DECISION MAKING AND EMOTIONAL STATE IN ASIAN AND NON-ASIAN STEM MAJORS

by
Amber Kamdar-Sharif

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Chair of Committee: Dr. Margit Wisner

Co-Chair of Committee: Dr. Susan X Day

Committee Member: Dr. Cameron White

Committee Member: Dr. Sascha Hein

University of Houston

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Abstract

Background: Although Asian Americans are the largest growing ethnic group in the United States (Census Bureau, 2014), limited research has studied Asian Americans' career development and the factors which guide this population into STEM college majors. **Purpose:** The study of STEM is linked to national economic prosperity in the United States, and college STEM majors are often populated by Asian-background students (Crumb & King, 2010). The purpose of this study was to gain a better understanding of the factors that influence students of Asian background and their college degree and major choices. Three research questions were addressed: (1) Do we have reason to suspect there are differences in cultural and familial expectations when making STEM major decisions between students of Asian background and Non-Asian students, and does student gender make a difference? (2) Do students of Asian background who major in STEM report more negative or positive emotional state than students of Non-Asian backgrounds who pursue a STEM major, and are these emotional states different for male and female STEM students? (3) Are Asian American students' STEM decision and emotional state associated with their birth order and generational status? The study sought to answer these questions to better understand the factors that are related to these decisions and characteristics. **Methods:** A total of 215 undergraduate and graduate STEM majors (50.6% male; 58.6% Asian ethnicity/race; 51% of the Asian students were foreign-born/first-generation) at a public research university completed an online survey. After completing questions on several demographic markers (college major, generational status, birth order, gender, age, country of origin), students reported on their perceptions of family and cultural influence on their choices of STEM majors and on their current

emotional states. Multivariate analysis of variance (MANOVA) was used to test the study hypotheses. **Results:** Students of Asian background reported significantly higher levels of family and cultural influence on major and career choice than non-Asians. In addition, students of Asian background reported significantly more positive day-to-day affect than non-Asians. Gender also shows a statistically significant difference in levels of reported total influence but not on total positive affect. Specifically, women of both Asian and non-Asian backgrounds reported higher levels of total influence. Generational status among the Asian students was also significantly related to total influence. **Conclusion:** This study is the first we know of to look at the emotional states of college STEM majors, and its results could inform culturally sensitive career assessment efforts by acknowledging and discussing collectivist points of view as well as the conventional person-environment fit in choosing a college major.

Keywords: career choice, emotional state, PANAS, Asian students, STEM majors, college students

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Chapter I

Introduction

Several factors guide students of Asian background toward the choices they make in college majors. These influences include cultural factors, family influences, generational status, birth order, and gender (Kamdar, 2014; Qin, 2010; Sandhu, 2017). It is important to further investigate these influences to gain a more concise understanding of how these factors affect students of Asian background when declaring a college major (Asian Americans Advancing Justice, 2014). Although Asian Americans are the fastest growing minority group in the United States (U.S. Census Bureau, 2014), little research has explored college majors and career development for this group. In fact, Asian Americans have been underrepresented relative to other ethnic/racial groups in most research on college choice. For example, researcher Mullen (2014) recruited only 5 students of Asian background (out of 50) to participate in the choice of college major study. Also, Asian Americans come from collectivistic cultures, and yet there is little information on how cultural influences may affect their college choice and decision making. Similarly, the role of family in decision making of Asian-American has been explored in some studies but given the importance that family plays in this group, more research is necessary (Sandhu, 2014). Identity of whether an individual is male or female; thus, living up to the gender roles defined by their background needs to be explored (Super, 1957). Finally, several factors in Asian background such as generational status and birth order also play an important role in cultural scripts. The present study discusses these factors and examines their influence for a sample of undergraduate and graduate students of Asian background when choosing an academic career focused on scientific,

technical, engineering and mathematics (STEM) areas of study. These factors were also tested to see their association with the day-to-day emotional state of Asian background college students in STEM, compared with non-Asian STEM students.

Overview

Asian Americans are the fastest growing racial group in the United States (Census Bureau, 2014). From 2005 to 2008, the Asian community in the United States grew by 38% (Kantamneni & Fouad, 2013). Approximately 60% of Asian Americans are foreign-born, according to recent government reports (U.S. Census Bureau, 2014). According to Piccorossi (2012), U.S. Asians now make up the largest share of recent immigrants into the United States. The U.S. Census Bureau reports that "South Asian Americans are highly represented within higher education settings; they have the highest educational attainment rate of all ethnic groups in the United States, with approximately 64% of South Asians attaining at least a bachelor's degree, compared to 28% of all Americans nationally" (U.S. Census Bureau, 2014). There are several factors guiding Asian students when choosing a college major. These include culture, family, generational status, birth order, and sex (Kamdar, 2014; Qin, 2010; Sandhu, 2017). The research studies on career development such as life-span, life-space theory of career, theory of vocational personalities and work environments and more recently, social cognitive career theory (Super, 1957; Holland 1957; Lent, Brown, & Hackett, 1994) have mostly used standardized variables such as academic abilities, vocational interests and personality. It is not certain that these standardized variables and traditional career theories are applicable to Asian American population (Sandhu, 2017) especially when these theories are used to model and guide career counseling. Students of Asian background report

experiencing a lack of culturally informed career guidance and feel torn when they choose majors and occupations to satisfy their parents (Qin, 2010). In this study, multiple variables were used with the inclusion of emotional state to examine the well-being of STEM Asian background students. It is expected that students of Asian background experience higher levels of negative or positive emotional state than non-Asian students who pursue a STEM majors which ultimately leads to occupational congruence or incongruence.

Purpose of the Study

The study of STEM is linked to national economic prosperity in the United States and occupies an esteemed status is public eye (Crumb & King, 2010). STEM fields are perceived as economically prosperous because they stand out amidst potential college majors as a highly valuable resource that leverages tangible earning and status potential. Coupled with prevailing public discourse about the importance of STEM, it stands to reason that obtaining a STEM degree is both a highly valued opportunity for individual and society (Crumb & King, 2010). The purpose of this cross-sectional study was to gain a better understanding of the factors that influence students of Asian background and their college degree and major choices in STEM field. This study also examines more specifically why this demographic (Asians) tends to lean more toward college and career choices in STEM fields compared to non-Asian students. The study explored how various factors such as cultural factors, family influences, generational status, birth order, and gender influence decision making and how the choice may be associated with current emotional states. Traditionally, the outcome of choosing certain occupations rather than others is measured by single career inventory that measured the congruence between

students' interest and actual career choice (Holland, 1997). However, recent literature reveals that vocational interests are less related to Asian American's career choice but rather based on their family's expectations (Qin, 2010). In a study of 187 Asian American college students, researchers Tang, Fouad and Smith (1999) examined the relationship between individual's vocational interests, self-efficacy, family background, and acculturation and found that interests were not related to Asian Americans' career choice but to self-efficacy, family background, and acculturation.

A students' selection of a career due to expectations and pressures has been linked to a variety of negative mental health outcomes such as depression and anxiety (Karaoglu & Şeker, 2010). Many would agree that this linkage is worth exploring further, but the literature in this area appears to be sparse particularly among the Asian American population. Asian are also the second largest racial and ethnic minority on the University of Houston campus (University of Houston Office of Institutional Research, 2018), where the current study was conducted. Therefore, examining and understanding more about contributing factors such as family and cultural influence and how they may be linked to emotional states will help career counselors and vocational psychologist explore other avenues with Asian American clients, given that the traditional way of suggesting career options based on matching individual interest with occupational environment may not be a comprehensive approach for Asian American students (Qin, 2010).

Research Question 1

Do we have reason to suspect there are differences in cultural and familial expectations (on) when making STEM major decisions (making) between students of Asian background and Non-Asian students, and does student gender make a difference?

Hypothesis 1: Compared to non-Asian STEM majors, Asian STEM students will report higher levels of influence by their cultural and family expectations in choice of college major, and Asian-background men and women will differ in their perceptions of influence, whereas no gender differences in levels of cultural and family influences are expected among non-Asian STEM college students.

Research Question 2

Do college students of Asian background who major in STEM report higher levels of negative or positive emotional state than non-Asian students who pursue a STEM major, and are these emotional states different for male and female STEM college students between and within ethnicities?

Hypothesis 2: Asian-background students in STEM will differ from non-Asian students in their current affect at the time of the study, and women and men in STEM may differ in current affect according to ethnic background.

Research Question 3

Are Asian American college students' STEM decision and emotional state associated with their birth order and generational status?

Hypothesis 3: Lower generational status and earlier birth order will be associated with emotional state and, stronger familial and cultural influences on STEM decisions in the Asian subsample.

The remaining chapters of this dissertation will seek to answer these research questions. For the purposes of this study, students provided self-identification of Asian and non-Asian backgrounds and gender, as well as reporting influences on choice of major and current affect.

The dissertation is organized as follows. First, Chapter Two includes the review of literature and provides the theoretical framework that guided this study. Chapter Three goes into the empirical overview, source of data, and analysis. Chapter Four presents results and finally, Chapter Five concludes with the proposed research, including a discussion of research questions, limitations, and future research plans.

Chapter II

Literature Review

The literature on country of origin, influence of collectivistic vs. individualistic culture, family influences, emotional state based on occupational congruence and incongruence, birth order, generational status, gender, and finally choice of STEM is reviewed to gain a better understanding of the career development and choices of this population.

Country of Origin

Regardless of country of origin, both men and women of Asian background have a higher level of representation in STEM fields than non-Asians. Fouad, Kantamneni, Smothers, Chen, Fitzpatrick, and Terry (2008) cited the U.S. Bureau of the Census data in 2007 and summarized that although Asian Americans compose only 4% of US population, they represent 25% of computer engineers, 30% of medical scientists, 17% of physicians, and 14% of dentists, but only 1% of social service workers. According to Min and Jang (2015), selective migration of Asians to the United States, specifically from India, China, Vietnam and Pakistan, is a major contributing factor to the concentration of Asian Americans in these fields of study and occupations. In 1965, the US Immigration Act endorsed selective immigration of Asians in “specialty occupations.” Specifically, those well-trained in technology, science, and health-care industry began migrating to the United States. Because of this selective migration, there are larger concentrations of students of Asian background with predecessors in such fields. Additionally, younger-generation students of Asian background also choose STEM majors because they are acutely aware of their marginal status as a racial minority (Sandhu, 2017). William and

Florian (1974) explain that marginality is the experience of a painful split, with accompanying feelings of insecurity, alienation, and ambivalence toward both the ethnic subculture and the dominant society that can be mitigated through upward social mobility achieved through prestigious and lucrative careers. Asian parents may guide their children to choose STEM fields because this choice allows for social mobility and economic security for the parents in their advanced years (Min & Jang, 2015).

The Influence of Collectivist vs. Individualist Culture

Hofstede (2001) defines culture as "the collective programming of the mind that distinguishes the members of one group or category of people from another" (p. 49). Culture prescribes the way of life and guides individuals with rules and principles when making life decisions. Examples include at what age a person marries, whom they marry, and what careers are appropriate for men and women.

Culture is embedded in one's identity, and people view themselves as a reflection of their culture and society. Markus and Kitayama (1998) explained that Asian students have an interdependent view of themselves through their culture. Instead of viewing themselves as individuals, they see themselves as part of the larger group, community, and so on. Many factors contribute to the make-up of an individual's culture. This research focuses on collectivism, individualism, and family connectedness due to the impact these components may have on college major choices. In Asian societies, individuals develop interdependence that binds them to others. These societies are characterized as collectivistic societies that emphasize cultural values that unite all its members as one (Lui & Rollock, 2013). Traditionally, the collective needs and interests of the family take precedence over the desires and ambitions of individual members

(Tang et al., 1999).

Different cultures view individuality differently. Collectivistic cultures link individuals to other individuals and refer to this as interdependence, harmony, or fitting in (Markus & Kitayama, 1998). Hofstede (2001) also added a long list of differences that separate factors of collectivism and individualism. The list classifies attributes that link societies to either high individualism (IDV) or low IDV. Low IDV is representative of collectivism. The characteristics common to low IDV are interdependence, obligation to others, reliance on the group, adherence and maintenance of traditional values, fulfilling roles in the group, group achievement, group or hierarchical decision making, shame in failing the group, living in extended families, caring for their own elderly and sick, property sharing, and elders being the transmitters of knowledge (Hofstede, 2001). From this reasoning, it is plausible to assume that individuals in collectivistic cultures merge their identity with that of their in-group and pursue the collective goals over individualistic goals (Agishtein & Brumbaugh, 2013).

In collectivistic culture, social hierarchy exists that is based on gender, birth order, and/or age, and family elders often have roles of authority within the family (Markus & Kitayama, 1998). These elders have the responsibility to ensure that other family members do what is best for the family instead of what is best for themselves as individuals. Further, elders may determine how much education their children receive, who they marry, or where they work. The difference between individualistic and collectivist societies is that these decisions by authority figures in collectivist cultures are much more likely to be obeyed and questioned less, than in an individualistic culture (Triandis, 1989).

In contrast, individualism, high IDV, places priority on the self. Thus, self-identity is defined by a primary focus on personal goals rather than collective goals. Individualism describes a preference for independence, freedom, competition, and low levels of group identification and integration (Hofstede & McCrae, 2004). A distinction between collective and individual society is that individualistic societies are more heterogeneous in their racial, ethnic, and religious composition. Individualistic societies are considered to have more flexibility in individual role expectations and where there are unclear norms, there is a higher tolerance for deviance from the expected norms (Triandis, 1989). According to this line of reasoning, college-age students in individualistic societies can choose career paths that differ from their families' expectations. The individual has an identification and value through their personal fulfillment. In Western cultures, children are considered separate entities from their parents after adolescence.

Family Influences

In traditional non-Americanized Asian cultures, behavior is strongly tied to the family (Shen, Liao, Abraham, & Weng, 2014). Parents often use their personal stories of sacrifice and hardship so that their children will develop an appreciation for the struggles made to allow them to have a better life (Au, 2007). However, many times that "better life" is based upon what they feel their child should pursue not only to be financially stable themselves, but also to help care for other family members in the future (Au, 2007).

Research has consistently documented the influence parents have on the educational/career choices their children make in a variety of cultures (Abbasi & Sarwat,

2014). According to Yao (1985) the higher the expectation of Asian parents toward their children succeeding academically, the more financially successful that child will become. According to Chen (2001), Chinese American students generally exceed the expectations of their parents for their vocational careers. Tang, Kim, and Havilland (2013), reported parental expectation were extremely influential regarding the choices made about colleges and majors among first generation Cambodian American college students. In this study, parental support and expectations shaped the value of education of the students who participated. Validating agents (Tang et al., 2013) are forces that assist students' transition to college. Of these agents, in the Tang et al. (2013) study, parental influence was the highest factor that students of Asian background considered when determining college choice. Many of the students were children of parents with refugee backgrounds. While the parents themselves in this study did not attend college, they did promote hard work and study habits to encourage their children to do well. In most of the cases of this study, parents were not instrumental in assisting with homework through the student's secondary education, but unanimously all the students agreed that the encouragement and motivating factors in their choosing college majors were their parents. In the study, most of the students were studying in STEM fields. The motivation to see their parents proud and to be able to help their parents was a strong factor.

Beginning at the high school level, students of Asian background may have a slight advantage over students from non-Asian backgrounds. Parents of students of Asian background - place a high value on academic performance and are known to spend a great amount of resources shaping their children to be academically successful and to be accepted into the best universities (Atwater, Lance, Woodard, & Johnson, 2013). Asian

families' involvement in their child's academic performance is important because it is linked to college majors that promise economic social mobility, and immigrant parents want their children to pursue occupations that would help raise the family's socioeconomic status (Chung, 2001). To home in on this point, a study was conducted by Saw, Berebaum and Okazai (2013). 836 students of Asian background were compared to 856 Caucasian students on family and school worries. In both these areas, students of Asian background reported higher levels of worry with effect sizes of .40 and .57 respectively.

Similarly, in her comparison study of high academic achievers between students of Asian backgrounds and their Anglo-American counterparts, Esther Lee Yao (1985) conducted a study on the parental attitudes toward the public-school system between these two cultures. The study found that both cultures took great pride in guiding their students, but that parents of students of Asian background were more concerned with academic excellence than after-school activities, whereas the Anglo counterparts were more concentrated on other areas such as sports, dance, and so on. This academic grooming of students of Asian backgrounds suggests that choice of academic college major is a prominent topic for Asian children and their parents (Chung, 2001).

Emotional State Based on Occupational Congruence and Incongruence

Congruence refers to the degree of fit between a person and his or her work environment (Holland, 1997). Person-environment fit, or congruence, is usually measured by obtaining a profile of an individual's interests, abilities, and values, and matching it with a profile of a job's demands and rewards. A good match is congruent, and a poor match is incongruent. Most career counseling is based on some version of

person-environment matching. It assumes that people who are congruent with their work environment are likely to experience job satisfaction, which directly affects quality of life and carries psychological value (Lent & Brown, 2008; Song & Park, 2005). A meta-analysis performed by Assouline and Meir (1987) included three studies with 452 adult participants. A correlation of .55 was revealed between congruence and well-being, when using a strict statistical measure of person/environment congruence and various measures of life satisfaction. Selecting a college major is preparation for a career and is regarded as the first step on college-bound vocational career paths. Fit with college major is important because it directly influences college experiences such as academic performance, major commitment, and satisfaction, which in turn can affect career outcomes (Eun, Sohn & Lee, 2013). Eun, Sohn, and Lee studied two hundred and forty-seven undergraduate students from an urban university in Seoul, Korea, and concluded that congruence was the main contributor to satisfaction with major.

However, whether Asian students choose their own career path based on personal attributes or other factors such as family expectation, culture, or other outside influences, they still must find satisfaction in the overall choice they make, especially since more organizations are seeking to hire people who are confident in the career choices they make (Litzler, Samuelson & Lorah, 2014). It is for reasons such as this that students should understand their interests, abilities, and values and be confident in their college and career choice. If students understand themselves as individuals, they may find more satisfaction in the choice they make. However, if this understanding of self is absent, students may choose majors and careers based on other influences, which could certainly lead to incongruence in the choice they make. They may pursue a career that is culturally

and socially acceptable, but they may not find happiness or satisfaction (Litzler, Samuelson & Lorah, 2014).

Students who find themselves struggling to find satisfaction in their choices are often unable to separate all the voices that provide advice and expectation in their lives. It is in this conflict that students may falter in truly finding satisfaction in the path they choose. Amundson, Borgen, Laquinta, Butterfield and Koert (2010) stated that personal meaning was a factor in finding congruence in the choices' students make. Students want to feel that they will find meaning, purpose, and have a fulfilling job that provides challenging and stimulating environments.

For students of Asian and non-Asian background, personal happiness with career preparation and choice could either be bolstered or compromised by following others' expectations. Happiness could be the end state, but the routes to get there may differ. Whether they make their decisions based on expectation or personal preference, there is a necessity to analyze the path that will eventually lead them to be happy in the choices they make during their college career. For example, if a student makes a choice in STEM based upon the influence or leanings of a parent or other family member, they may not find happiness in that career but did so out of duty to family. However, if a student makes a choice based upon personal preference, they may not choose a career path that will provide financial security, but the lack of earnings may be balanced out with work happiness for the longer-term goals of that student (Amundson et al, 2010). The current study explored whether emotional state was associated with the source of the student's choice of college major.

Birth Order

Birth order is of importance in most families, whether collectivist or individualistic (Liu, 1998). In fact, there is a strong relationship between birth order and family expectation when it comes to decision making about a college major. In certain Asian cultures, the eldest male sibling receives, on average, 65% greater education attainment than his younger siblings (Found & Sam, 2013). Male firstborns are given more privileges than their counterpart, female firstborns. Upon the oldest male, rests the highest expectation for providing not only for the parents but in some cases, providing also for younger siblings. Therefore, males experience a higher level of parental expectations as far as careers are concerned (Yang, 1991).

Bradley and Mims (1992) found that strong parental influence and earlier birth order are related based on the culture and expectations of Asian families. In fact, birth order hierarchy is so strong in Chinese and Japanese cultures that word “brother,” or “sister” is paired as either “older brother,” and “younger sister” to emphasize the importance of birth order (Kuo, 1971). One would expect that first-born children receive more parental pressures to be the most successful in climbing the socioeconomic ladder.

Generational Status

Acculturation is the cultural modification of a group of individuals based upon what has been handed down along with adaptation to a new culture (Nguyen, Messé, & Stollak, 1999). Acculturation proceeds over time, with later generations of immigrants becoming more like the host culture. The process varies according to how thoroughly the immigrant family becomes integrated into the host culture. Going through the acculturation process for Asian immigrants may be ridden with different complexities

and conflicts than other ethnic immigrant groups (Hussain, 2015). In fact, immigrants who experience the confluence of inherited culture and adopted culture report poorer mental and psychological health (Schwartz, Unger, Zamboanga & Szapocznik, 2010). This complex process of acculturations can be explained by the theory of "segmented assimilation" originally proposed by Portes and Zhou (1993). The researchers suggested that there are three paths to the segmented assimilation process of which immigrants may take. The first is essentially what is predicted by classical assimilation theory, that is, increasing acculturation and integration into the American middle class. The second is acculturation and assimilation into the urban underclass, leading to poverty and downward mobility. And third, which is more reflective of the present study, is the deliberate preservation of the immigrant own cultural values while accompanied by economic integration (Rumbaut, 1997; Portes and Zhou 1993; Zhou 1997).

Although children of Asian background may assimilate to the American culture, they may still be expected to follow cultural protocol at home and when making decisions. They may continue to follow a collective view in the choices or goals they make towards college and career choice even as they assimilate.

In the past, studies on generational status and acculturation have been based on the immigrant narrative (Gordon, 1964). Students who make choices based upon cultural traditions are most probably influenced by first or second-generation family members, even if they have adapted well to a host culture such as America or Europe (Abe-Kim, Okazaki & Goto, 2001). Many Asians have immigrated to the United States, and while there are those who fully adopt the host culture, others experience a process in which adapting to the host culture does not necessarily sacrifice the identification with heritage

culture. Second generation immigrants who retain their culture are more respected by their families and society members than those who assimilate into the current culture (Qin, 2010). Research suggests that birth order and generational status play important roles within the choice of college major subject (Sandhu, 2014). While Asian American students may struggle to find a balance between traditional expectation and contemporary cultures in which they are raised, there is, indeed, a balance struck. Another point of view is that second generation Asian Americans often find that their choices resonate with previous generations and are as influenced by family and culture in their choice of major as first-generation students are. A sample of 139 Asian Indian college students, 137 fathers, and 133 mothers were identified as either first generation or second generation Asian Indian immigrants. Results indicated that first generations had science majors and although second generations preferred nonscience majors, most of them elected math and science, which is what their parents preferred (Sandhu, 2014).

In contrast DeWind and Kasinitz (1997), assert that avoidance of incorporation into the U.S. mainstream may have costs as well as benefits. For instance, lack of social ties outside the ethnic community may restrict immigrants' knowledge of the full range of available opportunities. Strong ties within the community may also burden them with excessive obligations toward family and increase psychological distress. Therefore, the question is unresolved whether second and later generations adopt individualism in their choices or whether they knowingly follow family preferences instead, and whether sense of well-being in college is associated with either of these paths.

Gender

In Found and Sam's (2013) survey with an Asian sample, parents expected that

sons would have a higher earning potential than their daughters. Furthermore, the parental expectation for boys and girls differed based on birth position. An older female was not necessarily given preference over her younger male sibling(s) (Found & Sam, 2013), so birth order and gender work together in the hierarchy. In general, Asian men are more likely to choose a college path based on the family pressure and the expectations of parents for them to take a certain path. However, women may make choices based upon those influences as well and choose a path in STEM regardless of lacking interest in math and science (Tang, Kim, & Havilland, 2013).

Asian men and STEM. In a study of college major choices and occupational distributions, 60% of male students of Asian backgrounds were in STEM majors compared to 28% white men. In fact, Asian men were also over-represented in the fields compared to their women counterparts (Min & Jang, 2015). In 2005, Asian males showed some of the strongest movement toward STEM with over 68% of Asian males nationwide declaring a STEM major whereas only 32% of females declare a STEM major (Chang, Heckhausen, Greenbeger, & Chen, 2010). As stated previously, in traditional Asian homes, the family exercises a great amount of control over its members (Au, 2007). Men are required to uphold family traditions and follow the advice of the elders. Adult women, in most cases, are expected to follow tradition by caring for their husbands and families and may be excused from career pressures in many cases. Their emotional state while in college may be tempered by the prospect that their main work in life will be in the family.

Asian women and STEM. In a specific study on women and STEM advancement, only one Asian American participant was identified (Min & Jang, 2015).

Other studies tend to group women as a sex without taking into consideration the role of ethnicity in collecting data. One reason there is less data on specific ethnicities of women in STEM may be the overwhelming number of men in STEM fields (Ramsey, Betz & Sekaquaptewa, 2013). However, Min and Jang (2015) did determine that women representing Indian, Chinese, and Vietnamese cultures were more concentrated in STEM fields than the other female Asian groups were.

According to Wu and Wei (2011), the advancement of Asian female scientists and engineers in STEM careers is very small and continues to lag behind their male counterparts. Asian women can generally be advancing as full professors, deans, or university presidents in academia, to serving on corporate boards of trustees or managers in industry, or managerial positions in government. However, these numbers are also very low (Wu & Wei, 2011): in academia, 80% of Asian women can be found in non-faculty and non-tenured positions, and 95% of Asian women employed in industry and over 70% employed in government are in lower-level positions.

A review of the 2010 National Science Foundation (NSF) data on the science and engineering business and industry workforce reveals a surprising under-representation of female Asians at the managerial level. As in the other sectors, among all scientists and engineers who are employed in industry at the manager rank, the percentage of Asian females is consistently lower than the percentage of black and Hispanic females (Wu & Wei, 2011). There is less research on the female Asian culture and STEM than on Asians in STEM in general, partly because there are overall so few women to study. Wladis, Hachey, and Conway (2015) reported that even with the increase of community college and on-line education as alternatives to face-to-face classes, Asian females make up less

than 1% of the population of declared STEM majors. Because cultural expectations direct women to produce and manage families, they may feel discouraged from pursuing demanding STEM fields. Contrary, women who pursue careers in STEM may feel less support and encouragement. In a study examining distress levels, Zhang, Zhang, Zhang and Feng (2018) reported that female college students experienced higher levels of distress (94.07%) than males (89.11%) concerning perceived social support.

The Choice of STEM

Dickson (2010) reported that college major choice varies by race and ethnicity in major Texas universities. In a study of three college campuses in the State of Texas, Dickson (2010) found that Asian Americans majored in the following: Engineering and computer science (48.1%), natural and physical sciences (42.1%) business (25.3%), humanities (14.7%), and social sciences (13.2%). Whites on the other hand were as follows: Engineering and computer science (8.1%), natural and physical sciences (27.8%) business (29.8%), humanities (24.3%), and social sciences (25.9%). From this data it is evident that Asian American students preferred STEM majors over other choices.

University of Houston data for 2018 enrollment indicated that 17.1% Asian American students selected STEM majors while .01% selected liberal arts and humanities majors. Similarly, 16.9% White students selected STEM majors while .9% chose liberal arts and humanities majors (University of Houston Office of Institutional Research, 2018). Thus, the diverse university examined in this study did not closely follow the expected differences in ethnicity and STEM: White and Asian background students pursued liberal arts and STEM majors almost equally. University of Houston's location in a scientific and industrial stronghold may explain why both Asians and Whites choose

this college strongly for STEM majors.

A study explored data from National Education Longitudinal Study (NELS) on Asian American students from first year in college. This included 16,317 Whites, 3,171 Hispanics, 3,009 Blacks, 1,527 Asian Americans, 299 Native Americans, and 276 subjects who identified as “Other”. The results indicated that compared to other groups, Asian Americans spent more time doing homework and were more likely to pursue careers in the fields of engineering, computer science, physical & biological sciences, and mathematics (Peng & Wright,1994; Song & Glick, 2004).

Within the past 30 years, career-related interests and choices of students of Asian backgrounds specifically in undergraduate studies have been largely concentrated in the fields of STEM (Au, 2007). Additionally, studies have found that Asian students are more represented in the fields of engineering and physics than any other groups. According to Failin Au (2007), Asians have consistently expressed more interest in STEM, and less interest in sales, social science, and verbal-linguistic occupations.

Students from Asian backgrounds’ career interests have significant roots in their generational status, cultural and family backgrounds, gender, and birth order. Asian immigrants assimilate into different paths upon arriving to the US and as a result they may take an upward, or “straight-line,” assimilation, downward assimilation, or “selective acculturation.” Given these complexities of acculturation and gaps in career research on the Asian population, a study of the college and career behavior of students of Asian background is warranted (Au, 2007).

Students who pursue careers in STEM fields experience both positive and negative emotions during their college days. However, the construct of student well-

being has received very little attention as applied to STEM students from Asian backgrounds (Kamdar-Sharif, 2014). Although PsycInfo and Education Source databases contained more than 13 studies of international versus mainstream students' adjustment to college for the period from 2000 to 2019, specific explorations of emotional states among diverse STEM majors at U.S. institutions of higher education were lacking. To address this concern, this study sought to understand whether students of Asian backgrounds who major in STEM report the same current level of positive and negative affect as students of different backgrounds who pursue STEM majors.

Career counselors cannot effectively help Asian American students seeking career counseling without knowledge of the role that career plays in their lives. Students of Asian backgrounds are more likely to pursue careers in the fields of engineering, computer science, physical and biological sciences, and mathematics, and less likely to pursue careers in the areas of education and humanities (Song & Glick, 2004). This study will help career counselors examine the influences of family and cultural values on career. Awareness of these factors may also help vocational psychologists effectively address stressors related to making career choices in an individualistic society, while possessing a collectivistic background (Qin, 2010) This could lead to intervention and assessment practices that assess for collectivistic values, family influences, acculturation, and worldview when providing vocational services to students of Asian background (Fouad et al., 2008).

Research Questions

The purpose of the study was to gain a greater perspective on factors that influence the choices in college majors by Asian-background students in comparison to

non-Asian background students. Specifically, the study explored the reasons behind students of Asian backgrounds' choice of college majors which are pointed toward careers in STEM fields. The current level of positive and negative affect was also examined to explore how Asian and non-Asian students felt in the setting of STEM study considering the possible differences in their motivations to choose majors. Gender, birth order, and generational status were explored in association with Asian students' choices and emotional status, as well.

Research Question 1

Do we have reason to suspect there are differences in cultural and familial expectations when making STEM major decisions between students of Asian background and non-Asian students, and does student gender make a difference?

Hypothesis 1: Compared to non-Asian STEM majors, Asian STEM students will report higher levels of influence by their cultural and family expectations in choice of college major, and Asian-background men and women will differ in their perceptions of influence, whereas no gender differences in levels of cultural and family influences are expected among non-Asian STEM college students

Research Question 2

Do college students of Asian background who major in STEM report higher levels of negative or positive emotional state than non-Asian students who pursue a STEM major, and are these emotional states different for male and female STEM college students between and within ethnicities?

Hypothesis 2: Asian-background students in STEM will differ from non-Asian students in their current affect at the time of the study and women and men in STEM may differ in current affect according to ethnic background.

Research Question 3

Are Asian American college students' STEM decision and emotional state associated with their birth order and generational status?

Hypothesis 3: Lower generational status and earlier birth order will be associated with stronger familial and cultural influences on STEM decisions in the Asian subsample.

Chapter III

Methods

To respond effectively to a significant gap in the literature, the overall purpose of this study was to examine variables that may influence the decision making of students of Asian backgrounds when choosing STEM majors and how they are associated with emotional state.

Participants

The participants (*N* = 215) were a convenience sample of undergraduate and graduate STEM students who took an anonymous, online survey at the University of Houston, a public Carnegie-designated Tier 1 research university in a Southern metropolitan region. The demographic characteristics of the sample are described further below (see results section). Data collection occurred during summer and fall semester 2018 and then again in the summer of 2019. The survey for this study was created through Qualtrics and then a hyperlink connected the external link directly onto a personal device such as iPad, laptop and desktop. Students were personally invited by the researcher to take part in the study while going to STEM classes in the College of Engineering, Biology Department, College of Pharmacy, Anderson Library, and computer labs. In addition to the personal solicitation, participants were also recruited online through Facebook and social media. The sample was stratified in that the researcher attempted to acquire equal numbers of Asian- and non-Asian-background and male and female students. No one declined to take the survey.

The students needed to meet inclusion criteria presented on the cover page entry into the online survey. Specifically, participants had to be STEM majors of 18 years or

older. If students identified themselves as of Asian background (i.e. India, China, Pakistan, Vietnam or other), they were asked to select their select birth order (1st born, 2nd born or 3rd or further born) and generational status. Rumbaut (2004) defined generational status as either 1st (i.e., you immigrated to the United States), 2nd (i.e., your parent(s) immigrated to the United States) or 3rd and further (i.e., your grandparent(s) immigrated to the United States).

The power analysis was reported for three dependent variables (total influence, total positive affect, total negative affect) because cultural and family influence were collinear at .76 (explained later). The target sample size was 49 participants based on statistical power analyses conducted with the software program G*Power version 3.1, selecting a statistical power level of .80 and an effect size of .15 for main effect and interaction MANOVA (note that this effect size is more stringent than that found by Saw, Berenbaum and Okazaki, 2013). The two-way MANOVA had two independent variables (gender and ethnicity) with two levels each (Asian men, Asian women, non-Asian men, non-Asian women) and three dependent variables (total influence, total positive affect, total negative affect). Similarly, a second statistical power analysis for main effect and interaction MANOVA was conducted for a one-way MANOVA with 1 independent variable, either generational status or birth order with 3 levels (1st, 2nd, and 3rd or further generational status 1st, 2nd , and 3rd or further birth order) and 3 dependent variables (total influence, total positive affect, total negative affect). Using an alpha of 0.05 and a statistical power of 0.80 to detect a medium effect size of 0.15, the desired minimum sample size was 77 (Faul, Erdfelder, Buchner & Lang, 2009). Initial power analyses were conducted for MANOVAs with three dependent variables. As described later (see results

section), only two of the originally planned dependent variables were used in statistical analyses. The effect size of .15 was chosen based on the following considerations. In the study, "A Comparison of Decision Making and Life Satisfaction in Asian and non-Asian STEM majors," a medium effect size of .17 between Asian and non-Asian STEM students' cultural career influences and life satisfaction (Kamdar-Sharif, 2013) was reported. Looking at life influences in general, Fouad et al., (2016) found very large differences between Asian and non-Asian students in their reports of the strength of *family expectations* and *values and beliefs*, with Cohen's d = 1.04 and 1.6, respectively. Given this information, a conservative medium effect size was used for this study.

Procedure

The Institutional Review Board of the university approved the study. Data was collected from undergraduate and graduate STEM students through an online Qualtrics survey. Student informed consent was required for study participation and obtained at the beginning of the online survey. The participation in this project was voluntary; no incentives were offered, and students consented to take part in the study with no individually identifiable information. On average, it took students between 7-10 minutes to complete the online survey.

Measures

In the survey, students first provided demographic information (gender, birth order, generational status) and academic major (STEM or non-STEM). Non-STEM majors who accidentally took the survey were deleted from the analysis sample of this study. Next, students rated collectivist beliefs and family influence on their choice of major as well as their state of negative and positive affect in the last week.

To construct the survey for this study, several pre-existing scales were reviewed, and only relevant questions to the study were selected for analysis, resulting in a 45-item survey for this study. The survey was created to be reflective of four main parts. Part I consisted of questions 1-9 and requested of participants demographic information. Questions about country of origin, generational status, and birth order were only administered to students who indicated an Asian background because the relevant background literature focused on these features among Asians, not non-Asians. Part II covered cultural influence from questions 10-18, and Part III asked about family influence from questions 19-25. Last, Part IV assessed positive and negative affect of the students with 20 questions.

Demographic information. Part I reported the first nine demographic questions from the survey. Question 1 queried whether the student consented to take the survey. If the participant did not consent, the survey would end at that point. Question 2 determined what educational level the participant belonged to such as freshman, sophomore, junior, senior or graduate student. Question 3 determined if the participant identified him-/herself as either Asian or non-Asian. If participants were non-Asian, they were asked to skip to question 7. In question 4, participants were asked which country they identify with the most from a list of Asian countries (i.e., India, China, Pakistan, Vietnam or other). This list was generated through University of Houston's diversity index (2018) and represents the countries of most students of Asian background. Question 5 asked participants to select their generational status as either 1st (i.e., you immigrated to the United States), 2nd (i.e., your parent(s) immigrated to the United States) or 3rd and further (i.e., your grandparent(s) immigrated to the United States). Question 6 requested the birth

order of the participants as either 1st born, 2nd born or 3rd or further born. In question 7, participants were asked to select male or female. Question 8 reported age which began at 18 to eliminate any minor from the study which would require parental consent. Finally, question 9 asked participants to select from a list of University of Houston STEM majors.

Cultural influence. Upon completing the demographic scale, students were asked to respond to nine questions from the Asian American Value Scale-M (AAVS-M; Kim, Li, & Ng, 2005) that measured collectivist beliefs of the undergraduate and graduate STEM students. The AAVS-M was developed to measure the adherence to traditional Asian cultural values. In the study by Kim, Atkinson, & Yang (1999) with 163 Asian American college students, the coefficient (Cronbach) alpha for the Collectivism subscale was .89. Concurrent validity was found between AAVS-M and AVS (Asian Values Scale) scores. The AVS was the source of the AAVS-M scale and was previously validated (Kim, Atkinson, & Yang, 1999). Discriminant validity was explored between AAVS-M and Rosenberg Self-Esteem Scale (RSES) scales and showed a lack of significant relationship between Asian values and self-esteem (Kim, Li, & Ng, 2005).

The nine items used in the current study are from the Cultural Related Questions, Collectivism, part of the AAVS-M and included “the welfare of the group should be put before that of the individual”; “one’s efforts should be directed toward maintaining the well-being of the group first and the individual second”; “one’s personal needs should be second to the needs of the group”; “the needs of the community should supersede those of the individual”; “one need not always consider the needs of the group” (reverse scored); “the group should be less important than the individual” (reverse scored); “one need not sacrifice oneself for the benefit of the group” (reverse scored); “your choice of

major is similar to that of other people with your ethnic or cultural background"; and "your ethnic background influenced your choice of major" (see Appendix A, questions 10-18). Each item measured adherence to Asian cultural values and was rated on a Likert from 1 through 6, ranging from 1(*strongly disagree*), 2 (*disagree),* 3 (*slightly disagree*), 4 (*slightly agree*), 5 (*agree*), to 6 (*strongly agree*). The total score of cultural influence was the sum across the nine items. A higher value on the total score indicated a higher level of collectivistic beliefs. The Cronbach alpha for the subscale in this study was .63.

Family influence. The Family Influence Scale (FIS) was developed to measure and understand family obligation and career choice (Fouad, Kim, Ghosh, Chang, & Figueredo, 2016). In a sample of 377 U. S. university students from India, the coefficient alphas were .91, .90 and .95 (family expectations, values and beliefs, and informational support) respectively (Fouad et, al., 2016). Convergent validity was evaluated by examining associations between Career Decision-Making Self-Efficacy and FIS. Positive correlations were expected and found between both these scales (CDMSE; Fouad, Cotter, Fitzpatrick, Kantamneni, Carter, & Bernfeld, 2010).

In this study, a total of seven FIS items were chosen from the three subscales (family expectations, values and beliefs, informational support) based on face validity and used to assess levels of family influence among the undergraduate and graduate STEM students. The questions were, "my family explained how our values and beliefs pertain to my career choices", "my family expects that my choice of occupation will reflect their wishes"; "my family expects me to select a career that has a certain status"; "my family showed me what was important in choosing a career"; "my family discussed career issues with me at an early age"; "my family expects people from our culture to

choose certain careers" and "my family expects my career to match our family's values/beliefs" (see Appendix A, questions 19-25). Each item was rated on a scale ranging from 1 (*strongly disagree*), 2 (*disagree*), 3 (*slightly disagree*), 4 (*slightly agree*), 5 (*agree*) through 6 (*strongly agree*). Higher values for these items indicated a higher level of family influence. The total score of Family Influence used in the current study was formed by calculating the sum across the seven items. Higher values on the total score indicated a higher degree of family influence. The Cronbach alpha for the subscale in this study was .97.

Total Influence. The current study used only the subscales of AAVS-M and FIS that rated the family and collectivistic influence on participants and were pertinent to the analysis. The other subscales referred more to self-control, recognition and conformity, constructs that were not used in the analysis. Furthermore, as described in more detail later, a high correlation between cultural influence and family influence was present (.76) so a composite third variable labelled "Total Influence" was used in place for further analysis (Tabachnick & Fidell, 2007). The coefficient alpha for that composite variable was .92. Given that some of the items for this composite measure were chosen based on face validity, cross-validation of this composite construct with a larger sample is necessary.

Positive Affect and Negative Affect. Watson and Clark (1994) were among the first to design a multiple descriptor instrument, the Positive and Negative Affect Scale (PANAS), to classify and measure positive affect and negative affect over a limited time period. The measure presents the characteristics of both positive and negative state of mind of the participants. These descriptors have been used to assess emotional states

across cultures, languages, different populations, and time frames (Watson & Clark, 1994). In this study, the ten negative and ten positive descriptors from the PANAS scale (see last page of Appendix A) were surveyed on a 5-point scale from 1 (*not at all in the past week*) to 5 (*extremely often in the past week*). Student responses were summed up across ten negative and ten positive descriptors, respectively, to form two subscale scores (negative affect and positive affect) ranging from 10-50 points each. Higher values on each subscale indicated higher levels of positive and negative affect, respectively.

The PANAS was administered across three populations for validation purposes: middle-aged men, college undergraduate students, and chronic fatigue syndrome (CFS) patients. Middle-aged men showed a slightly lower negative affect than college students (Watson & Clark, 1994). In the test developers' samples, the internal consistency reliability for positive affect ranged from .83 to .90. The negative affect scale reliability (Cronbach alpha) ranged from .85-.90. As expected, the correlation between the negative and positive scale is low and ranged between -.05 to -.35 (Watson & Clark, 1994).

The measure has been validated in several ways. In a meta-analysis by Ian McDowell (2009), the reliability and validity of several instruments was reviewed for measuring well-being. The PANAS appeared to measure a generalized positive and negative affect that underlies more specific representations of anxiety, depression, or fear. A robust concurrent validity with general measures of depression and anxiety ranged from correlations of .55 to .75, suggesting that the PANAS is a valid indicator of general affect.

In a principal factor analysis with varimax rotation of the PANAS in six large data sets of 4,217 participants, both positive affect and negative affect emerged as the

dominant emotional states with roughly two-thirds of common loading on each factor (Watson & Clark, 1994). The data clearly supports both convergent and discriminant validity of the scale by association with other similar scales. Through the use of The Profile of Mood States (POMS) measure, a desirable convergent correlation from .89 to .95 among the positive factors of both measures was found. In addition, a low score on discriminant correlation on the negative factor of PANAS with the positive factor of POMS, between -.02 to -.18, also suggests that the PANAS is a valid measure of affect (Watson & Clark, 1994). In the current study, Cronbach's alpha was .89 for the positive affect scale and .83 for the negative affect scale. The correlation between negative affect and positive affect was -.18** (p = .01) in this study.

Analysis

To answer the research questions, first all the variables were checked for missing data and pairwise deletion (Barladi & Enders, 2010) was employed to accommodate missing scores (see results section for details). Variable totals were then examined with the bivariate correlation matrix to discern multicollinearity. Then MANOVAs were performed as described below. All statistical analyses in this study were performed using IBM Statistical Package for the Social Sciences (SPSS) software Version 22.0 (IBM Corp., 2014).

Descriptive statistics. Descriptive analysis (frequencies for nominal variables; measures of central tendency and dispersion for continuous variables) was conducted to examine the continuous outcomes (e.g., positive and negative affect) and demographics of the sample (e.g., age, gender, ethnicity, college major, Asian or non-Asian backgrounds). To reiterate, country of origin, generational status, and birth order

information was only asked of students who indicated Asian as their background.

Bivariate correlation matrix. Product-moment correlations among all continuous variables were examined to investigate the relationships among them.

Multivariate analysis of variance (MANOVA). A two-way multivariate analysis of variance (MANOVA) was conducted to address research questions 1 and 2. The ethnicity variable (Asian and non-Asian backgrounds) and gender were the grouping variables. It was originally planned to use cultural influence, family influence, positive affect, and negative affect as dependent variables in the MANOVA, but after the inspection of bivariate correlations revealed high collinearity among two of the dependent variables (see results section for details), just three outcomes were planned for the MANOVA, namely total influence (combination of cultural and family influence), positive affect, and negative affect. Two one-way MANOVAs (described in more detail below) were conducted to address research question 3.

Chapter IV

Results

Overall, the study sought to address three research questions: (1) Do we have reason to suspect there are differences in cultural and familial expectations when making STEM major decisions between students of Asian background and non-Asian students, and does student gender make a difference? Hypothesis 1: Compared to non-Asian STEM majors, Asian STEM students will report higher levels of influence by their cultural and family expectations in choice of college major, and Asian-background men and women will differ in their perceptions of influence, whereas no gender differences in levels of cultural and family influences are expected among non-Asian STEM college students. (2) Do college students of Asian background who major in STEM experience higher levels of negative or positive emotional state than non-Asian students who pursue a STEM major, and are these emotional states different for male and female STEM college students between and within ethnicities? Hypothesis 2: Asian-background students in STEM will differ from non-Asian students in their current affect at the time of the study, and women and men in STEM may differ in current affect according to ethnic background. (3) Are Asian American college students' STEM decision and emotional state associated with their birth order and generational status? Hypothesis 3: Lower generational status and earlier birth order will be associated with stronger familial and cultural influences on STEM decisions in the Asian subsample.

Data Screening

Before performing the descriptive, bivariate correlation, and multivariate analysis, a data screening procedure was conducted. First, data was screened for missing values.

Completed surveys with missing data were minimal (less than 1%), and it was evident that omitted items occurred at random. Given the minimal proportion of values missing completely at random (MCAR), it was deemed justifiable to handle missing data for further statistical analysis by using the pairwise deletion method where cases were dropped from an analysis only if they had a missing value in at least one of the specified variables (Barladi & Enders, 2010). Second, the main variables involved in the analyses were also checked for extreme scores, described below in more detail. A comparison of observed raw means and trimmed means for all continuous study variables suggested that very high or very low (top and bottom 5%) scores had negligible effect on the means. Table 1 provides the means and trimmed means.

Table 1

Means and Trimmed Means of Continuous Variables (N=215)

Variable	M	Trimmed M
Total Influence	62.42	62.54
Total Positive Affect	37.67	37.92
Total Negative Affect	11.09	10.61

Descriptive Statistics

Table 2 provides the descriptive statistics for the entire sample. Table 3 provides the frequencies, means, and standard deviations of continuous variables separated by birth order and generational status for just the Asian subsample. Table 4 displays the means and standard deviations of continuous variables by gender and Asian versus non-Asian background for the entire study sample.

Table 2 reported a nearly equal gender balance, with a higher number between ages 18-22 and fewer students of age 33 and older. The sample had 114 students of Asian background versus 101students of non-Asian background. These students were dispersed

unevenly amongst the educational levels with more upperclassmen and graduate students. Of this sample, only students of Asian background were asked to report their country of origin. The generational status and birth order had three levels (1st, 2nd and 3rd or further) and were only reported for students of Asian background. Each generational status and birth order level had comparable group sizes with more than 30 subjects in each category.

Table 2

Frequencies and Percentages of Demographic Characteristics for Study Sample (N = 215)

Variables	*N* (frequency)	Percentage
Gender		
Male	108	49.80
Female	107	49.30
Age (reported in spans)		
18-22	126	58.10
23-32	71	32.70
33 +	17	7.80
Educational Level		
Freshman	13	6.00
Sophomore	41	19.10
Junior	63	29.30
Senior	57	26.50
Graduate Student	41	19.10
Background		
Asian	114	52.50
non-Asian	101	46.50
Country of Origin (only for Asian Students)		
India	39	18.00
Pakistan	26	12.00
China	27	12.40
Vietnam	13	6.00
Other Asian countries	9	4.10
Generational Status (only for Asian Students)		
1st generation	33	15.20
2nd generation	49	22.60
3rd or further generation	32	14.70

Variables	*N* (frequency)	Percentage
Birth Order (only for Asian Students)		
1st born	33	15.20
2nd born	47	21.70
3rd or further born	34	15.70

Watson and Clark (1994) reported the mean of the positive and negative affect over the last week (PANAS) statistics for undergraduate students of Southern Methodist University (SMU). The mean of positive affect was 32.40 and the mean of negative affect 20.40. Table 4 shows that the mean of negative affect for our sample was well below the SMU undergraduate mean level, whereas the average level of positive affect was higher in the present study compared to levels reported in the Watson and Clark (1994) study. Both Tables 3 and 4 report the PANAS descriptive statistics for gender, ethnicity, generational status and birth order.

Table 3

Frequencies, Means, and Standard Deviations of Positive Affect, Negative Affect, and Total Influence by Birth Order and Generational Status for the Asian Subsample (N = 114)

	N	Positive Affect *M* (*SD*)	Negative Affect *M* (*SD*)	Total Influence *M* (*SD*)
1st Born	33	39.39 (7.18)	11.60 (3.37)	75.79 (7.18)
2nd Born	47	38.67 (6.56)	10.96 (2.34)	72.37 (5.41)
3rd Born	34	39.82 (5.41)	10.59 (1.37)	74.01 (7.15)
1st Generation	33	39.06 (6.22)	11.27 (2.31)	75.73 (7.63)
2nd Generation	47	38.33 (6.44)	11.23 (3.10)	72.37 (6.53)
3rd Generation	32	40.72 (6.34)	10.45 (1.00)	74.26 (4.98)

Note: Birth order and generational status were not assessed for STEM students from non-Asian backgrounds; numbers in parentheses are standard deviations.

Table 4

Means and Standard Deviation for Positive Affect, Negative Affect, and Total Influence by Gender and Asian/Non-Asian Background (N = 215)

	N	Positive Affect *M* (*SD*)	Negative Affect *M* (*SD*)	Total Influence *M* (*SD*)
Asian				
Men	60	38.81 (6.53)	10.94 (2.41)	73.55 (6.94)
Women	52	39.68 (6.23)	11.10 (2.52)	74.58 (5.74)
Non-Asian				
Men	47	36.29 (6.50)	10.79 (1.93)	47.06 (9.29)
Women	53	35.68 (6.77)	11.52 (3.28)	51.51 (8.47)

Note: Numbers in parentheses are standard deviations.

Bivariate Correlation Analysis

Table 5 provides the product-moment correlation coefficients among the positive affect, negative affect, total cultural influence, and total family influence subscales. Cohen's (1998) criteria were used to gauge the strength of correlation coefficients; for Pearson correlation coefficients, effect sizes (ES) of .10, .30, and .50 are considered to be small, medium, and large, respectively (Cohen, 1988). Table 5 shows that total culture was not significantly associated with negative affect (*ES* = .08), whereas its medium-size correlation (*ES* = .35) with positive affect was statistically significant. Family influence was not significantly correlated (*ES* = -.06) with negative affect but the medium-size correlation (*ES* = .33) with positive affect was statistically significant. The negative affect and positive affect (PANAS) subscales were significantly negatively correlated (*ES* = -.18) and there was a positive significant correlation (*ES* = .76) between the measures of total cultural influence and total family influence. Correlation coefficients that exceed .70 suggest high redundancy between variables (Tabachnick & Fidell, 2007). Therefore, a composite variable that was calculated as the sum across the total cultural influence and total family influence variables was used for subsequent analysis in lieu of both

subscales. The composite variable was named “Total Influence.”

Table 5

Means, Standard Deviations, and Pearson Correlations Among Originally Planned Set of Continuous Variables

Variable	*M*	*SD*	Total Cultural Influence	Total Family Influence	Total Negative Affect	Total Positive Affect
Total Cultural Influence	34.07	5.18	----	.76**	.08	.35**
Total Family Influence	28.34	14.56		----	-.06	.33**
Total Negative Affect	11.09	2.59			----	-.18**
Total Positive Affect	37.68	6.68				----

*Notes: N = 215; *p* < 0.05. **p* < 0.01.

Table 6 shows the product-moment correlation coefficients among the two PANAS subscales and the newly calculated composite variable Total Influence. The negative affect and positive affect (PANAS) had a significant negative correlation (*ES* = -.18). Total influence and negative affect were not significantly associated with each other (*ES* = -.02) while total influence and positive affect had a significant positive medium-size correlation (*ES* = .35).

Table 6

Means, Standard Deviations, and Pearson Correlations Among Final Set of Continuous Variable

Variable	*M*	*SD*	Skewness	Kurtosis	Total Influence	Total Negative Affect	Total Positive Affect
Total Influence	62.42	14.56	-.27	-1.10	----	-.02	.35**
Total Negative Affect	11.09	2.59	3.70	15.70			-.18**
Total Positive Affect	37.68	6.68	-.59	.08			

*Notes: N = 215; *p* < 0.05. **p* < 0.01.

MANOVA Analysis

A two-way between-groups multivariate analysis of variance was performed to investigate background differences in levels of total influence and emotional state, as stated in Hypotheses 1 and 2. Three dependent variables were used: total influence, total positive affect, and total negative affect. The independent variables were ethnic background (Asian and non-Asian students) and gender (male and female). Table 4 shows the means and standard deviations for the dependent variables. Before conducting the MANOVA, the underlying statistical assumptions were examined for potential violations. As reported earlier, the bivariate correlation (Table 5) showed multicollinearity between cultural influence and family influence. In this case, it was best to combine both culture and family to create a third variable called Total Influence. Upon examining the histograms and Mahalanobis distances of all dependent variables, the negative affect variable was severely positively skewed and showed a strong floor effect. Figure 1 indicates that over half of the sample had the lowest score of 10 on the negative affect subscale (i.e., scores on both PANAS subscales can range from 10-50).

Also, the comparable sample of SMU students (Watson & Clark, 1994) had a negative affect mean double in value to the current study sample mean of 11.09, making the variable uninformative for inferential purposes in this study. Therefore, the negative affect outcome variable was eliminated from MANOVA analysis. In other words, only two dependent variables (i.e., total positive affect, total influence) were used in all MANOVA analyses.

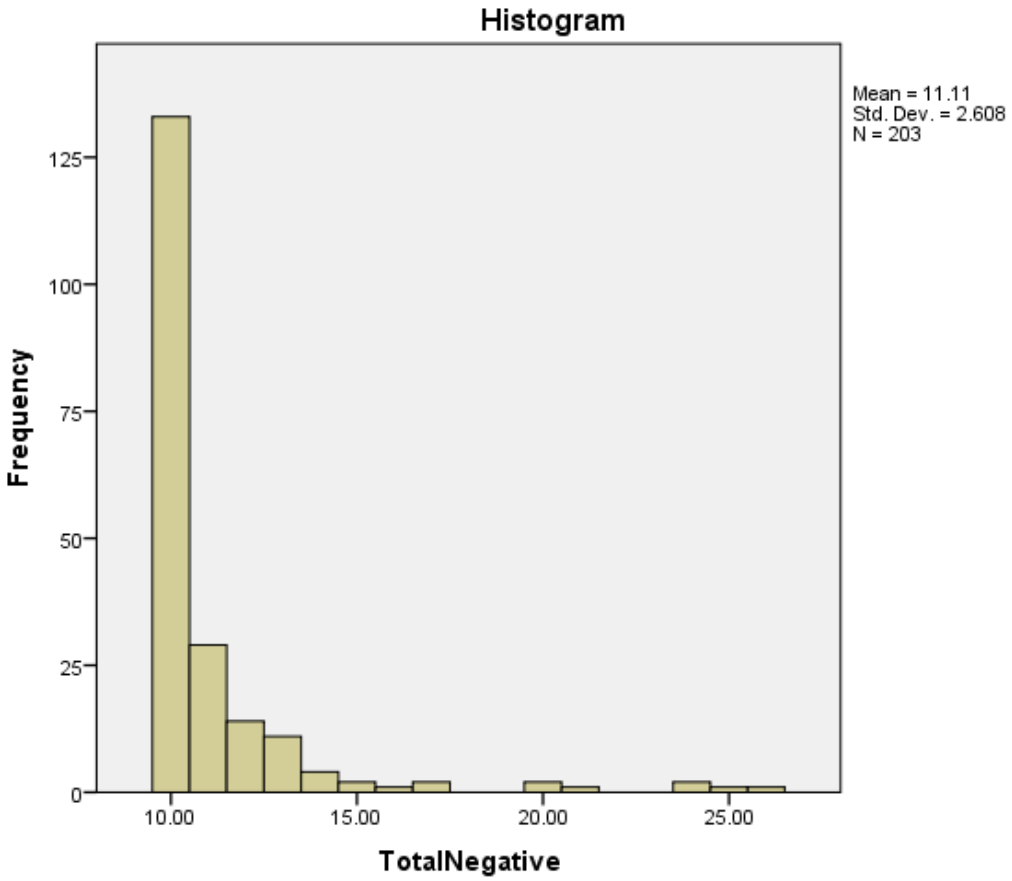

Figure 1. Distribution of Negative Affect

The assumption of linearity was tenable based on an examination of scatter plots amongst two dependent variables and the assumption of univariate normality through inspection of histograms and kurtosis and skewness values (see Table 6). The assumption of independence of observations (cases do not cross between grouping categories) was

met. There were over 45 participants in each gender-by-Asian/Non-Asian background cell (see Table 4). The assumption of homogeneity of covariance/variance (Box's *M* test) was also tenable (p = .003) at the recommended stringent nominal alpha level of .001 (Tabachnick & Fidell, 2007). The data also supported the equality of variances assumption as assessed by Levene's F- test for Total Positive Affect with p = .79 but not for Total Influence (p = .001). However, since groups are nearly equal in size, the findings of the MANOVA should not be strongly affected by this violation (Leech, Barrete & Morgan, 2005). The Mahalanobis maximum statistic in this sample was 8.03, which is well under the critical value of 13.82 (Fisher & Yates, 1963).

Findings of the two-way MANOVA omnibus test revealed a significant difference between students of Asians and non-Asian (ethnicity) backgrounds on the omnibus test, F (2, 205) = 277.07, p = .00; Wilks' Lambda = .27 and partial eta squared = .73 which is a very large effect (Cohen, 1998; Cohen considers large = .14, medium = .06 and small = .01 effect size). There was also a significant difference between genders on the omnibus test, F (2, 205) =3.45, p = .03; Wilks' Lambda = .97 and partial eta squared = .33, a large effect size. There was no significant interaction effect between ethnicity and gender, F (2, 205) = 2.15, p = .12; Wilks' Lambda =.98 and partial eta squared = .02, a low effect size.

Answering hypothesis 1 and 2, the follow-up univariate tests revealed that levels of the linear composite differed between Asians and non-Asian college students, with Asians scoring significantly higher on Total Influence (F (1, 206) =542.38, p = .00, and partial eta squared = .73) and Total Positive Affect (F (1, 206) =12.51, p = .00, and partial eta squared = .06) than non-Asians. Gender differed only on Total Influence (F (1, 206) = 6.38, p = .01, partial eta = .03) but not on Total Positive Affect (F (1, 206) = .00, p

= .95, partial eta = .00). Women of both Asian and non-Asian backgrounds reported significantly higher levels of total influence (see Table 4). The univariate test for ethnicity-by-gender interactions was not significant for either Total Influence (F (1, 206) = 2.71, p = .10, partial eta = .01) or Total Positive Affect (F (1, 206) = .49, p = .48, partial eta = .00).

Next, hypothesis 3 was tested using data from just the Asian subsample (N = 114). Among Asian STEM students, a one-way MANOVA was conducted for birth order and generational status each. For the comparisons by birth order, the three levels (1st, 2nd and 3rd or further) were used with two dependent variables (i.e., Total Influence and Total Positive Affect). The result of the Box's M test was p = .003. The Levene's test for Total Influence was p = .28 and for the Total Positive was p = .25 (Tabachnick & Fidell, 2007). The omnibus test of the one-way MANOVA for birth order revealed no statistically significant differences between Asian students of 1st, 2nd and 3rd or further birth order on the linear composite (i.e., Total Influence, Total Positive Affect), F (4, 212) = 1.54, p = .19; Wilks' Lambda = .94 and partial eta squared = .03. Total Influence was F (1, 107) = 2.57, p = .08, partial eta squared = .05 and Total Positive Affect was F (1, 107) = .40, p = .62, partial eta squared = .00.

Next, the one-way MANOVA for the generational status factor was conducted. The generational status Box's M test was p = .23. The Levene's F-test for total influence was p = .74 and for Total positive affect p = .67 (Tabachnick & Fidell, 2007). The findings of the one-way MANOVA indicated a statistically significant difference between Asian students of 1st, 2nd and 3rd generations on the omnibus test, F (4, 212) = 2.68, p = .03; Wilks' Lambda = .91 and partial eta squared = .05, with the major

difference being between 1st generation (*M* = 76.45) and second generation (*M* = 72.44) on the set of dependent variables. The follow-up univariate test for generational status differed only on Total Influence (F (1, 107) = 3.86, p = .02, partial eta squared = .07) but not on total positive affect (F (1, 107) = 106, p = .35, partial eta squared = .02). 1st generation scored significantly higher on total influence on total influence (see Table 3).

Chapter V

Discussion

The overall purpose of the study was to examine the variables that may influence students of Asian background and their decision making of college degree and major choices as well as their emotional state once these choices have been made. To that end, extant research on the influence of family and culture on career expectations, choosing STEM majors in college, acculturation levels, adherence to Asian cultural traditions, and career-related choices of students of Asian background was conducted.

The literature review suggested that there would be sharp cultural and familial differences between Asians and non-Asians when it came to influences on a younger generation's choice of major in college. Research has continuously identified the influence parents have on the choices their children make in a variety of cultures (Abbasi & Sarwat, 2014). In the case when discussing the factors that influence students of Asian background when deciding on a college major, our results supported the findings of these earlier researchers and attempted to expand on these factors by exploring gender, generational status and birth order. Through a bivariate correlation, it was discovered that the family and cultural variables had a high positive correlation (above .7) suggesting that the family is a conduit for collective or individualistic cultural stances, so a composite of the family and cultural factors was derived and used in the study. In addition, the emotional state was also assessed using the PANAS scale. Hypothesis I proposed that compared to non-Asian STEM majors, Asian STEM students will report higher levels of influence by their cultural and family expectations in choice of college major, and Asian-background men and women will differ in their perceptions of influence, whereas no

gender differences in levels of cultural and family influences are expected among non-Asian STEM college students. In the current study, Asian and non-Asian students, male and female, were different. Both women of Asian and non-Asian background reported greater total influence than men in general. The gender-by-ethnicity interaction however, was not statistically significant. As reflected in the literature, Asian-background students still greatly consider the input of culture and family when considering a college major, which leads them to adhere far more toward social norms and expectations when making career choices (Agarwal, 2000). More specifically, Agishtein and Brumbaugh's (2013) assumption that collectivistic cultures merge their identity with that of their in-group and pursue the collective goals over individualistic goals is reflected in the survey results. The MANOVA results indicate that STEM college students of Asian background identify themselves as more collectivistic than Non-Asian STEM classmates and select goals that are in line with society and family expectations (Hypothesis 1). The results are also consistent with the speculation of Jambunathan and Counselman (2002) who explain that individuals from collectivistic backgrounds contribute to the welfare of the family.

Hofstede and McCrae (2004) suggest that individualism supports a personal preference, independence, and freedom. The results support these claims, and non-Asian students depict a greater role of self in selecting choice of major and career decisions. The results are also congruent with Hofstede's (2001) list of differences that separate factors of collectivism and individualism, with Asians supporting interdependence, obligation to others, reliance on the group, adherence and maintenance of traditional values, while non-Asians place priority on the self and creating self-identity, independence, and competition.

The analyses of gender and its interaction effect with ethnicity in a two-way MANOVA were not significant in comparing reports of influence and emotional state. Perhaps the lack of gender differences can be explained by the upperclassmen status of the sample. Conceivably, women serious about their careers in STEM have stayed in the program, as opposed to women who may have dropped out due to other pressures, and thus upperclassmen only represent committed and satisfied women heading for careers rather than emphasizing family. These results indicate that Hypothesis I was supported for ethnicity and gender but not for the interaction of the two.

The second hypothesis was that Asian-background students in STEM will differ from non-Asian students in their current affect at the time of the study, and women and men in STEM may differ in current affect according to ethnic background. Once students have chosen their majors, whether they are happy in everyday college life is another question. The answer may determine whether they persist in their studies and ultimately whether they are satisfied in their careers (Amundson et al., 2010). A specific scale was used for reporting of everyday emotional states: the PANAS (Positive and Negative Affect Schedule—Expanded Form). Exploring positive and negative emotional states provided a different type of information from career motivation reports, and the descriptors have been used to assess emotional states across cultures, languages, different populations, and time frames (Watson & Clark, 1994).

Litzler, Samuelson and Lorah (2014) explain that regardless of whether Asian students choose their own career path based on personal choice or other factors such as family expectation, culture, or other outside influences, they still must find satisfaction in the overall choice. In the current study, emotional states did differ for Asian and non-

Asian students in STEM majors. In fact, in the descriptive analysis, the negative affect was lower than positive affect for both Asians and non-Asians, and Asians reported more state happiness than non-Asians. Chang (2010) echoed similar sentiments in that students who are assured about the support of their parents were much happier and more able to stay on top of their academic goals than those who didn't feel parental support.

In this sample, positive affect was well past mid-range, and negative affect was very low. Most of the participants (76%) in this study were upperclassmen: it may be that most upperclassmen have been in their prescribed major for some time now and feel a strong sense of focus and desire to pursue their degree. Both Asians and non-Asians have taken similar advanced classes in the later part of completing their degree, and they probably feel a natural satisfaction that comes from course completion. It could be that dissatisfied underclassmen have changed majors or dropped out and thus were not represented in the current sample.

The data analysis had almost equal numbers of male and female students so that comparisons were possible. However, it turned out that neither gender nor its interaction with ethnicity had a significant association with emotional state. It was a welcome finding that overall, the STEM students surveyed did report a positive emotional state in the STEM study setting (mean = 39 for positive affect, mean = 11 for negative affect, both on a scale from 10-50). The measure of emotional state only asked for reports about one week of school; however, the period of responses extended over 15-month period, allowing for time-of-semester mood effects (like pre-finals, pre-holiday, and pre-summer moods) to be distributed. The results indicate that Hypothesis II was only supported for ethnicity but not for gender nor the interaction of ethnicity and gender.

The last hypothesis suggested that lower generational status and earlier birth order would be associated with stronger familial and cultural influences on STEM decisions in the Asian subsample. The results indicated that university students of lower generational status reported higher levels of cultural influence on their decisions of choosing STEM majors. Generational status was significantly different for 1st, 2nd and 3rd generation in the omnibus, and it was expected that family influence would fade by 2nd generation based on extant literature (Abe-Kim, Okazaki & Goto, 2001). In the current study, a significant difference between 1st and 2nd generation STEM students in reports of total influence and a non-significant difference in total positive affect were found. Birth order was not a significant factor amongst students who chose STEM major or their positive affect. Therefore, Hypothesis III was only partly supported.

The research study provided a very diverse sample of Asian backgrounds at the university. This allowed the research to have a rich population of varied Asian cultures versus choosing one or two. Although Asian countries are different among themselves (i.e. different languages, different food and customs) they do share a homogenous factor: collectivism (Lui & Rollock, 2013). The collective needs of the family and community are endorsed before any personal interests and ambitions of individual members (Tang, Fouad & Smith, 1999).

Limitations and Future Research

The current study focused on gender, birth order, generational status and ethnicity as variables that may influence career-related decisions. These variables were hypothesized to be significant factor of how students of Asian backgrounds expected to make career choice. Additionally, generational status was a variable that influences the

values of immigrants and their adaptation to the host culture through a process called "segmented assimilation" (Portes and Zhou, 1993). The current study sample only reflected the third path of segmented assimilation which is a deliberate preservation of own culture while adapting to new norms and seeking upward mobility.

The findings of this study should be considered within the context of study limitations. First, the sampling method does have setbacks. A true random sampling method was compromised through a specific aim to recruit equal shares of Asian and non-Asian STEM students and, men and women. In this study, the sample was achieved through purposeful convenience sampling. The researcher recruited many students who were at library or computer labs, allowing perhaps only the most committed students to partake in the survey. This sample did not recruit from non-studious settings (i.e., bar, cafeteria, student center).

Second, items for the family influence study variable were selected from extant scales based on their face validity; its factorial structure and construct validity were not investigated in this study. Findings for this measure thus need to be viewed as preliminary and cross-validation with independent samples is indicated. Another limitation of this study relates directly to its cross-sectional, correlational design and the use of survey methodology. The implication of cross-sectional study does not prove causal relationships. While in this method, students of Asian background report more influence from their culture, why they feel that way is not explored. It reflects a snapshot of how students feel at the time of survey and not how they may feel at a different time. Cross-sectional study cannot be used to analyze behavior over a period to time (Graziano & Raulin, 1993).

Despite screening for random or inconsistent response patterns, self-report judgments made by participants are affected by concerns of self-presentation (see, e.g., Ellison & Langhout, 2017) such as reluctance to endorse negative affect in this sample.

Because a sampling procedure was done at a strong STEM university, generalizability of the study findings might be questioned for other types of universities (i.e. liberal arts). Conducting the study at liberal art universities may generate different findings; this study was done at a public Carnegie-designated Tier 1 research university that is very conducive to STEM interests, and where Asian-background students are not a rare minority. It might have been beneficial to include more freshmen to examine discrepancies among newer and older STEM majors regarding positive and negative affect as well as the levels of total reported influence. The sample of upperclassmen may not include those most adversely affected by their choice of major (for example, those thinking of changing majors or dropping out).

Additional demographic information such as parental education, parental career, and socio-economic status (SES) could be asked in the survey in order to better understand the influence of parents and culture on decision making. This information could perhaps help to understand the lack of connection of birth order with career choice. Also, career related values such as occupational prestige, interests, and aspirations can be tested as predictors of choice of STEM majors. Additionally, it could also be effective to look at different ways to measure negative affect. Perhaps someone close to the participant could complete the PANAS form or submit a behavioral observation in order to re-run the negative affect. A qualitative component could be added to the survey that consists of open-ended questions which homes in on the negative affect of the participant.

On a similar vein, this scale can be used for different cultural populations such as Hispanics. The similarities and differences can be based on whether the cultural values are individualistic or collectivistic. Portes and Rumbaut (2001) explain that family influence varies significantly among nationalities. A study was conducted between multiple nationalities to determine if parental authority and filial duty is fully preserved during the acculturation process. It was determined that Latin Americans nationalities have the most cohesive families as well as the lowest levels of parent-child conflict. This suggests that Hispanics maintain family values and lead towards more collectivistic-centered decisions (Portes & Rumbaut, 2001). Furthermore, examining the similarities and differences can help understand if all Hispanic population also has similar findings as students of Asian background. Finally, Practitioners might be more effective by taking into account the cultural influences on college students as they relate to the balance of cultural expectations and personal preferences in choice of major.

Conclusion

With this comes some valuable conclusions that can be made from the correlations among some of the variables. Questions regarding the influence of family and culture were answered on the STEM major decision. The literature on Asian culture and career development cites the importance of family influence and family relationships (Ferry, Fouad, & Smith, 1999; Fouad et al., 2008). However, this study considers both total influences along with emotional state as a factor of decision making. This study is the first we know of to look at the emotional states of STEM majors, and our results could inform culturally sensitive career assessment efforts by encouraging discussion of students' culture-driven motivations in choosing a STEM major, supplementing the

traditional method of matching student interests with choice of major.

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Appendix A

Survey

Q1. You are invited to participate in a web-based online survey on "Factors Students of Asian Background Consider in Choosing a College Major within the Scientific, Technology, Engineering and Mathematics (STEM) Fields." This is a research project being conducted by Amber Kamdar-Sharif, a PhD student at the University of Houston. It should take approximately 10 minutes to complete. This survey is anonymous, and your participation in this survey is voluntary. You may refuse to take part in the research or exit the survey at any time without penalty. Do you wish to continue taking this survey?

- o Yes
- o No

If No is selected, then skip to the end of the survey option

Q2. Please select your educational level.

- o Freshman
- o Sophomore
- o Junior
- o Senior
- o Graduate Student

Q3. Do you identity yourself as a student from an Asian background?

- o Yes
- o No

If No is selected, then skip question 4 & 5 and proceed to question 6

Q4. Select a country that you identify from.

- o India
- o China
- o Pakistan
- o Vietnam
- o Other (type in country) _____

Q5. What is your generational status? (Skip if non-Asian)

- 1st generation (i.e., you immigrated to the United States)
- 2nd generation (i.e., your parent(s) immigrated to the United States)
- 3rd or further (i.e., your grandparent(s) immigrated to the United States)

Q6. Select your birth order from list below:

- 1st born
- 2nd born
- 3rd or further

Q7. Please check the gender that applies to you:

- Male
- Female

Q8. What is your age?

- Between 18-21
- Between 22-32
- Above 33

Q9. Are you a STEM major? (Science, Technology, Engineering, Mathematics: Biochemical & Biophysical Sciences, Biology, Biomedical Engineering, Biotechnology, Chemical Engineering, Chemistry, Civil Engineering, Communication Sciences & Disorders, Computer & Electrical Engineering, Computer Engineering Technology, Computer Information Systems, Computer Science, Electrical Engineering, Electrical Power Engineering Technology, Geophysics, Physics, Industrial Engineering, Mathematical Biology, Mathematics, Mechanical Engineering, Mechanical Engineering Technology, Petroleum Engineering, Physics)

- Yes
- No

Culture Related Questions: Using a 6-point Likert Scale, respond to the statements below.

Q10. The welfare of the group should be put before that of the individual.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q11. One's efforts should be directed toward maintaining the well-being of the group first and the individual second.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q12. One's personal needs should be second to the needs of the group.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q13. The needs of the community should supersede those of the individual.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q14. One need not always consider the needs of the group.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q15. The group should be less important than the individual.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q16. One need not sacrifice oneself for the benefit of the group.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q17. Your choice of major is similar to that of other people with your ethnic or cultural background

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q18. Your ethnic background influenced your choice of major?

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Family Related Questions:

Q19. My family explained how our values and beliefs pertain to my career choices.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q20. My family expects that my choice of occupation will reflect their wishes.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q21. My family expects me to select a career that has a certain status.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q22. My family showed me what was important in choosing a career.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q23. My family discussed career issues with me at an early age.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q24. My family expects people from our culture to choose certain careers.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

Q25. My family expects my career to match our family's values/beliefs.

Strongly Disagree (1)	Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Agree (5)	Strongly Agree (6)

PANAS-X SCALE:

Please place a number (1-5) on how you are feeling in the past week.

Very Slightly OR Not at all (1)	A Little (2)	Moderately (3)	Quite a Bit (4)	Extremely (5)

_____1. Interested

_____2. Distressed

_____3. Excited

_____4. Upset

_____5. Strong

_____6. Guilty

_____7. Scared

_____8. Hostile

_____9. Enthusiastic

_____10. Proud

_____11. Irritable

_____12. Alert

_____13. Ashamed

_____14. Inspired

_____15. Nervous

_____16. Determined

_____17. Attentive

_____18. Jittery

_____19. Active

_____20. Afraid