found that the educational aspirations of working class and middle class parents were the same, they differed in their level of expectations for their children's education. For example, working class parents did not have high expectations for their children and were satisfied with a high school diploma. Additionally, Lareau found that working class parents were reluctant to participate in their children's schooling and tended to turn the responsibility for their education to the teacher. In contrast, middle class parents initiated contact with teachers and attended more school events. Lareau attributed these findings to the different social, cultural and economic resources of the two sets of parents. It is not clear whether working class Asian American parents would have similar low-level expectations for their children's educational attainment.

MacLeod's (1995) ethnographic study of two adolescent peer groups from a low-income housing development brings to light the effects of class and family influence on

adolescents' educational and occupational aspirations. He discovered that because the parents of the *Brothers* (African American men) exercised a substantial degree of authority over their children, the *Brothers* had higher educational and occupational aspirations than the *Hallway Hangers* (White men), whose parents did not exercise the same level of authority. A closer look at this difference revealed that the *Hallway Hangers'* parents feared that fostering high aspirations in their sons would only result in disappointment and frustration while the *Brothers'* parents may have projected their own unfulfilled ambitions to their children (MacLeod). Asian American parents who have experienced hardship and discrimination in American society may also be projecting their own ambitions to their children, wanting them to secure a piece of the American dream (Leong & Serafica, 1993).

Role of Acculturation

Park and Harrison (1995) hypothesized that level of acculturation was a possible contributor to Asian Americans' vocational interests. In their study, they compared career-related interests and values of 184 Asian American and 130 Caucasian American college students and explored the relationship between career interests, perceived control and acculturation. Using Holland's model of vocational personality types and work environments, they found that Asian American students showed higher interest in the Investigative and Conventional vocational categories, but lower interest in the Social category. Park and Harrison found that high-acculturated Asian Americans showed more interests in Holland's Social vocational type than did the low medium acculturated students. They speculate that less-acculturated Asian Americans may be more interested

in Investigative and Conventional occupations because success does not rely on having strong interpersonal skills. A limitation of this study is in its sample of students who may be highly acculturated given their attendance in a major West coast university. Therefore, the results may not be generalizable to low-acculturated students. Additionally, Park and Harrison recognized that students may change their preferences over time, hence they pointed to the study's limitation in capturing students' interests longitudinally.

Leong and Tata (1990) used the Ohio Work Values Inventory (OWVI) and the Suinn-Lew Asian Self-Identity Acculturation scale (SL-ASIA) in their study of 177 Chinese American children (5th and 6th graders) in an inner city Chinatown. They found that high-acculturated children valued self-realization, using one's own skills and talents, more than the less-acculturated children. They connected this to the fact that individualism is a cultural value among White Euro Americans, while Chinese Americans seem to be more group-oriented. Hence, Chinese American children who were high-acculturated were more likely to view their occupational choice as a "personal matter," whereas students who adhered to collectivistic values may view the same choice as an obligation to the group (p. 211). It is questionable whether the study's findings are applicable to Chinese American children living in more heterogeneous settings. Leong and Tata also noted the lack of a comparable White sample as a limitation.

Bagasao (1983) looked at 226 Asian Pacific American college-bound high school seniors and 384 White seniors from the High School and Beyond (HS & B) national study. She found that Asian American students' length of residence was closely related to their choice of major and career plans. Students who had lived in the United States for a short period of time were more likely to pursue a science major such as engineering and

computer science. Bagasao speculated that recent immigrants may restrict themselves to applied science and technological careers as these courses require less reading, writing and social-verbal interaction. The only exception she found was with third- and fourth-generation Japanese American students whose choice of major and career plans seemed to be guided more by personal preferences. This is consistent with Sue and Frank's (1973) research, which indicated that Japanese Americans seem to be more acculturated than any other Asian American ethnic group.

Role of Parental Involvement

Parental Encouragement and Students' Aspirations

Conklin and Dailey (1981) examined the relationship between parental educational encouragement and adolescents' enrollment in college. They analyzed previously collected longitudinal data of 2,700 ninth graders from seven public and parochial secondary schools in New York. Follow-up data were collected when the respondents were in the tenth and twelfth grades. Six months after graduation, questionnaires were also mailed to students who participated in the base study. The final sample was 1,734 students who completed questionnaires at all four measurement points. No demographic breakdown of the students was provided. Conklin and Dailey used the "Taken for Granted" (TFG) variable to measure parental encouragement. Students answered "Yes," "No" and "Do not know" to the question: "Would you say that in your home it has been just about taken for granted that you will continue your education after you get out of high school?" (p.256). Conklin and Dailey found that consistent parental encouragement (students answered "Yes" from ninth to twelfth grade) was positively

associated with college entry, particularly at a four-year college. A limitation in this study was its inability to measure the sources of variance in students' perceived parental educational support.

Perceived Maternal and Paternal Educational Goals

Smith (1981) surveyed sixth, eighth, tenth and twelfth grade students in middle-class suburban school districts in South Carolina and Georgia to see if their educational expectations were related to perceived maternal and paternal educational goals. The study's final sample was 4,918 students, 14 % of whom were Black and 68% White. Smith found that the relationship of perceived maternal goals on adolescent educational expectation was greater than perceived paternal goals. He speculated that this might be due to the amount of time students spend with their mothers versus their fathers. From this study, Smith underscored the importance of differentiating between maternal and paternal influence on adolescents' educational goals. However, since a high rate of Black students' responses were excluded from the final sample due to missing data, the generalizability of this finding to Black students is questionable.

Asian American Parents

Mau (1997) examined the differences in educational effort, perceived parental expectation, and parental educational involvement and their effects on the academic achievement of Asian immigrants, Asian Americans and White Americans. Mau obtained data from the National Educational Longitudinal Study of 1988 (NELS:88) sponsored by the National Center for Educational Statistics. The study's sample consisted of 13,837

White Americans, 472 Asian immigrants (English as their second language), and 184 Asian American (English-speaking native) 10th grade students. Mau found that the academic success of Asian as well as Asian American students was associated with high parental educational expectation and educational effort. This finding indicates that despite assimilation to American culture, Asian American students continue to perceive high expectations from their parents. Mau also found that Asian parents tended to be less involved in their children's schools, but this lack of involvement was generally not predictive of Asian students' educational achievement. Kao (1995) suggested that Asian parents may have different styles of involvement from those of mainstream culture. Mau cautioned educators from encouraging parental participation, as it may not have the same educational outcomes for Asian American students as it would for White students. A limitation in Mau's study is that it did not draw a causal relationship between parental involvement and academic achievement.

Goyette and Xie (1999) examined the determinants of Asian Americans' high educational expectations by looking at the relationship between socioeconomic background, academic ability and parental expectations. They studied at 10th graders using NELS:88/90 data and used linear and logistic multivariate regression models to explain differences in educational expectations between Asian American ethnic groups and Whites. Goyette and Xie found that Asian American ethnic groups have higher educational expectations than Whites. The higher educational expectations of Asian American groups that are well assimilated are primarily influenced by socioeconomic and demographic factors. According to Goyette and Xie, parental expectations play an important role in explaining the Asian-White gap with the exception of looking at South

Asian youths. Goyette and Xie's descriptive analysis found that parents of Asian American students reported higher educational expectations for their children than did their White counterparts. Chinese and South Asian parents expected their children to attain the most schooling, followed by Southeast Asian and Korean parents. In general, parental expectations explained a large portion of children's high educational expectations for all Asian American groups. However, Goyette and Xie also emphasized that the explanatory power of socioeconomic status, academic ability and parental expectations need to be considered separately for each Asian American ethnic group.

Qualitative Studies

Qualitative studies also inform this study's understanding of how Asian parents' cultural model of success and educational strategies affect student's career choice. From interviews with 40 Korean American college students and conducting ethnographic fieldwork in the Korean community, Kim (1993) found that Korean students were choosing narrowly defined careers to please their family and community. Kim noted that Korean American immigrants defined success in terms of money and prestige, and observed that students internalized these values, making it an important part of their identity.

Summary

This review of literature has discussed career choice and development theories and college students' choice of major. The role of gender, ethnicity, socioeconomic status, acculturation and perceived parental educational expectation in Asian American

students' career and vocational interests was also explored. The following chapter will discuss the study's methodology.

CHAPTER THREE: METHODOLOGY

The purpose of this study was to explore how Asian American college students with different majors vary in gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental educational expectation. This study used data from the National Educational Longitudinal Study of 1988 (NELS:88) and its third follow-up survey, NELS:88/94. The first part of this chapter describes the study's hypotheses and research design followed by a more detailed description of the NELS:88/94 sample, instruments, and data collection procedures. A discussion of the study's participants, survey measures and data analysis concludes the chapter.

Hypotheses

Based on the review of literature cited in the previous chapter, the hypotheses for this study were as follows:

1. There are no differences between students' gender and choice of major.
2. There are no differences between students' ethnicity and choice of major.
3. There are no differences between students' socioeconomic background and choice of major.
 - a. There are no differences between students' socioeconomic composite quartile score and choice of major.
 - b. There are no differences between students' home resources score and choice of major.
4. There are no differences between students' degree of acculturation and choice of major.

- a. There are no differences between students' generational status and choice of major.
 - b. There are no differences between students' limited English proficiency and choice of major.
5. There are no differences between perceived parental educational expectations by gender and choice of major.
- a. There are no differences between fathers' expectations by gender and choice of major.
 - b. There are no differences between mothers' expectations by gender and choice of major.

The hypotheses for this study were stated in null form because the nature of this study was exploratory and the existing literature on this topic is scarce. Thus, it would be premature to hypothesize that differences would exist between students' gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental educational expectations and choice of major.

Research Design

Since this study used NELS:88 and NELS:88/94 data to investigate the background characteristics of Asian American students who chose different majors, this study followed a causal-comparative research design method or an ex post facto design. According to Isaac and Michael (1995), the causal-comparative method is appropriate to use when it is not possible to select, control and manipulate the facts necessary to study

relationships, when laboratory controls would be impractical and unethical, or when controlling for a single independent variable may be unrealistic and artificial.

The National Education Longitudinal Study of 1988 and 1994

Overview

The National Educational Longitudinal Study of 1988 (NELS:88) is a survey that began in 1988 with a nationally representative sample of eighth graders who were surveyed every two years. The most recent follow-up survey was conducted in 2002. NELS:88 is the third longitudinal study sponsored by the National Center for Education Statistics (NCES). The first NCES study was the National Longitudinal Study of the High School Class of 1972 (NLS-72) and the second was the High School and Beyond (HS&B) study. All these studies provide trend data about critical transitions young people face as they develop, attend school, and embark on their careers (NCES, 1996).

The NELS:88 study design had four components: surveys and achievement tests in reading, social studies, mathematics and science were administered to students, and surveys of parents, school administrators and teachers were collected. The NELS:88/94 study collected information relevant to individuals who were employed and/or enrolled in postsecondary education. For the purposes of this study, data from NELS:88 and NELS:88/94 were used.

More specifically, this study analyzed the NELS:88 student survey for information on students' gender, ethnicity, socioeconomic status, limited English proficiency and perceived parental educational expectations. This study used the NELS:88 survey to obtain students' perceived expectations for the following reasons:

using the base year survey ensured higher cell sizes than follow-up surveys; eighth grade is a peak time for students to decide which academic tracks to pursue in high school; and this measure gave students six years to act on their perceived parental educational expectations. The NELS:88 parent survey was used to obtain information on generational status, and NELS:88/94 was used for information on students' major field of study.

Sample

The NELS:88 sample design started as a two-stage stratified sample. The first stage resulted in 1,052 schools (815 public and 237 private), and the second stage produced a random sample of 26,435 students, of which 24,599 participated. On average, each of the participating schools surveyed 23 eighth grade students in the spring term of 1988. Asian American students and Hispanic students were oversampled. A total of 1,527 Asian American students completed the survey in 1988 (NCES, 2002).

For the first follow-up study NELS:88/90, a freshened sample was added to the student component since some high school sophomores were not in the country or were not in eighth grade during the base year study. Freshening added an additional sample of 1,043 eligible tenth graders who were not in the NELS:88 sampling frame (NCES, 1994).

The NELS:88/92 second follow-up study also implemented sample freshening to provide a representative sample of twelfth grade students enrolled in the spring term of 1991-1992. Freshening in the second follow-up added an additional 243 eligible twelfth graders who were not contained in either the base year or first follow-up sampling frames (NCES, 1994).

The NELS:88/94 third follow-up sample design was created by dividing the sample for the second follow-up study into 18 groups, based on their response history, dropout status, eligibility status, school sector types, race, test score, socioeconomic status and freshened status. Each sampling group was assigned an overall selection probability and the final sample size was 15,875 students, 874 of which were Asian Pacific Islander students (NCES, 2002).

Instruments

The NELS:88 instruments included a student questionnaire, student cognitive tests, and parent, teacher and school administrator questionnaires. In order to establish validity and reliability, the research team field-tested data collection procedures and instruments with the eighth grade class of 1987, one year prior to the NELS:88 main study. Results from the field tests were used to inform planning for the main study, and to improve measurement properties and the length and format of the instrument.

The form and content of the NELS:88/94 questionnaire differed from earlier instruments as the sample was transitioning from high school to postsecondary education or work. Therefore, content areas of the survey included academic achievement, postsecondary school access and achievement, family structure, employment experience and work-related training. The NELS:88/94 instrument was field-tested in 1993 to establish its validity and reliability.

Data Collection

Members of the NCES research team first sought cooperation from school administrators and educational organizations before collecting data. At public schools, the research team sought approval from the state superintendent, district superintendent and school principals. A similar approach was used for private schools. The principals within each cooperating school designated a school coordinator (often a guidance counselor or senior teacher) who served as a liaison with the data collection staff and handled the logistics for data collection on school premises.

Student questionnaires and tests were administered in group sessions usually in a classroom or library. Students first completed the questionnaire followed by a 10-minute break, during which the NCES field staff reviewed questionnaires for missing or invalid responses and critical items. After the break, students took four cognitive tests in mathematics, reading, science, and social studies, which lasted approximately 85 minutes (NCES, 2002).

Data for the NELS:88/94 study were collected primarily by one-on-one administration in the form of computer-assisted telephone interviews (CATI). The CATI system presented the questionnaire items to the interviewer on a series of screens, each with one or more questions. The system evaluated and applied a series of cross-checks to the responses and if an interviewer encountered problems, the system could suggest prompts for a more complete answer. In-person interviews were conducted with respondents requiring intensive in-person locating and in-person refusal. Data collection for NELS:88/94 lasted for six months (NCES, 2002).

Measures

The following paragraphs describe the measures used in this study. A complete description of the NELS variables used in this study is provided in Appendix A. Students' gender, ethnicity, socioeconomic status, limited English proficiency, and perceived parental educational expectation were taken from the NELS:88 student survey, and generational status was taken from the NELS:88 parent survey. Information on students' major fields of study was taken from the NELS:88/94 survey.

Asian or Pacific Islander categories (BYS31B). The possible responses for this measure were: Chinese, Filipino, Japanese, Korean, Southeast Asian (Vietnamese, Laotian, Cambodian/Kampuchean, Thai, etc.), Pacific Islander (Samoan, Guamanian, etc.), South Asian (Asian Indian, Pakistani, Bangladeshi, Sri Lankan, etc.), West Asian (Iranian, Afghan, Turkish, etc.), Middle Eastern (Iraqi, Israeli, Lebanese, etc.) and Other Asian. This study excluded analysis of West Asian, Middle Eastern and Other Asian students because this population was not the focus of this study. Additionally, this study excluded analysis of Pacific Islander respondents because of their small cell sizes.

Major field of Study (PSELONMJ). This variable contains measures for the major field of study reported by the respondent at the valid institution with his or her longest enrollment period. All 111 majors (excluding the category "no major") were grouped into the following eight categories: arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies. This study selected these eight major groupings to ensure that science-

related majors were not aggregated into one general science category. Appendix B gives a list of majors listed under each category.

Socioeconomic status (SES). Two measures of SES, the socioeconomic status composite quartile score (BYSESQ) and the home resources score (BYS35A-P), were used in this study. BYSESQ is the quartile into which the socioeconomic status composite score (BYSES) fell. BYSES was created using data from parents' educational level, occupation and family income. Parental education ranged from 1 (did not finish high school) to 6 (Ph.D, M.D., or other post graduate degree). Occupational data were coded using the Duncan SEI scale. Family income data were based on the total family income in 1987. Income level ranged from 1 (none) to 15 (\$200,000 or more). Each component was standardized with a mean of 0 and a standard deviation of 1. All components were averaged yielding the SES composite. The composite scores were then recoded into quartiles (NCES, 1990). The quartile coding of the socioeconomic composite score ranged from quartile 1 (low) to quartile 4 (high). Goyette and Xie's (1999) analysis of the NELS:88/90 data found that the average family incomes of Japanese, Chinese, South Asian and Filipino Americans were higher than that of Whites. Yet Barringer, Takeuchi and Xenos's (1990) analysis of the 1980 Census indicated that higher educational levels of Asian immigrants and even U.S. born Asians did not necessarily lead to income equity with Whites. Hune (2002) also reported from data collected by the American Council on Education that the median income of Asian American full-time workers (25 years or older) with a bachelor's degree was \$36,844 compared to \$41,094 for whites and \$40,240 for all U.S. persons in the study. Scholars

have suggested that these economic disparities are a result of occupational discrimination or the glass ceiling (Hune, 2002; Leong & Serafica, 1995; Woo, 2000). Since education and occupational attainment do not lead to income equity, this study used home resources as an additional measure to complement the SES composite score.

Home resources (BYS35A-P) was measured by whether or not respondents had a specific place for study, had their own bedroom and if their families had the following: a daily newspaper, a regularly received magazine, an encyclopedia, an atlas, a dictionary, a typewriter, a computer, an electric dishwasher, a clothes dryer, a washing machine, a microwave oven, more than 50 books, a VCR, and a pocket calculator. Respondents indicated whether (a) they had the item or (b) they did not have the item. Home resources score was the total number of items reported by students and ranged from 1-16. Kao (1995) analyzed the home resources measure in her study of Asian American students' academic performance and found that Asian parents invested more in educational resources than Whites despite comparable family incomes. She speculated that the availability of educational resources in Asian families is driven in part by cultural values.

Degree of acculturation. Degree of acculturation was measured by generational status and limited English proficiency (BYLEP). Generational status was created using the variables BYP11 (eighth grader mother's birthplace), BYP14 (eighth grader father's birthplace), BYP17 (eighth grader's birthplace). Students were classified according to the following criteria:

First-generation: Students born outside of the 50 states or the District of Columbia.

Second-generation: U.S. born students, whose parents were born outside of the 50 states or the District of Columbia.

Third-generation: U.S. born students whose parents were also U.S. born.

Limited English proficiency (BYLEP). Limited English proficiency is a composite measure constructed from student self-evaluations and teacher evaluations for proficiency in using the English language. The values for LEP were 0 if students were not Limited English Proficient and 1 if they were. BYLEP was set to 1 if the student responded to BYS27A-D, which asked how well students understand, speak, read, and write English with a 4 ("Not very well"), or if either teacher marked yes to BYT1_12, which asked if the student was a Limited English Proficiency student.

Perceived parental educational expectations (BYS48A-B). Perceived parental educational expectations were measured by the question: "How far in school do you think your father and your mother want you to get?" Students recorded their perceptions of each parent separately. The responses ranged from: 1) "won't finish high school," 2) "will graduate from high school," 3) "will go to vocational school," 4) "will attend college," 5) "will graduate from college," and 6) "will attend a higher level of school after graduating from college." Since this variable was only available in the base year survey, this study used students' perceived parental educational expectation while students were in 8th grade.

Participants

The panel flag (F3PNLFLG) was used to determine the number of Asian American students who completed questionnaires in all four rounds of NELS:88 up to and including the third follow-up study, NELS:88/94. There were 10, 827 respondents under this panel flag with 598 Asian American students in all four rounds, excluding Pacific Islander, West Asian, Middle Eastern, and Other Asian respondents.

Of the 598 respondents, Chinese comprised the largest ethnic group ($n=155$), followed by Filipino ($n=129$), Southeast Asian ($n=116$), Korean ($n=93$), South Asian ($n=63$), and Japanese ($n=42$). Two hundred eighty six (48%) of the respondents were male, 305 (51%) were female, and 7 (1%) did not respond. A full description of respondents' ethnicity, gender, generational status, English proficiency, socioeconomic background and perceived parental educational expectations can be found in Table 1.

Respondents' degree of acculturation was measured using generational status (BYP11, BYP14, and BYP17) and limited English proficiency (BYLEP). Generational status most represented in the sample was first ($n=259$), followed by second ($n=192$) and third ($n=45$). Ninety two percent of respondents ($n=549$) were not limited English proficient and eight percent ($n=47$) had limited English proficiency.

Respondents' socioeconomic background was measured using the socioeconomic status composite quartile score (BYSESQ) and the home resources score (BYS35A-P). Two-hundred sixty eight (45%) Asian American students were in the highest quartile, followed by 120 students (20%) in quartile 3, 110 (18%) in quartile 2, and 100 (17%) in quartile 1. Home resources score was the total number of items reported by students and

Table 1

Ethnicity, Gender, Generational Status, English Proficiency, SES and Perceived Parental Educational Expectations of Participants (N=598)

Variable	N	%	M	SD
Ethnicity				
Chinese	155	26		
Filipino	129	22		
Japanese	42	7		
Korean	93	16		
Southeast Asian	116	19		
South Asian	63	10		
Gender				
Male	286	48		
Female	305	51		
Generational Status				
First Generation	259	43		
Second Generation	192	32		
Third Generation	45	8		
English Proficiency				
LEP	549	92		
Not LEP	47	8		
SESQ				
Quartile 1	100	17		
Quartile 2	110	18		
Quartile 3	120	20		
Quartile 4	268	45		
Home Resources			12.25	3.08

Table 1 (continued).

Ethnicity, Gender, Generational Status, English Proficiency, SES and Perceived Parental Educational Expectations of Participants (N=598)

Variable	N	%	M	SD
Perceived Parental Expectation				
Father				
Less than high school	1	.2		
Finish high school	4	.7		
Vocational trade after high school	6	1		
Attend college	25	4.2		
Finish college	214	35.8		
Graduate school	265	44.3		
Mother				
Less than high school	4	.7		
Finish high school	3	.5		
Vocational trade after high school	5	.8		
Attend college	28	4.7		
Finish college	218	36.5		
Graduate school	256	42.8		

Notes. LEP=Limited English Proficient. SES=Socioeconomic Status.

SESQ=Socioeconomic Composite Quartile. Home resources score ranged from 1

(lowest) to 16 (highest). Some cells may not add to 100 percent due to missing cases.

ranged from 1 (lowest) to 16 (highest). The mean score for home resources was 12.25 ($SD=3.08$).

Perceived parental expectations were measured using BYS48A-B. Respondents were asked: “How far in school do you think your father and your mother want you to get?” Students recorded their perceptions of each parent separately. The responses ranged from: 1) “won’t finish high school,” 2) “will graduate from high school,” 3) “will go to vocational school,” 4) “will attend college,” 5) “will graduate from college,” and 6) “will attend a higher level of school after graduating from college.” Two-hundred sixty five students (44%) perceived that their fathers wanted them to attend graduate school and 214 (36%) thought their fathers wanted them to finish college. Twenty-five students (4%) reported that their fathers wanted them to attend college, followed by 6 (1%) to attend a vocational school, 4 (1%) to finish high school, and 1 (.02%) less than high school. Eighty-three students (14%) did not respond.

Two-hundred fifty six students (43%) reported that their mothers wanted them to attend graduate school, followed by 218 (37%) who thought their mother wanted them to finish college, 28 (5%) to attend college, 5 (0.8%) to attend vocational school, 3 (0.5%) to finish high school, and 4 (0.7%) to finish less than high school. Eighty-four students (14%) did not respond to the question.

Data Analysis

Major field of study reported by Asian American students was determined using the variable (PSELONMJ). Majors were then categorized in the following groups: arts

and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies.

In the first hypothesis the distribution of gender (BYS12) within the eight major categories was examined. Since gender is a categorical variable, a chi-square analysis was conducted to compare the proportions of men and women who majored in arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies.

In the second hypothesis, the ethnic distribution of students (BYS31B) within six major categories was examined. Since a crosstabulation showed that 16 cells had an expected count of less than 5, the following changes were made: math and computer science majors ($n=12$) was combined with engineering majors ($n=45$); and vocational studies ($n=14$) and Japanese students ($n=38$) were removed from the analysis due to their small cell sizes. A chi-square analysis was then conducted to compare the proportions of Chinese, Filipino, Korean, Southeast Asian and South Asian students who majored in arts and humanities, business, engineering, math and computer sciences, health and medical sciences, life sciences, and social sciences.

In the first hypothesis for socioeconomic background, the quartile coding of the socioeconomic composite score (BYSESQ) within six major categories was examined. Since a crosstabulation showed that 6 cells had an expected count of less than 5, the following changes were made: math and computer science majors ($n=12$) was combined with engineering majors ($n=45$) and vocational studies ($n=14$) was removed from the analysis due to its small cell sizes. Since the socioeconomic composite quartile score was a categorical variable, a chi-square analysis was conducted to compare the proportions of

students in the four quartiles who majored in arts and humanities, business, engineering, math and computer sciences, health and medical sciences, life sciences, and social sciences.

In the second hypothesis for socioeconomic background, the home resources score within eight major categories was examined. ANOVA had initially been selected as the appropriate statistic to test this hypothesis. However, one assumption of ANOVA is that the variances of the groups are equivalent (Lomax, 2001). The Levene test statistic found that group variances were not equivalent ($p < .001$), thus the Welch test was used as an alternative to the ANOVA to determine if the means for home resources were different by major. Dunnett's C, a multiple comparison test that does not assume equal variances, was conducted to determine which majors differed significantly from one another. Dunnett's C was used to ensure that the Type I error probability rate did not exceed alpha (Wilcox, 1987).

In ancillary analyses, a bivariate correlation was performed to determine the correlation between home resources score (BYS35A-P) and socioeconomic composite score (BYSES), and a one-way ANOVA was conducted to determine if the mean scores for home resources were different by socioeconomic status composite quartile score (BYSESQ).

In the first hypothesis for degree of acculturation, students' generational status within six major categories was examined. Since a crosstabulation showed that 2 cells had an expected count of less than 5, the following changes were made: third-generation students ($n=45$) was combined with second-generation students ($n=192$); math and computer science majors ($n=12$) was combined with engineering majors ($n=45$); and

vocational studies ($n=14$) was removed from the analysis. Since generational status was conceptualized in this study as a categorical variable, a chi-square analysis was conducted to compare the proportions of first-generation and second- and third-generation students within the six major fields of study.

In the second hypothesis for degree of acculturation, a crosstabulation showed a small number of limited English proficient students ($n=38$). Thus, it was determined that the hypothesis could not be tested given small cell sizes across eight major fields of study.

In the fifth hypothesis for students' perceived parental educational expectation, a two-way ANOVA was conducted to determine if the means for mother and fathers' perceived educational expectations were different by gender and students' major. Similar to Mau's (1997) study, perceived parental educational expectation was conceptualized as a continuous variable. Tukey's honestly significant difference (HSD) was conducted to determine which gender or majors were significantly different from one another.

Summary

This chapter has described the study's hypotheses, research design, sample, instruments, and data collection procedures. A discussion of the study's participants, survey measures and data analysis concluded the chapter. The following chapter will discuss the study's results.

CHAPTER FOUR: RESULTS

The purpose of this study was to explore how Asian American college students with different majors vary in gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental educational expectation using data from the National Educational Longitudinal Study of 1988 (NELS:88) and its third follow-up survey, NELS:88/94. This chapter presents the statistical findings from the study's hypotheses.

Statistical Analyses

Null Hypothesis One: Gender and Choice of Major

The first hypothesis stated that there was no difference between students' gender and choice of major. A chi-square analysis found a significant difference between Asian American male and female students' choice of major, $\chi^2(7, N=467)=29.75, p<.001$. As shown in Table 2, the primary differences were that there were more male engineering majors from what was expected (36 count, 21.8 expected) and fewer female engineering majors (10 count, 24.2 expected). However, there were more female business majors (47 count, 42.7 expected) and health and medical science majors (52 count, 40 expected) and fewer males in business (34 count, 38.3 expected) and health and medical sciences (24 count, 36 expected) than what was expected.

Null Hypothesis Two: Ethnicity and Choice of Major

The second hypothesis stated that there was no difference between students' ethnicity and choice of major. The ethnic groupings used in this study were Chinese, Filipino, Japanese, Korean, Southeast Asian and South Asian. Since a crosstabulation

Table 2

Crosstab Results by Gender and Choice of Major

Gender	Students' Major							
	A & H	Bus	Eng	H & M	LS	M & C	SS	VS
Male								
Count	44	34	36	24	33	8	35	7
Expected	47.3	38.3	21.8	36	32.2	5.2	34.1	6.2
Female								
Count	56	47	10	52	35	3	37	6
Expected	52.7	42.7	24.2	40	35.8	5.8	37.9	6.8

$\chi^2(7, N=467)=29.75, p<.001$

Note. A & H=Arts & Humanities; Bus=Business; Eng=Engineering; H & M=Health & Medical Sciences; LS=Life Sciences; M & C=Math & Computer Sciences; SS=Social Sciences; VS=Vocational Studies.

showed that 16 cells had an expected count of less than 5, the following changes were made: math and computer science majors ($n=12$) was combined with engineering majors ($n=45$); and vocational studies ($n=14$) and Japanese students ($n=38$) were removed from the analysis due to their small cell sizes. The chi-square analysis found a significant difference between students' ethnic background and their choice of major, $\chi^2(20, N=427)=54.97, p<.001$. The crosstabs procedure revealed that there were more Chinese business majors (32 count, 23.4 expected) and social sciences majors (31 count, 24.6 expected) and fewer health and medical science majors (11 count, 20.9 expected) than expected. Filipino students tended to major primarily in health and medical sciences (30 count, 16.9 expected) and less in life sciences (6 count, 15.3 expected). Korean students leaned more towards social sciences majors (19 count, 13.5 expected) and less in health and medical sciences majors (6 count, 11.5 expected). There were more Southeast Asian students with majors in life sciences (19 count, 13.1 expected) and more South Asian life sciences majors (15 count, 8.3 expected) than what was expected (see Table 3).

Null Hypothesis Three: Socioeconomic Background and Choice of Major

The first socioeconomic background hypothesis stated that there was no difference between students' socioeconomic composite quartile score and choice of major. The quartile coding of the socioeconomic composite score ranged from quartile 1 (low) to quartile 4 (high). Since a crosstabulation showed that 6 cells had an expected count of less than 5, the following changes were made: math and computer science majors ($n=12$) was combined with engineering majors ($n=45$); and vocational studies ($n=14$) was removed from the analysis due to its small cell size.

Table 3

Crosstab Results by Ethnicity and Choice of Major

Ethnicity	Students' Major					
	A & H	Bus	Eng, M & C	H & M	LS	SS
Chinese						
Count	14	32	17	11	17	31
Expected	18.9	23.4	15.4	20.9	18.9	24.6
Filipino						
Count	21	13	15	30	6	14
Expected	15.3	19	12.5	16.9	15.3	19.9
Korean						
Count	15	9	9	6	9	19
Expected	10.4	12.9	8.5	11.5	10.4	13.5
Southeast Asian						
Count	12	18	7	15	19	14
Expected	13.1	16.3	10.7	14.5	13.1	17.1
South Asian						
Count	4	10	6	11	15	8
Expected	8.3	10.4	6.8	9.2	8.3	10.9

$\chi^2(20, N=427)=54.97, p<.001$

Note. A & H=Arts & Humanities; Bus=Business; Eng, M & C=Engineering, Math & Computer Sciences; H & M=Health & Medical Sciences; LS=Life Sciences; SS=Social Sciences.

The chi-square analysis did not find a significant difference between students' socioeconomic composite quartile score and their choice of major, $\chi^2(15, N=460)=20.96$, $p>.05$. Although there were no significant differences found, the crosstabulation results are reported in Table 4.

The second socioeconomic background hypothesis stated that there was no difference between students' home resources score and choice of major. The home resources score is the total number of items reported by students ranging from 1-16. ANOVA had initially been selected as the appropriate statistic to test this hypothesis. However, one assumption of ANOVA is that the variances of the groups are equivalent (Lomax, 2001). The Levene test statistic found that group variances were not equivalent ($p<.001$). Since the assumption of equal variances was not met, an alternative to the ANOVA was used. The Welch test found a significant difference within comparisons of home resources among eight different major groups, $W(7, 89.94)=3.497$, $p<.01$. Dunnett's C, a multiple comparison test that does not assume equal variances, found that home resources of business majors was significantly different from home resources of arts and humanities, engineering, health and medical sciences, life sciences, and social sciences majors (see Table 5). Dunnett's C procedure was used to ensure that the Type I error probability rate did not exceed alpha (Wilcox, 1987).

In ancillary analyses, positive correlation was found between home resources and socioeconomic composite score ($r=.61$, $p<.01$). ANOVA was initially selected to determine if the mean scores for home resources were different by socioeconomic status composite quartile score, but the Levene test statistic found that group variances were not equivalent ($p<.001$). Since the assumption of equal variances was not met, an alternative

Table 4

Crosstab Results by Socioeconomic Composite Quartile Score and Choice of Major

Ethnicity	Students' Major					
	A & H	Bus	Eng, M & C	H & M	LS	SS
Quartile 1						
Count	14	21	7	6	9	16
Expected	11.7	13.2	9	12.1	11.1	15.9
Quartile 2						
Count	10	17	9	17	10	16
Expected	12.7	14.3	9.8	13.1	12	17.2
Quartile 3						
Count	13	18	15	12	11	22
Expected	14.6	16.4	11.3	15	13.8	19.8
Quartile 4						
Count	37	27	26	41	40	46
Expected	34.9	39.2	26.9	35.9	33	47.2

$$\chi^2(15, N=460)=20.96, p>.05$$

Note. Quartile 1=Low; Quartile 4=High; A & H=Arts & Humanities; Bus=Business; Eng, M & C=Engineering, Math and Computer Science; H & M=Health & Medical Sciences; LS=Life Sciences; SS=Social Sciences.

to the ANOVA was used. The Welch test found a significant difference within comparisons of home resources among four quartiles, $W(3, 224)=96.86, p<.001$. As shown in Table 6, Dunnet's C found that all four quartiles were significantly different from one another.

Null Hypothesis Four: Degree of Acculturation and Choice of Major

The first acculturation hypothesis stated that there was no difference between students' generational status and choice of major. Since a crosstabulation showed that 2 cells had an expected count of less than 5, the following changes were made: third-generation students ($n=36$) was combined with second-generation students ($n=180$); math and computer science majors ($n=12$) was combined with engineering majors ($n=45$); and vocational studies ($n=14$) was removed from the analysis. The chi-square analysis did not find a significant difference between generational status and students' choice of major, $\chi^2(5, N=391)=6.11, p>.05$. Although there were no significant differences found, the crosstabulation results are reported in Table 7.

The second acculturation hypothesis stated that there was no difference between students' English proficiency and choice of major. Since the number of limited English proficient students was small ($n=38$), it was determined that the hypothesis could not be tested due to small cell sizes across major. Although there were no significant differences found, the crosstabulation results are reported in Table 8. The crosstabs procedure revealed that the largest percentage of limited English proficient students were business majors ($n=12$) and the largest percentage of English proficient students were social sciences majors ($n=97$).

Table 5

Multiple Comparison Results by Home Resources and Choice of Major

Students' Choice of Major							
A & H	Bus	Eng	H & M	LS	M & C	SS	VS
12.8 ^a	11 ^b	12.7 ^a	12.7 ^a	12.9 ^a	10.7 ^{ab}	13 ^a	11.6 ^{ab}

Note. A & H=Arts & Humanities; Bus=Business; Eng=Engineering; H & M=Health & Medical Sciences; LS=Life Sciences; M & C=Math & Computer Sciences; SS=Social Sciences; VS=Vocational Studies. Means that do not share superscripts differ at $p < .05$ in the Dunnett C comparison. The mean score for home resources was 12.25 ($SD=3.08$).

Table 6

Multiple Comparison Results by Home Resources and Socioeconomic Composite

Quartile

Socioeconomic Composite Quartile			
Quartile 1	Quartile 2	Quartile 3	Quartile 4
9.3 ^a	10.7 ^b	12.1 ^c	14 ^d

Note. Quartile 1=Low; Quartile 4=High. Means that do not share superscripts differ at $p < .05$ in the Dunnett C comparison.

Table 7

Crosstab Results by Generational Status and Choice of Major

Ethnicity	Students' Major					
	A & H	Bus	Eng, M & C	H & M	LS	SS
1 st Generation						
Count	29	43	20	33	34	40
Expected	31.6	35.6	24.4	36.1	31.6	39.7
2 nd & 3 rd Generation						
Count	33	27	28	38	28	38
Expected	30.4	34.4	23.6	34.9	30.4	38.3

$\chi^2(5, N=391)=6.11, p>.05$

Note. A & H=Arts & Humanities; Bus=Business; Eng, M & C=Engineering, Math & Computer Sciences; H & M=Health & Medical Sciences; LS=Life Sciences; SS=Social Sciences.

Table 8

Crosstab Results by Limited English Proficiency and Choice of Major

		Students' Major					
LEP Status	A & H	Bus	Eng	H & M	LS	SS	
Not LEP							
Count	68	71	54	70	66	97	
Expected	67.9	77.2	53	70.7	64.2	93	
LEP							
Count	5	12	3	6	3	3	
Expected	5.1	5.8	4	5.3	4.8	7	

Note. A & H=Arts & Humanities; Bus=Business; Eng=Engineering; H & M=Health & Medical Sciences; LS=Life Sciences; M & C=Math & Computer Sciences; SS=Social Sciences; VS=Vocational Studies. LEP=Limited English Proficient.

Null Hypothesis Five: Perceived Parental Educational Expectation and Choice of Major

The first perceived parental educational expectation hypothesis stated that there was no difference between fathers' perceived educational expectation by gender and students' major. The two-way ANOVA found a significant main effect for major, $F(7, 397)=2.733, p<.01$, but there was no significant main effect for gender, $F(1, 397)=.012, p>.05$ and no significant major by gender interaction, $F(7, 397)=1.436, p>.05$. Tukey's honestly significant difference (HSD) found fathers' perceived educational expectations differed significantly for arts and humanities majors from life sciences majors (see Table 9).

The second perceived parental educational expectation hypothesis stated that there was no difference between mothers' perceived educational expectation by gender and students' major. The two-way ANOVA found a significant main effect for major, $F(7, 390)=3.737, p<.01$, but there was no significant main effect for gender, $F(1, 390)=.167, p>.05$ and no significant major by gender interaction, $F(7, 390)=1.389, p>.05$. Tukey's honestly significant difference (HSD) found mothers' perceived educational expectations differed significantly for arts and humanities majors from life sciences and social sciences majors and for business majors from life sciences and social sciences majors (see Table 10).

Summary

Results from the chi-square analyses did not find significant differences between students' socioeconomic composite quartile score and generational status, but significant

Table 9

Multiple Comparison Results by Fathers' Expectations and Choice of Major

Students' Choice of Major							
A & H	Bus	Eng	H & M	LS	M & C	SS	VS
5.3 ^a	5.3 ^{ab}	5.4 ^{ab}	5.5 ^{ab}	5.7 ^b	5.3 ^{ab}	5.6 ^{ab}	5.2 ^{ab}

Note. A & H=Arts & Humanities; Bus=Business; Eng=Engineering; H & M=Health & Medical Sciences; LS=Life Sciences; M & C=Math & Computer Sciences; SS=Social Sciences; VS=Vocational Studies. Means that do not share superscripts differ at $p < .05$ in Tukey's HSD comparison.

Table 10

Multiple Comparison Results by Mothers' Expectations and Choice of Major

Students' Choice of Major							
A & H	Bus	Eng	H & M	LS	M & C	SS	VS
5.3 ^{ad}	5.2 ^{ad}	5.4 ^{abcd}	5.5 ^{abcd}	5.7 ^{bc}	5.2 ^{abcd}	5.7 ^{bc}	5.2 ^{abcd}

Note. A & H=Arts & Humanities; Bus=Business; Eng=Engineering; H & M=Health & Medical Sciences; LS=Life Sciences; M & C=Math & Computer Sciences; SS=Social Sciences; VS=Vocational Studies.

^a=Arts & Humanities; ^b=Life Sciences; ^c=Social Sciences; ^d=Business; Means that do not share superscripts differ at $p < .05$ in Tukey's HSD comparison.

differences were found between gender and students' choice of major, and ethnicity and students' choice of major. The Welch test and ANOVA also found home resources and perceived parental educational expectations significantly different by major. Results of the two-way ANOVA showed that mothers' perceived educational expectations differed significantly by particular majors and fathers' perceived educational expectations also differed significantly for particular majors. The number of non-English proficient students was too small to test the null hypothesis. A discussion of these results, limitations, and implications for theory, practice, and future research will be provided in the next chapter.

CHAPTER FIVE: DISCUSSION, LIMITATIONS, AND IMPLICATIONS

The purpose of this study was to explore how Asian American college students with different majors vary in gender, ethnicity, socioeconomic background, degree of acculturation and perceived parental educational expectation. This study used data from the National Educational Longitudinal Study of 1988 (NELS:88) and its third follow-up survey, NELS:88/94. This chapter presents findings and limitations of the study, implications for practice, and recommendations for future research.

Discussion

Gender and Choice of Major

It was hypothesized that there would be no differences in Asian American students' gender and choice of major. Results of this study indicated that Asian American men and women appear to have different major choice patterns. This finding is consistent with research by Dawson-Threat and Huba (1996) and Thomas (1984), which found differences in men and women's major choice patterns. Although Hsia (1988) and Sue and Abe (1995) have observed that male and female Asian American college students tend to pursue math, science or engineering majors, this study found proportionately fewer Asian American women pursuing engineering majors. Perhaps engineering continues to be an unwelcoming environment for Asian American women. It is also possible that the list of engineering-related majors from NELS:88/94 were limited in scope.

In addition, this study found that Asian American women were predominantly in business and health and medical sciences majors as opposed to social sciences, a

traditionally female-dominated major. As Leong (1991), Leung (1993), and Leung, Ivey and Suzuki (1994) have found, Asian American students preferred careers that were prestigious and profitable. Perhaps Asian American women were attracted to the prestige and profitability of business and health and medical sciences majors. A closer look at the home resources measure, to be discussed in greater length later, also revealed that Asian American students with low home resources scores tended to major in business and were less likely to major in social sciences. This is consistent with Leppel, Williams and Waldauer's (2001) study, which found that students who considered it very important to be very well off financially were more likely to choose a business major.

Ethnicity and Choice of Major

It was hypothesized that there would be no differences in students' ethnicity and choice of major. The ethnic groupings used in this study were Chinese, Filipino, Japanese, Korean, Southeast Asian and South Asian. Due to low cell sizes, math and computer science majors were combined with engineering majors, and vocational studies and Japanese students were removed from the analysis.

Results showed that there was an overall significant difference in choice of majors of different Asian American ethnic groups. It is important to interpret these findings with an understanding that most of the cell sizes for majors by ethnic group were very small (see Table 3). Nevertheless, this study found that the greatest proportion of Chinese students were business majors, followed by Filipino students who were frequently health and medical sciences majors. Koreans pursued primarily social sciences majors, and there appeared to be more Southeast Asian and South Asian life sciences majors than what was

expected. This finding contributes to the lack of research on Asian American students' ethnicity and choice of major and underscores the importance of recognizing the heterogeneity of the Asian American community (Hune, 2002). This finding also provides further evidence that Asian American students pursue various majors, not just in math and science. Still, it is important to point out that by ethnicity, a large proportion (between 36% and 59%) of Asian American students were engineering, math and computer science, health and medical sciences and life sciences majors.

Socioeconomic Status and Choice of Major

It was hypothesized that there would be no differences in students' socioeconomic status (SES) and choice of major. Results of the socioeconomic composite quartile score did not find a significant difference in students' choice of major. This finding supports Tang, Fouad and Smith's (1999) study, which found that family SES was not a significant predictor of self-efficacy, interest, or career choice for Asian Americans. However, this finding is in direct contradiction to studies that have found SES as a predictor of choice of major, especially for women (Leppel, Williams & Waldauer, 2001; Trusty, Robinson, Plata & Ng, 2000). Leung, Ivey and Suzuki (1994) suggested that Asian American students' desire for high-prestige occupations could be a means of survival and upward mobility as well as a result of parental expectations. They found that Asian American students considered occupations with higher prestige more often than White students as measured by the Duncan SEI scale. Perhaps Asian American students' pursuit of the American Dream and their desire to meet family expectations transcends the effects of SES on their choice of majors.

Although results of the socioeconomic composite quartile scores and students' choice of major were not significant, a significant difference was found between students' home resources score and choice of major. Home resources of business majors was significantly lower from home resources of arts and humanities, engineering, health and medical sciences, life sciences, and social sciences majors. Kao (1995) analyzed the home resources measure in her study of Asian American students' academic performance and found that Asian parents invested more in educational resources than Whites despite comparable family incomes. She speculated that the availability of educational resources in Asian families is driven in part by cultural values. Thus, for Asian American students, home resources may not only be a measure of SES, but also a form of parental involvement, encouragement and support. It is no wonder then that home resources appears to be related to Asian American students' choice of major as parental involvement has been associated with academic success and prestigious career choices (Kim, 1993; Mau, 1997).

In ancillary analyses, a positive correlation ($r=.61$) between home resources and the socioeconomic composite score was found, which meant that the values were moderately related to one another. However, the moderate correlation suggests that socioeconomic composite score and home resources are measuring two related but different constructs. Nevertheless, the mean scores for home resources were significantly different ($p<.05$) by socioeconomic composite quartile and that the quartiles were significantly different from one another. As shown in Table 6, students with the highest quartile did have the most resources.

Degree of Acculturation and Choice of Major

It was hypothesized that there would be no significant differences between Asian American students' degree of acculturation and choice of major. Degree of acculturation was measured by students' generational status and English proficiency. Results of the analysis showed that there was no significant difference in the choice of majors of first generation compared with second and third generation Asian American students. This finding is contradictory to studies that have found a relationship between Asian American students' level of acculturation and their career-related interests, occupational values, and choice of major (Bagasao, 1983; Leong & Tata, 1990; Park & Harrison, 1995). A closer look at these studies however, revealed that different measures were used to analyze students' level of acculturation. For example, Leong and Tata and Park and Harrison used the Suinn-Lew Asian Self-Identity Acculturation scale (SL-ASIA), and Bagasao measured acculturation by students' length of residence. The SL-ASIA is a questionnaire with 21 items that cover language, identity, friendship choice, behaviors, generational and geographical history, and attitudes (Park & Harrison). Perhaps this study's reliance on place of birth as a measure for acculturation does not adequately capture the varied immigration patterns and experiences of Asian American students. Additionally, place of birth does not account for 1.5-generation students, a term that has been used to describe Asian Americans who immigrated to the United States as a child or as an adolescent (Kim, Brenner, Liang & Asay, 2003).

Because of a small number of limited English proficient students, the hypothesis concerning choice of major and English proficiency was not tested. Perhaps the NELS:88 measure that identified whether or not students were native or non-native English

speakers used in Mau's (1997) study would have resulted in adequate cell sizes and thus been a more effective measure.

Perceived Parental Educational Expectation and Choice of Major

It was hypothesized that there would be no differences in students' perceived parental educational expectations by gender and choice of major. Results showed that mothers' expectations differed for particular majors, as did fathers' expectations. More specifically, mothers' expectations were significantly lower for arts and humanities majors from life sciences and social sciences majors and significantly lower for business majors from life sciences and social sciences majors. Fathers' expectations were significantly lower for arts and humanities majors from life sciences majors. The results suggested that parental expectation is not only associated with academic success (Mau, 1997), but also Asian American students' choice of major. It is important to interpret these findings with an understanding that this study measured students' perceived parental expectations, not parents' actual expectations.

The finding that perceived educational expectation did not vary by gender is consistent with Brandon's (1991) study, which found that Asian American parents had the same expectations regarding educational attainment for both males and females. Perhaps traditional values regarding education for women are changing, an observation Leung, Ivey and Suzuki (1994) also noted. However, Leong and Gim-Chung (1995) question whether the goal and purpose of education are the same for Asian and Asian American women as it is for men and point to the possible conflicts that women may encounter in trying to maintain traditional gender roles.

Limitations

Several factors influencing students' choice of major have been examined such as students' elementary and secondary school experiences and educational and occupational values and expectations (Thomas, 1984), and job prospects of a major and students' GRE scores (Cebula & Lopes, 1982). This study primarily analyzed students' demographic characteristics and was not able to account for other factors such as salaries or students' interests that may influence Asian American students' choice of major. At the same time, this study analyzed Asian American students alone and did not compare choice of majors across other racial groups. Thus, findings of this study lacked context. For example, this study found that between 36% and 59% of Asian Americans major in engineering, math, computer science, health and medical sciences, and life sciences. Without data from other racial groups, it is difficult to determine whether or not this was a unique trend for Asian American students.

Since the NELS:88/94 data are 10 years old, its measures such as home resources and major field of study may be outdated. Technological advancements such as the Internet have made such items as an encyclopedia, atlas, and dictionary obsolete. Similarly, NELS88/94 lists such majors as Clinic pastoral care and Basic/personal skills that may no longer be representative of the types of majors that students pursue today. Therefore, the home resources score and the eight major categories analyzed in this study may not be generalizable to the entire population. Additionally, measures for generational status and limited English proficiency may not have adequately captured the complexity of Asian American students' immigration patterns and adaptation experiences.

This study looked at students' choice of majors at the institution where they were enrolled for the longest period of time but this study did not examine whether these were two-year or four-year institutions. Students who were enrolled at two-year institutions would likely have more limited major choices than students at four-year institutions. Finally, this study analyzed Chinese, Filipino, Korean, Southeast Asian and South Asian students' choice of major, but the low cell size of Japanese students prohibited inclusion of Japanese students in analysis of the second hypothesis and the low cell size of Pacific Islander students prohibited their inclusion in all analyses of this study.

Implications

According to Leong and Gim-Chung (1995), theories of career choice and development have traditionally focused on individual factors such as the values, attitudes, and abilities of individuals without taking into account the social, cultural, and historical variables that may impinge upon Asian American students' career choice and development. Although this study did not establish a causal connection, the findings provide a glimpse of the contextual elements that could be shaping the major choices of Asian American students. These contextual elements included gender, ethnicity, home resources and perceived parental expectations. Although socioeconomic status and acculturation were not found to be significant in this study, they remain important factors to consider when working with Asian American students (Leong, 1985; Leong & Gim-Chung).

Educators need to be aware of the heterogeneity of the Asian American community and develop culturally sensitive interventions when working with this

population (Leong & Gim-Chung, 1995). First, it is important for educators to avoid subscribing to stereotypical images of Asian American students and provide multiple mediums for students to explore their varied academic interests (Leong & Gim-Chung). It is also important for educators to avoid lumping Asian American students into one group and to recognize that Chinese, Filipino, Korean, South Asian and Southeast Asian students have unique interests and goals. Third, it may be necessary for academic advisors and career counselors to teach Asian American students decision-making skills that allow them to consider their interests, abilities, and values when selecting a major (Mau, Hitchcock & Calvert, 1998). Do students have a strong desire to abide by their parents' expectations or are they willing to explore non-traditional occupations? Are students' perceptions of the rewards and requirements of certain majors accurate? By processing such questions, counselors might help Asian American students make more informed decisions.

Finally, the findings suggest that educators need to continue to outreach to Asian American women who may be interested in pursuing engineering majors. Perhaps more educators need to invest in programs that would increase the math and science self-efficacy of young women. Fouad (1995) suggests that interventions need to begin as early as middle school in order to effectively influence girls' career aspirations. Additionally, academic advisors and career counselors need to be aware of the possible sex role conflicts that Asian American women might experience because of their adherence to traditional Asian values (Leung, Ivey & Suzuki, 1994).

Recommendations for Future Research

Although this study established relationships between Asian American students' choice of major and gender, ethnicity, home resources, and perceived parental educational expectations, it did not establish a causal connection. Future research might attempt to establish a causal connection between these variables and students' choice of major.

Scholars have noted the importance of recognizing individual and group distinctions with the Asian American community (Hune, 2002; Leong & Gim-Chung, 1995). Thus, future research on Asian American students' choice of major should examine the interaction of ethnic differences with gender, socioeconomic status, degree of acculturation, and perceived parental educational expectation in order to better understand within group differences. Researchers might also consider analyses using multiple demographic characteristics such as generational status and ethnicity or SES and ethnicity in relation to Asian American students' choice of major. A comparative study with White, African American, Native American, and Latino students' choice of major might likely be pursued to reveal group distinctions and provide context for unique trends in Asian American students.

Future research interested in examining SES and Asian American students might consider adopting the home resources measure from NELS given that traditional measures of SES including parents' educational level, occupation and family income have been considered inaccurate (Barringer, Takeuchi, & Xenos, 1990; Hune, 2002). Researchers using NELS:88/94 data might consider using alternative measures for acculturation such as the variable F2S107, which measures whether or not English is a

student's native language. Generational status might also be measured by using an established acculturation instrument, such as the Suinn-Lew Asian Self-Identity Acculturation scale (SL-ASIA), and by asking students for their length of residency in the United States.

Scholars have acknowledged that students tend to change their majors throughout their college careers (Leppel, Williams & Waldauer, 2001; Park & Harrison, 1995; Thomas, 1984). Thus future research might examine whether students remained in their majors until graduation and whether they obtained jobs related to their majors. Researchers might find data from NELS:88/2000, the fourth follow-up study, useful since it surveys students' earned degrees, current job title, employer type and job satisfaction.

Finally, a qualitative research design might reveal new dimensions and perspectives on Asian American students' choice of major that quantitative measures are not able to capture. For example, future research should not overlook the role that racism and discrimination have played in Asian American students' choice of major. Scholars have hypothesized that Asian immigrant parents encourage their children to pursue prestigious majors or careers so that their children do not have to face the same type of discrimination that they faced (Leong & Gim Chung, 1995; Leung, Ivey & Suzuki, 1994). At the same time, students who do not speak English fluently have been found to restrict themselves to majors that do not require frequent interpersonal contact (Leong & Gim Chung; Leung, Ivey & Suzuki). Individual interviews or focus groups might shed light on the how racism and discrimination have affected Asian American students' choice of major. Additionally, Tang, Fouad and Smith (1999) found that Asian American students' interests did not bear any significance on their career choices, therefore it may

be interesting for future research to also explore the relationship of Asian American students' interests and choice of major.

APPENDIX A: Glossary of NELS Variables

This glossary describes the variables used in this study in alphabetical order. The variables were taken directly from the NELS surveys or they were derived by combining one or more items in these surveys. Variables beginning with a “BY” were collected in the Base Year (1988). The items below were taken directly from the National Education Longitudinal Study (NELS:88/94) Data Analysis System (DAS).

ASIAN OR PACIFIC ISLANDER SUBDIVISION (BYS31B)

Survey Question: Which of these best categorizes your background?

- 1) CHINESE
- 2) FILIPINO
- 3) JAPANESE
- 4) KOREAN
- 5) SOUTHEAST ASIAN
- 6) PACIFIC ISLANDER
- 7) SOUTH ASIAN
- 8) WEST ASIAN
- 9) MIDDLE EASTERN
- 10) OTHER ASIAN

GENERATIONAL STATUS (BYP11, BYP14, BYP17)

Survey Questions:

- 1) Was your eighth grader's mother born in the United States (that is, any of the fifty states or the District of Columbia), in Puerto Rico, or in another country or area? (BYP11)
- 2) Was your eighth grader's father born in the United States (that is, any of the fifty states or the District of Columbia), in Puerto Rico, or in another country or area? (BYP14)
- 3) Was your eighth grader born in the United States (that is, any of the fifty states, or the District of Columbia), in Puerto Rico, or in another country or area? (BYP17)

Response Options:

BORN IN U.S.

BORN IN PUERTO RICO

BORN IN ANOTHER COUNTRY

HOME RESOURCES (BYS35A-P)

Survey Question: Which of the following does your family have in your home?

- 1) A specific place for study (BYS35A)
- 2) A daily newspaper (BYS35B)
- 3) Regularly received magazine (BYS35C)
- 4) An encyclopedia (BYS35D)
- 5) An atlas (BYS35E)
- 6) A dictionary (BYS35F)
- 7) Typewriter (BYS35G)

APPENDIX A: Glossary of NELS Variables (continued)

- 8) Computer (BYS35H)
- 9) An electric dishwasher (BYS35I)
- 10) Clothes dryer (BYS35J)
- 11) Washing machine (BYS35K)
- 12) Microwave oven (BYS35L)
- 13) More than 50 books (BYS35M)
- 14) VCR (BYS35N)
- 15) Pocket calculator (BYS35O)
- 16) A room of your own (BYS35P)

Response Options:

- 1) HAVE
- 2) HAVE NOT

LIMITED ENGLISH PROFICIENCY COMPOSITE (BYLEP)

BYLEP specifies whether the student had Limited English Proficiency. It was constructed from the student self- evaluation and the teacher evaluations for proficiency in using the English language. BYLEP was set to 1 if the student responded to any of BYS27A, BYS27B, BYS27C, or BYS27D, which asks how well students understand, speak, read, and write English with 4 ("Not very well"), or if either teacher marked yes to BYT1_12, which asks if the student is a Limited English Proficiency student. If both the student responses to BYS27A-D and the teacher response to YT1_12 were missing, BYLEP was set to missing. It was 0 otherwise.

Response Options:

- 1) The student is not reported to be Limited English Proficient
- 2) The student is self-reported as Limited English Proficient or so reported by one of his or her teachers
- 3) Missing

APPENDIX A: Glossary of NELS Variables (continued)

MAJOR FIELD OF STUDY CODE AT LONGEST PSE ENROLLMENT (PSELONMJ)

This variable contains the major field of study reported by the respondent at the valid institution with his or her longest enrollment period. This list follows the order in which they appear on the NELS survey.

1. Agriculture
2. Agricultural science
3. Natural resources
4. Forestry
5. Architecture
6. American civilization
7. Area studies
8. African-American studies
9. Other ethnic studies
10. Accounting
11. Finance
12. Business/mgmt system
13. Management/bus admin
14. Secretarial
15. Business support
16. Marketing/distribution
17. Journalism
18. Communications
19. Communication tech.
20. Computer programming
21. Data processing
22. Computer/info science
23. Cosmetology
24. Other consumer/pers.
25. Early childhood ed
26. Elementary ed
27. Secondary ed
28. Special education
29. Physical education
30. Education: other
31. Electrical engineer
32. Chemical engineering
33. Civil engineering
34. Mechanical engineering
35. Engineering: all other
36. Engineering technols
37. Spanish
38. Foreign lang:non-European
39. Foreign lang:other
40. Dental/medical tech
41. Community/mental health
42. Health/phys ed/recreation
43. Nurse assisting
44. Allied health:general & other
45. Audiology
46. Clinical health science
47. Dentistry
48. Medicine
49. Veterinary medicine
50. Nursing
51. Health/hospital admn
52. Public health
53. Health science/prof:oth
54. Dietetics
55. Textiles
56. Home econ: all other
57. Child care/guidance
58. Vocation home economics:other
59. Paralegal (pre-law)
60. Law
61. Eng/Amer literature
62. Writing:creative/tch
63. Letters:other
64. Liberal studies
65. Zoology
66. Botany
67. Biochem\biophysics
68. Biol science:other
69. Statistics
70. Mathematics: other
71. Military sciences
72. Women's studies
73. Environ studies
74. Biopsychology
75. Integrated/general science
76. Interdisciplinary

APPENDIX A: Glossary of NELS Variables (continued)

77. Leisure studies	95. Political science
78. Basic/personal skill	96. International relations
79. Philosophy	97. City planning
80. Religious studies	98. IA: construction
81. Clinic pastoral care	99. Mechanics
82. Chemistry	100. IA: electronics
83. Earth science	101. Mechanics:other
84. Physics	102. Commercial art
85. Physical science: other	103. Precision production
86. Psychology	104. Air transportation
87. Protective services	105. Transportation: other
88. Social work	106. Design
89. Public administration:other	107. Speech/drama
90. Anthropology/archaeology.	108. Film arts
91. Economics	109. Music
92. Geography	110. Art history/fine art
93. History	111. Fine & performing arts:other
94. Sociology	

PERCEIVED PARENTAL EXPECTATION (BYS48A-B)

Survey Questions:

- 1) How far in school do you think your father (or male guardian) want you to get?
(BYS48A)
- 2) How far in school do you think your mother (or female guardian) want you to get?
(BYS48B)

Response Options:

- 1) LESS THAN HIGH SCHL
- 2) GRADUATE HIGH SCHOOL
- 3) VOC,TRD,BUS AFTR H.S
- 4) ATTEND COLLEGE
- 5) GRADUATE FRM COLLEGE
- 6) HIGHER SCH AFTR COLL
- 7) DON'T KNOW

SEX OF RESPONDENT (BYS12)

Survey Question: What is your sex?

- 1) MALE
- 2) FEMALE

APPENDIX A: Glossary of NELS Variables (continued)

SOCIOECONOMIC STATUS COMPOSITE (BYSES)

BYSES was constructed using the following parent questionnaire data: father's education level, mother's education level, father's occupation, mother's occupation, and family income (data coming from BYP30, BYP31, BYP34B, BYP37B, and BYP80). The actual range for BYSES is -2.97 to 2.56, with 99.99 indicating Missing.

SOCIOECONOMIC STATUS COMPOSITE QUARTILE (BYSESQ)

BYSESQ is the quartile into which BYSES falls. It was constructed by recoding BYSES into quartiles based on the weighted, BYQWT, marginal distribution. The values for BYSESQ are:

- 1) Quartile 1 Low
- 2) Quartile 2
- 3) Quartile 3
- 4) Quartile 4 High
- 8) Missing

APPENDIX B: Major Categories and their Fields of Study

This section outlines the fields of study within each of the eight major categories: arts and humanities, business, engineering, health and medical sciences, life sciences, math and computer sciences, social sciences, and vocational studies.

ARTS AND HUMANITIES

African- American studies
American civilization
Area studies
Architecture
Art history/fine art
Communications
Design
English/American literature
Film arts
Fine & performing arts:other
Foreign lang:non-European
Foreign lang:other
Interdisciplinary
Other ethnic studies
Journalism
Letters:other
Liberal studies
Music
Philosophy
Religious studies
Spanish
Speech/drama
Writing:creative/tch
Women's studies

BUSINESS

Accounting
Business/management system
Business support
Finance
Management/bus admin
Marketing/distribution

ENGINEERING

Air transportation
Chemical engineering
Civil engineering
Engineering: all other
Engineering technology
Electrical engineer
Mechanical engineering
Military sciences
Precision production
Transportation: other

APPENDIX B: Major Categories and their Fields of Study (continued)

HEALTH AND MEDICAL SCIENCES

Allied health:general & other
Audiology
Community/mental health
Clinical health science
Clinic pastoral care
Dental/medical technician
Dentistry
Dietetics
Health/hospital administration
Health/phys ed/recreation
Health science/prof:oth
Medicine
Nurse assisting
Nursing
Public health
Veterinary medicine

LIFE SCIENCES

Agriculture
Agricultural science
Biochem\biophysics
Biol science:other
Botany
Chemistry
Earth science
Environmental studies
Forestry
Natural resources
Physics
Physical science: other
Zoology

MATH AND COMPUTER SCIENCES

Communication tech.
Computer/info science
Computer programming
Data processing
Mathematics: other
Statistics

APPENDIX B: Major Categories and their Fields of Study (continued)

SOCIAL SCIENCES

Anthropology/Archaeology
Biopsychology
City planning
Economics
Early childhood education
Education: other
Elementary education
Geography
History
Integrated/general science
International relations
Law
Leisure studies
Paralegal (pre-law)
Physical education
Political science
Protective services
Psychology
Public administration:other
Secondary education
Social work
Sociology
Special education

VOCATIONAL STUDIES

Basic/personal skill
Child care/guidance
Commercial art
Cosmetology
Home econ: all other
Industrial Arts: Construction
Industrial Arts: Electronics
Mechanics
Mechanics:other
Other consumer/personal services
Secretarial
Textiles
Vocation home economics:other

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