

## **ABSTRACT**

Title of Thesis:       EVOLUTION OF OCCUPATIONAL INTERESTS IN FIRST-YEAR COLLEGE STUDENTS FROM 1971 TO 2012

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Since the 1970s, the roles of women and men in the workforce have evolved. Crossing traditional gender barriers in occupational choice has become more commonplace, particularly for women who have seen domestic role changes interact with professional progress. The 1971 through 2006 data for college students from the Higher Education Research Institute's The American Freshman: Forty year Trends, and The Freshman Survey annual reports from 2007 to 2012 are analyzed to determine trends in first-year college women's and men's occupational aspirations classified according to Holland's occupational types and level of complexity and to determine whether first-year college students have increasingly crossed traditional gender career barriers. The results indicate that the aspirations of female and male first-year college students follow similar trends over time, and the gap between the occupational aspirations of female and male first-year college students has decreased from 1971 to 2012, although it still exists.

EVOLUTION OF OCCUPATIONAL INTERESTS IN FIRST-YEAR COLLEGE  
STUDENTS FROM 1971 TO 2012

by

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Thesis submitted to the Faculty of the Graduate School of the  
University of Maryland, College Park in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
2013

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Evolution of Occupational Interests in First-year College Students from 1971 to 2012

### **Women in the American workforce**

Between 1970 and 2006, the percentage of women aged 16 and older employed in the American civilian workforce increased from 41% to 57%, whereas the percentages of men employed those years was 76% and 70% respectively (Chao & Rones, 2007). This increase in female participation reflects changes in social expectations and perceptions as well as institutional workforce changes.

At the beginning of the twentieth century, it was already common to find women in the paid workforce. One in five American women worked for wages (Blackwelder, 1997). This statistic increased to 43% of American women over age 16 by 1970 and to 59% in 2009 due to a variety of political, social and cultural forces (U.S. Dept. of Labor, 2010). At the beginning of the twenty-first century, American women have been more accepted on traditionally male-dominated professional career paths than ever before, but among the 20 leading occupations of employed women in the United States were still the traditionally female-dominated areas of secretaries and administrative assistants, nurses and aids, teachers and teacher assistants, childcare workers, waitresses, and maids and housekeeping cleaners (U.S. Department of Labor, Bureau of Labor Statistics, 2010). While some of these caretaking and assisting careers, such as administrative assistants, were initially dominated by men before it became common for women to become employed outside of the home, many have become known as “women’s work.”

With current initiatives to push girls and young women toward the more male dominated science and business worlds, such as the National Math and Science Initiative’s Advanced Placement Training and Incentive Program (APTIP) program for

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young women in the science, technology, engineering and mathematics (STEM) fields, STEM camps for girls at universities like Southern Methodist University, Rockefeller University's Women and Science initiative, Brandeis University's Women in Science initiative, the Girls Leadership Institute, and Goldman Sachs' 10,000 Women Initiative, one might think that girls and young women would be more likely to aspire to work traditionally pursued by men than they have been in previous decades. Despite current efforts to broaden the careers pursued by women, women have historically faced many barriers that have influenced their choices today. One hundred years ago, social norms encouraged women of stable financial means, either through husbands or fathers, not to enter the workforce. Decades later, women in similar economic situations would work until they were married, or until they entered their childbearing years. Today, more women take paid leave with the birth of their first child and fewer quit their jobs than in previous decades (Laughlin, 2011). From the 1960s to the early 2000s, first-time mothers have been returning to work after childbirth more quickly and in greater numbers with each decade (Johnson, 2007). They also have become increasingly likely to continue working through pregnancy. The evolution of women in the workforce has influenced working women's interests and goals over the last half century. Society's expectations of women are different than they were in decades past, shaping their perceived possibilities and changing the face of the female workforce. More educated women of higher socioeconomic levels, who might not have entered or planned to stay long in the workforce fifty years ago, are flooding the market, and changing the landscape of America's workforce.

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### **Historical context**

Historically, sex discrimination has not only occurred due to the blatant exclusion of women, but also to more subtle discrimination as it relates to pregnancy, child rearing, body size and strength, and length and types of experience (Dunlap, 1979; Reagan, 1979). The result of occupational segregation and the responsibilities of parenthood is that women have historically been treated as lesser, temporary workers and have been denied the career opportunities of their male colleagues, who have been perceived as a more stable source of labor. As a result of occupational segregation, women are concentrated in traditionally “female” occupations such as nursing, teaching, assistants, servers, and retail; they facing a glass ceiling and receive lower pay for equal work or work of equivalent value. Legal efforts have been made to support women in their workplace success. Title VII of the Civil Rights Act in 1964 was enacted to prevent sex-based discrimination in employment and bring the nation closer to equal employment opportunity (Pub. L. No. 88-352, 78 Stat. 241). It prohibits employers from discriminating against an employee or potential employee because of “race, color, religion, sex, or national origin” (Title VII of the Civil Rights Act of 1964, 2009, p. 640) by direct and individual discriminatory acts (disparate treatment) or by employment practices that result in discriminatory effects on a group (disparate impact). Title VII was the culmination of hundreds of civil rights bills that were not passed, starting with Fair Employment Practices bill, H.R. 3994, entitled "A Bill to Prohibit Discrimination by Any Agency Supported in Whole or in Part with Funds Appropriated by the Congress of the United States, and to Prohibit Discrimination against Persons Employed or Seeking Employment on Government Contracts because of Race, Color or Creed," in 1941 (Vaas,



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1966). At the inception, the bills did not include protections for sex discrimination and focused on racial discrimination. After the Civil Rights Act of 1957 and the Civil Rights Bill of 1960, racial minorities gained some protection against discrimination. H.R. 405 entitled "A Bill to Prohibit Discrimination in Employment in Certain Cases Because of Race, Religion, Color, National Origin, Ancestry or Age," the nominal ancestor of Title VII, was introduced in the House of Representatives on January 9, 1963. The administration's comprehensive bill on civil rights, H.R. 7152, was introduced in the House on June 20, 1963, and only authorized the President to establish another commission, to be known as the "Commission on Equal Employment Opportunity," which would serve to prevent discrimination within government employment on the ground of race, color, religion or national origin. It was modified to exclude the formation of a commission, and to include the power to bring a civil action against the discriminator if a settlement by agreement was not possible. The House would also add "sex" as an unacceptable basis for discrimination. Within the first 100 days from which this act took effect, 15% of the Equal Employment Opportunity Commission complaints alleging discrimination were on the basis of sex (Vaas, 1966).

The role of women in the workplace has grown and changed over the past few generations. Prior to World War II, women who chose to work while married tended to work in the early years of marriage before childbearing (Reagan, 1979). They rarely returned to working outside the home even after the children entered school or were grown. This changed during the war when women were recruited to fill jobs that were left open by men who went to war; production demands during this era resulted in a social acceptance of working women. While many jobs went back to men after the war, it was a

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turning point in American women's working patterns. Although participation in the labor force previously declined steadily after age 30, after the war, many working women either continued to work through or returned to work after a brief absence during their early childbearing years.

Since the 1960s, the rate of labor force participation has steadily risen for decades until a recent small dip in 1999 due to baby boomers beginning to retire (Mosisa & Hipple, 2006). Between 1960 and 1970, women's labor force participation increased from 30% for women of all ages with a peak of 39% for women ages 45-54, to 40% for women of all ages with a peak of 48% for women ages 45-54 (Kreps & Clark, 1975). By 2006, 60% of adult women participated in the labor force with a peak of 76% for women ages 45-54 (U.S. Department of Labor et al., 2007).

The 1960s marked a significant time in the evolution of women in the work force. The proportion of women working outside the home increased as the average age of first marriage rose. Between 1956 and 1988, the mean age at which women were first married increased from 20.1 years to 23.7 years (Blackwelder, 1997). By 2006, the mean age of first marriage was 25.5 years (Goodwin, McGill & Chandra, 2009). This, along with the popularity of the birth control pill in the 1960s, afforded women more control over their fertility and allowed them to postpone pregnancy, thereby decreasing the number of child-rearing years and increasing the potential years for working outside the home. With this, the demographics of the working woman began to change to include more women with long-term career plans and more women who pursued more prestigious opportunities.

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The 1970s brought equal-opportunity training programs, boosting the number of women entering traditionally male-dominated skilled craft occupations for the first time since women's employment opportunities decreased when the male soldiers returned after World War II. In the 1980s, the economic recession made it more difficult for American women to find employment, even though they were attending college in numbers never seen before. The fight for equality for women in America latched onto and was bolstered by the fight for racial equality. The Civil Rights Act (1964) and the Higher Education Act (1965) served as legal reinforcement of affirmative action for women in the workplace, helping women to fight the glass ceiling that they faced, but they still faced challenges due to downsizing in industry (Blackwelder, 1997).

The end of the 20<sup>th</sup> century marked a shift in expectations of working women. For the first time, women were not expected to leave the work force upon having children. In fact, maternity leave became the norm, and more than half of working women did not plan to stay home with their preschool-aged children. Nevertheless, lower income mothers whose wages would not offset the cost of childcare continued to be driven back into the home at a disproportionate rate. By 1993, women's labor force participation rose to 56%, closer to men's participation at 75% (Blackwelder, 1997).

By the 1990s, women's wages had become more important to the average American family. As the rate of divorce rose and the rate of multiple marriages over the lifetime increased, more women began to work and raise their children simultaneously than those in previous decades (Blackwelder, 1997). In 1975, 47% of civilian American women with children younger than 18 years were in the labor force; by 2012, this increased to 71% (U.S. Bureau of Labor Statistics, 2013). The number of manufacturing

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job opportunities decreased, putting a greater financial pressure on working-class families who depended on those positions. This was also true for single working-class mothers who were the sole providers for their families. These changes produced a different set of burdens for working women in the 1990s than their mothers faced a generation earlier.

Title IX of the Education Amendments of 1972 served to “avoid the use of federal resources to support discriminatory practices in education programs, and to provide individual citizens effective protection against those practices”, and served as a legal platform against the discrimination of girls in schools. Most of the girls who grew up in the 1980s and 1990s had mothers who had worked regularly since school, setting a different example from generations of the past. A shift in the social expectations at this time was seen outside the home as well, as girls' clubs and public schools started to include girls in activities designed to make them competitive in the workforce. However, this effort was in its infancy and still harbored social and institutional biases against girls.

In the 1970s, more women than men enrolled in higher education programs (Blackwelder, 1997). By the 1980s, this trend extended to the graduate programs as well. It was around this time that women began to make significant headway not only in managerial and professional positions, but also in executive-level management, law, medicine, the natural sciences, and mathematics, fields that had historically been unwelcoming to women.

Affirmative action had another, unpredicted effect. As more women entered professional, male-dominated fields, new occupations were created. While most working women during the inception of affirmative action continued to earn their living in the historically female-dominated fields, the changes in their opportunities and the labor

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landscape have been evident in the subsequent years. In the field of medicine, where doctors had predominantly been male and nurses female, women have made gains, now dominating the relatively new occupation of physician's assistant at a status between physician and nurse (American Academy of Physician Assistants, n.d.). However, men still constitute the majority of the physicians (Young, Chaudhry, Thomas, & Dugan, 2013).

### **Social development and socialization of gender stereotypes and norms**

The development of the gender stereotype begins early in life. Children internalize stereotypes during socialization in their home and school environments as well as other media (Anker, 1998, 2001; L. S. Gottfredson, 1981). They are able to identify “feminine” and “masculine” occupational categories as young as 4 or 5 years of age (Hartung, Profeli, & Vondracek, 2005). These gender stereotypes may limit women’s perceived options to occupations that are less prestigious (Cejka & Eagly, 1999). The tendency of women to view their options as limited to the generally lower paid, historically female-dominated fields is reflected in college students’ choice of major, with fewer women in the sciences and engineering, and more women in the arts and humanities (Morgan et al., 2001).

Gender-related occupational interests persist today. A recent study of high school students indicated that female students were more likely than male students to choose nursing as a career, while male students were more likely to express interest in trade occupations (Sikora & Saha, 2009). Career tracks are influenced by personal aspiration as well as by environmental pressures and norms. Men and women not only pursue different occupational and career paths, but have different occupational and career aspirations in

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adolescence. In a longitudinal study of British cohorts born in 1958 and in 1970, Schoon and Polek (2011) found that occupational level aspirations expressed at age 16 were significantly associated with time spent in full-time education, and that women were more ambitious in their occupational aspirations in that they were more likely to indicate that they expected to pursue professional or managerial occupations and more likely to ultimately pursue higher education as measured by age of finishing full-time education. Today's female students may still have more ambitious occupational aspirations than male students, even at the high school level. A survey of 22,136 eighth and tenth grade students in a Midwestern state found that girls' occupational aspirations had a higher Socioeconomic Index (SEI) score, an indicator of prestige, and required higher levels of education than those of boys (Howard, Carlstrom, Katz, Chew, Ray, Laine, & Caulum, 2011).

In terms of prestige, traditionally male-dominated careers have a wider and higher range of prestige rankings, while traditionally female careers have a narrow range of generally lower prestige rankings (Haug, 1975; Girondi, 1991). While boys tend to express greater diversity in career aspirations, girls are more likely to cross the sex divide in the male and female-dominated professions and boys are more likely to explicitly endorse more rigid sex-based occupational preferences (Farmer, 1995; Hartung, Profeli & Voncrace, 2005).

Much of the research on occupational and career choices has examined children and adolescents at a particular point in time and not how these choices have evolved in American society over time. Studies have found differences in the vocational interests of men and women according to Holland's RIASEC (Realistic, Investigative, Artistic,

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Social, Enterprising, Conventional) typology. However, the results have been mixed as to gender differences in career aspirations. Earlier studies found that women tend to endorse career preference in the artistic, social, and conventional fields, whereas men tend to endorse career preference in the realistic, investigating, and enterprising fields (Holland & Gottfredson, 1976; Arbona and Novy, 1991; Hansen, Collins, Swanson, & Fouad, 1993). Later studies have been mixed. In 2009, Metz, Fouad and Ihle-Helledy surveyed introductory psychology students at three institutions in the Midwest and found that male students reported greater aspirations for conventional careers and female students reported greater aspirations for investigative careers. Tang, Pan and Newmeyer (2008) examined high school students in a Midwest suburban public school and found that the girls were more interested in and have a higher self-efficacy on occupations that fall into Holland's Artistic and Social types than did the boys. Meanwhile, the boys were more interested in and had a higher self-efficacy for occupations that fall into Holland's Realistic, Investigative, Enterprising, and Conventional types. The mixed results may suggest a shift in interests as social norms have evolved and crossing previous gender barriers becomes more acceptable.

### **Sex-dominated professions and social pressures**

A 1967 study by Clark and Misa found that boys believed that they could learn the tasks required of male-dominated occupations more so than did girls, and vice-versa. However, the trends of sex-dominated occupations have changed since the 1960s, as have the gender roles of couples in the household and the language that teachers use to encourage boys and girls to pursue their talents. According to Eccles's (2011) model of achievement-related choices, gendered socialization is a factor that leads to differences in

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general confidence in math and physical science abilities as well as a subjective value of those fields that result in a decreased chance of women pursuing these areas of study and career. Sex differences still exist today, but the definitions of male- and female-dominated occupations and male and female career expectations have changed.

Recently, we have seen a struggle between the female gender role and women's actual career interests. Women's explicit self-reports of career preference may be more influenced by gender stereotypes than are men's explicit self-reports of career preference. Gadassi and Gati (2009) collected data from 266 visitors of a career-related Internet site. The visitors indicated their career preferences both explicitly (independently listing 5 to 10 suitable occupations) and implicitly (reporting preferences of 31 career-related aspects used to produce a list of occupational alternatives with an occupational database). These occupations were rated for sex dominance. The authors found that men's explicit lists included mostly occupations rated as "masculine," and women's explicit lists included mostly occupations rated as "feminine." The gender bias was evident in the greater disparity between explicit and implicit self-reports for women than for men, suggesting that women may endorse opinions that align with a perceived female gender stereotype.

Women are not only susceptible to the gender stereotypes that they have faced since childhood, but may also face challenges with their self-perception when presented with the opposite scenario (i.e., women in a more prestigious career), even if well intended as encouragement. Priming for either traditional or non-traditional sex-dominated careers may have adverse consequences, leading women to have a limited view of their options or to perceive themselves as less successful as compared to other women, and should be done cautiously with additional support for women. Priming for



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traditional gender roles has been shown to increase automatic gender stereotypes, while priming for non-traditional gender roles may trigger upward comparison and has been shown to lower women's leadership self-concept and interest in male-dominated careers (Rudman & Phelan, 2010).

In a world where feminism and women's rights are discussed with pride and strength, actual differences in the interests of women and men do exist. In job selection, women place more weight on social workplace criteria than do men. A 2001 study of college students found that women valued interpersonal work goals more frequently and high pay and status work goals less frequently than did men in importance for career choice (Morgan, Isaac & Sansone, 2001). This may be, in part, a reflection of the different social pressures on and values of women and men. At the same time, these pressures have influenced our values since childhood and cannot be discounted.

### **Distribution of the U.S. workforce**

Over the course of the last 40 years, there have been changes in the popularity of different Holland occupational types in the work force. A 2004 study by Reardon, Vernick and Reed examined employment trends using census data. They found that the percentage of people who engaged in Realistic type occupations decreased from 48% in 1970 to 37% in 1990; the percentage of people who engaged in Investigative type occupations was relatively stable from 5% in 1970 to 6% in 1990; the percentage of people who engaged in Artistic type occupations was stable at 1% from 1970 to 1990; the percentage of people who engaged in Social type occupations were relatively stable from 12% in 1970 to 13% in 1990; the percentage of people who engaged in Enterprising type occupations increased from 17% in 1970 to 26% in 1990; and the percentage of people

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who engaged in Conventional type occupations remained stable at 17% from 1970 to 1990. These percentages reflect the interests and needs of the American public at each point in time, with an increase in Enterprising business occupations and a decrease in Realistic type occupations that coincide with the rise of the corporate sector in the 1980s. The actual distribution of the work force may predict the aspirations of college students at that time.

### **Stability of vocational interests**

The majority of the literature regarding the stability of college majors is concentrated in the 1960s. It suggests that there has been some degree of uncertainty when it comes to college major choice for first year students and that the occupational plans are variable during that time. Student frequently change their career plans after entering college, often to related fields, although the science and engineering fields have the lowest retention in the undergraduate years (Astin & Panos, 1969; Astin, 1978; Astin, 1993).

A 1966 study of 372 college juniors at a large Midwestern university found that an equal percentage (46%) of male and female juniors changed college majors (Adamek & Goudy, 1966). The study found no significant differences between sexes in reason for changing majors, although those reasons were not described. An earlier study of college students at Michigan State University reported that 734 (31%) of the 2,369 graduating seniors were graduating in majors other than those which they had originally selected (Pierson, 1962). Among the 403 who participated in the survey, there was a decrease in the number of communication arts majors, a slight increase in majors of agriculture and biological sciences, and a large number of changes away from engineering, home

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economics, and veterinary medicine. Nearly half of the students reported that a reason for the change was the original major was a tentative choice, and that the content of the required courses of their original major did not interest them. More than two-thirds of the students reported that their original major was satisfactory, but they later discovered that their ultimate major suited them better. Students may not have enough information about all of their options when entering college.

After college, there appears to be an increase in occupational choice stability. Gottfredson (1977) compared the career stability (the maintenance of an occupation within the same Holland code) of adults of different age groups from 1965 to 1970 according to Census data. He found that career stability increases up to the mid-30s (from 74.6% for men 21-25 years and 72.3% for women 21-25 years to 87.3% for men 36-40 years and 85.5% for women 36-40 years), increases at a slower rate up to about age 50 or 60 (91.3% for men 56-60 years and 90.3% for women 56-60 years), and stabilizes at that high level to age 70. This suggests that young people's aspirations and expressed interests may not necessarily predict their occupational outcomes as they age. It is unclear whether this is due to a change in interests or in life goals.

### **Holland's Occupational Codes**

Holland's theory of vocational interests and preference as expressions of personality and personal development assumes that people of similar personality types are drawn to similar occupations. Holland (1966) deduced this from an observation of similar personality types among those in the same profession. His theory is based on several assumptions: that we can characterize individuals' resemblance to personality types, that we can characterize the environment's resemblance to model environment

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types, and that the outcome of the pairing of people and environments is predictable based on what we know about personality and environment types.

The main tenets of Holland's theory of vocational personalities and work environments are that people can be described in terms of their resemblance to six personality types, that environments can be described by their resemblance to six kinds of environments, people search for environments that match their personality types, and that people's behavior can be explained by the interaction of their personality and the environment. These personality types can be assessed qualitatively, as in expressed aspirations, and quantitatively, such as with the Vocational Preference Inventory or the Self-Directed Search (Holland, 1977; Holland, 1985; Gottfredson & Holland, 1996). The Vocational Preference Inventory describes a person by creating a profile from a self-endorsed selection of appealing vocations from a list of occupational titles representing each of Holland's six personality types, resulting in a personality profile of the highest to lowest rankings of the six types. The Self-Directed Search assesses a person's activities, competencies, occupations, and self-ratings to determine the individual's resemblance to each of the six types. A personality pattern is the rank order of resemblance to the types, and is often described by listing the two to six types in order of the person's resemblance to them. A personality pattern is more comprehensive than is a single type, and may be used to identify more specific occupations appropriate for an individual (Gottfredson & Holland, 1996). For instance, a realistic person generally prefers to work with that which is tangible and concrete. If the person resembles the Realistic and Artistic types, then a chef might be an appropriate occupation, as it combines tangible and creative activities. However, if the person resembles the Realistic and Investigative types, then a laboratory

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technician might be more appropriate as it incorporates both the concrete activities and science.

With roots in Darley's (1938) idea of organizing typologies of occupational stereotypes, Holland's theory was influenced by earlier typologies based on physique, temperament and personality, including Forer's (1948) inventory to assess personality from interests and activities (Holland, 1966). The six personality types utilized in Holland's theory are Realistic, Investigative, Social, Conventional, Enterprising and Artistic (and are analogous to Guilford's (1954) six major factors of human interest: mechanical, scientific, social welfare, clerical, business and aesthetic). These types are presumed to be a result of a complex interaction of genetic and environmental forces, including cultural and personal influences. People's resemblance to types could be assessed by interest and personality inventories, self-descriptions, choice of vocation or career path, and life history.

Holland's original descriptions of the types were reflective of the 1950s and 1960s in which they were developed. Those initial descriptions reflected the teachings of Freud (characterizing types as anal and oral), and made use of the labels of "masculine" and "feminine" interests and abilities. The descriptions published in 1966 reflect the beliefs, attitude and language of the period. More recent descriptions of the types have changed with the times and mirror American society's increasing acceptance of people of either sex in roles and with interests traditionally associated with men or women.

The types include: Realistic, Investigative (formerly Intellectual), Artistic, Social, Enterprising, and Conventional (Gottfredson & Holland, 1996). The six personality types are characterized by the following attributes: preferences for activities and occupations,

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values, perception of self, others' perception of self, and avoidances. The Realistic type prefers "manipulation of machines, tools and things" (p. 3), values "material rewards for tangible accomplishments" (p. 3), sees self as "practical, conservative, and having manual and mechanical skills—lacking social skills" (p. 3), is seen by others as "normal, frank" (p. 3), and avoids "interaction with people" (p. 3). The Investigative type prefers "exploration, understanding and prediction or control of natural and social phenomena" (p. 3), values "development or acquisition of knowledge" (p. 3), sees self as "analytical, intelligent, skeptical and having academic talent—lacking interpersonal skills" (p. 3), is seen by others as "asocial, intellectual" (p. 3), and avoids "persuasion or sales activities" (p. 3). The Artistic type prefers "literary, musical, or artistic activities" (p. 3), values "creative expression of ideas, emotions or sentiments" (p. 3), sees self as "open to experience, innovative, intellectual—lacking clerical or office skills" (p. 3), is seen by others as "unconventional, disorderly, creative" (p. 3), and avoids "routines and conformity to established rules" (p. 3). The Artistic type tends to avoid conventional activities and values aesthetic qualities. The Social type prefers "helping, teaching, treating, counseling, or serving others through personal interaction" (p. 3), values "fostering the welfare of others, social service" (p. 3), sees self as "empathetic, patient, and having interpersonal skills—lacking mechanical ability" (p. 3), is seen by others as "nurturing, agreeable, extroverted" (p. 3), and avoids "mechanical and technical activity" (p. 3). The Enterprising type prefers "persuading, manipulating, or directing others" (p. 3), values "material accomplishment and social status" (p. 3), sees self as "having sales and persuasive ability—lacking scientific ability" (p. 3), is seen by others as "energetic, gregarious" (p. 3), and avoids "scientific, intellectual, or abstruse topics" (p. 3). The

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Conventional type prefers “establishing or maintaining orderly routines, application of standards” (p. 3), values “material or financial accomplishment and power in social, business or political arenas” (p. 3), sees self as “having technical skills in business or production—lacking artistic competencies” (p. 3), is seen by others as “careful, conforming” (p. 3), and avoids “ambiguous or unstructured undertakings” (p. 3). The Artistic and Social types were originally associated with more feminine qualities, while the Realistic, Intellectual, Conventional, and Enterprising types were originally associated with masculinity. The descriptions of the types were later changed to be more gender-neutral (Holland, 1985), likely a reflection of the current, more neutral view of masculinity and femininity.

The corresponding environments are characterized by skill requirements, demands of the environment, values, and types of activities involved. The Realistic environment requires “manual and mechanical competencies, interaction with machines, tools, and objects,” (Gottfredson & Holland, 1996, p. 4) demands “conforming behavior, practical accomplishment” (p. 4), values “practical, productive and concrete values; robust, risky, adventurous styles” (p. 4), and involves “concrete, practical activity; use of machines, tools, materials” (p. 4). Realistic occupations include carpenter and truck operator. The Investigative environment requires “analytical, technical, scientific, and verbal competencies” (p. 4), demands “skepticism and persistence in problem solving, documentation of new knowledge, understanding or solution of problems” (p. 4), values “acquisition of knowledge through scholarship or investigation” (p. 4), and involves “analytical or intellectual activity aimed at trouble-shooting or creation and use of knowledge” (p. 4). Investigative occupations include psychologist and microbiologist.

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Artistic environments require “innovative or creative ability, emotionally expressive interaction with others” (p. 4), demand “imagination in literary, artistic or musical accomplishment” (p. 4), value “unconventional ideas or manners, aesthetic values” (p. 4), and involve “creative work in music, writing, performance, sculpture, or unstructured intellectual endeavors” (p. 4). Artistic occupations include musician and interior designer. Social environments require “interpersonal competencies, skill in mentoring, treating, healing, or teaching others” (p. 4)), demand “empathy, humanitarianism, sociability, friendliness” (p. 4), value “concern for the welfare of others” (p. 4), and involve “working with others in a helpful or facilitating way” (p. 4). Social occupations include counselor and clergy member. Enterprising environments require “skills in persuasion and manipulation of others” (p. 4), demand “initiative in the pursuit of financial or material accomplishment; dominance; self-confidence” (p. 4), value “acquisitive or power-oriented styles, responsibility” (p. 4), and involve “selling, leading, manipulating others to attain personal or organizational goals” (p. 4). Enterprising occupations include lawyer and retail store manager. Conventional environments require “clerical skills, skills in meeting precise standards for performance” (p. 4), demand “organizational ability, conformity, dependability” (p. 4), value “conventional outlook and concern for orderliness and routines” (p. 4), and involve “working with things, numbers, or machines to meet predictable organizational demands or specified standards” (p. 4). Conventional occupations include production editor and bookkeeper. In addition to these types, the Holland occupational codes classify occupations by complexity based on the cognitive demand of the tasks involved.



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By determining the order of an individual's resemblance to each type (from most to least), Holland has created up to  $6!$  or 720 personality patterns. However, for practical reasons, fewer types may be used by identifying only the top one to five of the types that describe an individual (Gottfredson & Holland, 1996). This would allow career counselors to help people identify a variety of potential careers rather than narrowing the field to the point of eliminating choice. Holland used the same six names for the kinds of environments: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. In Holland's initial formulation, type of environment is created by the congregations of that type of people. These people then create an environment that reflects their personalities. People with similar personalities gather together because individuals tend to seek environments that allow them to express themselves in ways in which they are comfortable and successful. They have the most freedom to exercise their talents and express their attitudes among similarly minded others who have created a congruous environment. Finally, by looking at the interaction of personality type with environment type, we are able to predict people's behavior within that environment. Those personality and environment types that correspond to one another are more harmonious than those that do not. With this in mind, we can predict job-related behaviors such as choice and level of training, achievement, creativity, stability, stress, and occupational mobility (Holland, 1965). The interaction of personalities and environments can be described by a hexagonal depiction, with each vertex representing a type in the following order: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. The types that are closer around the hexagon are more similar in theoretical terms. Those that are opposite to one another are more divergent. People seek and are most comfortable in

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occupations that fit both their personality type and cognitive ability (Gottfredson & Holland, 1996).

Early in the development of this theory of personality and vocation, it was based largely on Holland's informal observations of the predominantly male World War II soldiers whom he interviewed as an Army personnel clerk. At this time, women were not as common in the workforce, much less the military, as they are now in the twenty-first century. Those women who did work outside the home were much more limited than they are today in their potential career fields and expectations. Females did not have the social role models to follow or widespread encouragement to pursue any career path available. They also faced institutional barriers from those people and organizations with the power to allow them to follow the more competitive and male-dominated fields.

### **General Research Aims**

My hypothesis was that between 1971 and 2012, female first-year college students' endorsements of intended careers and jobs have decreased in the more traditional caretaking and assisting fields and shifted towards the more assertive business field and intellectual sciences. In other words, I expected that, across time, a smaller percentage of first-year college women has endorsed occupations of Holland's Social and Artistic types [which were initially defined as "effeminate" (p. 26) and "feminine" (p. 34) in 1965], and a greater percentage has endorsed jobs of Holland's Realistic, Investigative, Enterprising and Conventional types [which were originally defined as "masculine" (p. 21, 23, 29, 34)] as social norms and expectations evolved to reduce social and institutional barriers for women to pursue traditionally male-dominated jobs. Conversely, I expected that a greater percentage of male first-year college students have endorsed the

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Social and Artistic type occupations as social norms of masculinity have evolved, and a smaller percentage have endorsed the Realistic, Investigative, Enterprising and Conventional type occupations as women have increasingly entered those fields. Additionally, I expected that, across time, female first-year college students have endorsed jobs of increasing cognitive difficulty as women's educational aspirations have risen.

### **Methods**

A Cooperative Institute Research Program Freshman Survey has been administered to students at colleges across the country by the Higher Education Research Institute (HERI) at the Graduate School of Education and Information Studies at the University of California at Los Angeles since the 1960s. This Survey served as an initial instrument of assessment, followed by the Your First College Year and College Senior Surveys. The Higher Education Research Institute's The American Freshman: Forty year Trends, 1966-2006 report contains statistics on responses made by first-year college students from 1201 American colleges and universities and 8,309,318 incoming first-year college students, which is, on average, 202,666 students per year (Pryor, Hurtado, Saenz, Santos & Korn, 2007). The trends documented in the report include those of student characteristics, aspirations, values, attitudes, expectations and behaviors. Two items on the survey have asked first-year college students to indicate their "probable career/occupation" (p. 217) out of a possible 44 categories. This report provides data on the percentage of male and female first-year college students who endorsed their probable career/occupation out of a possible 44 categories each year from 1966 to 2006, with

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missing disaggregated data from 1966 to 1970 and from 1973 to 1975 (Pryor et al., 2007). Data for the years 2007 to 2012 was obtained by the The American Freshman annual reports (Pryor, Hurtado, Sharkness, & Korn, 2007; Pryor, Hurtado, DeAngelo, Sharkness, Romero, Korn, & Tran, 2008; Pryor, Hurtado, DeAngelo, Blake, & Tran, 2009; Pryor, Hurtado, DeAngelo, Blake, & Tran, 2010; Pryor, DeAngelo, Blake, Hurtado, & Tran, 2011; Pryor, Eagan, Blake, Hurtado, Berdan, & Case, 2012). Figures 1 and 2 represent the annual number of participating institutions and students, respectively.

By collapsing and recoding the 44 categories into Holland's six career types, the data were used to map trends in preferences by type over time. Additionally, level of complexity of each category was assessed. Two individuals rated the primary Holland occupational code for each of the 44 career categories using the *Dictionary of Holland Occupational Codes* (Gottfredson & Holland, 1996). The classification of the career and occupational titles is not an exact science and is subject to judgment, particularly when reclassifying the poorly defined list used in the HERI surveys. The careers and occupations were classified first using the Occupational Employment Statistic Occupations section of the book. If the occupation could not be found in that section because it is too specific, the Dictionary of Occupational Titles section, which contains more specific occupations, was used. In only one case, for the occupation of "housewife," later renamed "homemaker" in the HERI surveys, the best judgment of the raters was used to classify it as a Social occupation type, because it would not have been included in the *Dictionary of Holland Occupational Codes*. For the remainder of the occupations, the primary Holland code (the first of the three letters according to the Occupational Employment Statistic Occupations or the Dictionary of Occupational Titles section of the

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book), was considered its code. In the event, of a career category spanning multiple occupations with different primary Holland codes, the raters ranked as many of the occupations listed in one of the two aforementioned sections of the *Dictionary of Holland Occupational Codes* that was deemed appropriate for the HERI occupation, assigning 3 points to the first letter, 2 points to the second letter, and 1 point to the third letter of each occupation. The points were summed, and the Holland code with the greatest sum was considered the primary Holland code for that occupational category. The codes were then “sore thumbed” (Gottfredson & Holland, 1996, p. 709) to locate grossly misclassified occupations. This procedure identified one instance in which the derived code did not appear in agreement with common knowledge or interest data. The category of “accountants and actuaries” was originally classified as Investigative, which is primarily due to the inclusion of actuaries. However, there are many more accountants than actuaries, and most first-year students who responded that they would likely become an accountant or actuary likely meant accountants. Therefore, the category was reclassified as Conventional, putting more weight on the accountant occupation. There were no instances in which there was a tie between Holland codes. In the case that a career category spanned multiple occupations with different levels of complexity, the mean of those levels of complexity was used for that career category. A list of the occupations within each Holland occupational code can be found in Table 1.

The trends in percentages of female and male first-year college students who endorse the formerly considered “masculine” career types, Realistic, Intellectual, Enterprising and Conventional, and those who endorse the formerly considered “feminine” career types, Social and Artistic, as well as the mean level of complexity of

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occupations endorsed by female and male first-year college students were analyzed. The hypothesis was that the percentage of females who endorse Realistic, Intellectual, Enterprising and Conventional career types would have increased from 1971 to 2012, the percentage of females who endorsed Social and Artistic career types would have decreased from 1971 to 2012, and the mean level of complexity of females' probable occupations would have increased from 1971 to 2012 given the changes in social norms and expectations during that time. Meanwhile, the expectation was that the percentage of males who endorsed Realistic, Intellectual, Enterprising and Conventional career types would have decreased from 1971 to 2012, and the percentage of males who endorsed Social and Artistic career types would have increased from 1971 to 2012 as gender barriers have changed.

The data are reported as percentages of women and men who indicated that they aspired to occupations in the six Holland codes each year, and the mean cognitive complexity index of occupations endorsed by women each year from 1971 to 2012. Trends over time were examined by plotting the percentages of women and men who aspired to occupations in each of the six Holland categories and the mean cognitive index for occupations endorsed by women each year between 1971 and 2012, as well as a rolling 5-year average.

Error bars were constructed around the original percentages by assuming that the clustering of individual students within colleges increased the variance of error by a factor of 2 (i.e., that the design effect of the clustering, Kish, 1965, =2.0). This statistical approach seemed appropriately conservative in the context of this investigation in which I did not have access to the raw individual-level data to calculate standard errors directly.

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Specifically, the standard errors of percentages were calculated as follows:

$$SE_{pct}=100\sqrt{2\frac{p(1-p)}{N}}$$

Where  $p$  is the proportion aspiring to an occupational category and  $N$  is the number of students providing data in a given year.

In order to capture the overall change from 1971 to 2012, odds of female and male students endorsing each Holland occupational type, the relative odds from male to female in 1971 and 2012, the relative odds for females and males from 2012 to 1971, and the change in relative odds from ratio of relative odds from 2012 to 1971 were calculated (Table 2).

### Results

From 1971 to 2012, the number of participating universities in a single year ranged from 270 in 2011 to 494 in 1996 (Figure 1). In that same time period, the number of participating first-year college students ranged from 171,509 in 1971 to 289,452 in 2004 (Figure 2). Percentages and odds of female and male students who endorsed each Holland occupational type, relative odds between years and sex, and change in relative odds are presented in Table 2.

#### Realistic

The trends in the percentages of male and female first-year college students who endorsed probable Realistic careers/occupations from 1971 to 2012 are presented in Figure 3. The percentage of female students endorsing Realistic occupation types ranged from 0.6% in 1971 and 2005 to 1.7% in 1977 with standard errors of percentages ranging from 0.02% to 0.04%. The percentage of male students endorsing Realistic occupation

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types ranged from 2.9% in 2007 to 8% in 1972 with standard errors of percentages ranging from 0.05% to 0.09%. While the female students' endorsement stayed consistently low, the male students' endorsements trended down from 1971 to 2012, with the majority of the decrease before the 1990s, although it was consistently higher than that of female endorsements.

One way of interpreting the trends is the overall difference from 1971 to 2012. In 1971, 0.6% of female students and 7.9% of male students endorsed Realistic occupation types (Table 2). In 2012, 1% of female students and 3.8% of male students endorsed Realistic type occupations. In 2012, the odds that female students endorsed Realistic type occupations was 167% that of the odds in 1971. In 2012, the odds that male students endorsed Realistic type occupations was 46% that of the odds in 1971. In 1971, the odds that a male student endorsed Realistic type occupations was 14.2 times that of a female student. In 2012, the odds that a male student endorsed Realistic type occupations was 3.9 times that of a female. The ratio of relative odds favoring men for Realistic aspirations in 2012 was 0.275 that in 1971.

### **Investigative**

The trends in the percentages of male and female first-year college students who endorsed probable Investigative careers/occupations from 1971 to 2012 are presented in Figure 4. The percentage of female students endorsing Investigative type occupations ranged from 13.3% in 1971 to 25.9% in 2011 with standard errors of percentages ranging from 0.11% to 0.14%. The percentage of male students endorsing Investigative type occupations ranged from 28% in 2006 to 40.2% in 1982 with standard errors of percentages ranging from 0.12% to 0.16%. The trends for both male and female students



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followed a similar pattern with male students consistently endorsing Investigative careers at a higher rate. The difference between sexes decreased from 1971 to 2012.

In 1971, 13.3% of female students and 28.3% of male students endorsed Investigative occupation types (Table 2). In 2012, 25.1% of female students and 33.9% of male students endorsed Investigative type occupations. In 2012, the odds that female students endorsed Investigative occupations was 2.18 times the odds in 1971. In 2012, the odds that male students endorsed Investigative type occupations was 1.3 times the odds in 1971. In 1971, the odds that a male student endorsed Investigative type occupations was 2.57 times that of a female student. In 2012, the odds that a male student endorsed Investigative type occupations was 1.53 times that of a female. By 2012, the ratio of relative odds between sexes declined to 59% of the ratio in 1971.

### **Enterprising**

The trends in the percentages of male and female first-year students who endorsed probable Enterprising careers/occupations from 1971 to 2012 are presented in Figure 5. The percentage of female students who endorsed Enterprising type occupations ranged from 4.6% in 1971 to 22.4% in 1988 with standard errors of percentages ranging from 0.09% to 0.13%. The percentage of male students who endorsed Enterprising type occupations ranged from 16.9% in 2010 to 29.4% in 1988 with standard errors of percentages ranging from 0.11% to 0.14%. The male and female trends are similar, with peaks in the late 1980s, although men consistently endorse Enterprising occupations at a greater percentage. The difference between sexes decreased from 1971 to 2012.

In 1971, 4.6% of female students and 19.4% of male students endorsed Enterprising occupation types (Table 2). In 2012, 11.7% of female students and 18% of

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male students endorsed Enterprising type occupations. In 2012, the odds that female students endorsed Enterprising type occupations was 2.75 times that of the odds in 1971. In 2012, the odds that male students endorsed Enterprising type occupations was 0.91 times that of the odds in 1971. In 1971, the odds that a male student endorsed Enterprising type occupations was nearly 5 times that of a female student. In 2012, the odds that a male student endorsed Enterprising type occupations was 1.66 times that of a female. By 2012, the ratio of relative odds between sexes declined to 33% of the ratio in 1971.

### **Conventional**

The trends in the percentages of male and female first-year college students who endorsed probable Conventional careers/occupations from 1971 to 2012 are presented in Figure 6. The percentage of female students who endorsed Conventional occupation types ranged from 2.3% in 2010 to 7.9% in 1985 with standard errors of percentages ranging from 0.04% to 0.09%. The percentage of male students who endorsed Conventional occupation types ranged from 2.6% in 2001 to 6.8% in 1976 with standard errors of percentages ranging from 0.04% to 0.08%. From 1971 to 1977 and from 2002 to 2012, a higher percentage of males endorsed these occupations, while from 1978 to 2001, a higher percentage of females endorsed Conventional occupations. For male students, the trend peaked in the late 1970s, while for female students, it peaked in the mid-1980s. For both male and female students, the trend decreased in the 1990s.

In 1971, 4% of female students and 4.3% of male students endorsed Conventional occupation types (Table 2). In 2012, 2.6% of female students and 4% of male students endorsed Conventional type occupations. In 2012, the odds that female students endorsed

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Conventional type occupations was 0.64 times that of the odds in 1971. In 2012, the odds that male students endorsed Conventional type occupations was 0.93 times that of the odds in 1971. In 1971, the odds that a male student endorsed Conventional type occupations was 1.08 times that of a female student. In 2012, the odds that a male student endorsed Conventional type occupations was 1.56 times that of a female. By 2012, the ratio of relative odds between sexes increased to 145% of the ratio in 1971.

### **Artistic**

The trends in the percentages of male and female first-year students who endorsed probable Artistic careers/occupations between 1971 and 2012 are presented in Figure 7. The percentage of female students who endorsed Artistic type occupations ranged from 7.9% in 2011 to 10.5% in 2000 with standard errors of percentages ranging from 0.08% to 0.10%. The percentage of male students who endorsed Artistic type occupations ranged from 6.4% in 2011 to 9.4% in 2000 with standard errors of percentages ranging from 0.07% to 0.09%. These values appear to be stable for both men and women from 1971 to 2012. Women endorsed these occupation types at a greater rate with the exception of a time in between 1991 and 1999 when a higher percentage of male students endorsed these occupations.

In 1971, 8.7% of female students and 7.3% of male students endorsed Artistic occupation types (Table 2). In 2012, 8% of female students and 6.8% of male students endorsed Artistic type occupations. In 2012, the odds that female students endorsed Artistic type occupations was 0.91 times that of the odds in 1971. In 2012, the odds that male students endorsed Artistic type occupations was 0.93 times that of the odds in 1971. In 1971, the odds that a male student endorsed Artistic type occupations was 0.83 times

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that of a female student. In 2012, the odds that a male student endorsed Artistic type occupations was 0.84 times that of a female. By 2012, the ratio of relative odds between sexes increased to 102% of the ratio in 1971.

### **Social**

The trends in the percentages of male and female first-year college students who endorsed probable Social careers/occupations between 1971 and 2012 are presented in Figure 8. The percentage of female students who endorsed Social type occupations ranged from 21.1% in 1985 to 47% in 1971 with standard errors of percentages ranging from 0.12% to 0.17%. The percentage of male students who endorsed Social type occupations ranged from 5.7% in 1982 to 13.9% in 1971 with standard errors of percentages ranging from 0.08% to 0.12%. These values, for both men and women, decreased through the 1970s, but have appeared to stabilize since then. Although the trends follow the same pattern, women consistently endorse these occupations at a higher percentage than do men. The difference between sexes decreased from 1971 to 2012. The greatest changes over time occur in these occupations.

In 1971, 47% of female students and 13.9% of male students endorsed Social occupation types (Table 2). In 2012, 25.3% of female students and 10.4% of male students endorsed Social type occupations. In 2012, the odds that female students endorsed Social type occupations was 0.38 times that of the odds in 1971. In 2012, the odds that male students endorsed Social type occupations was 0.72 times that of the odds in 1971. In 1971, the odds that a male student endorsed Social type occupations was 0.18 times that of a female student. In 2012, the odds that a male student endorsed Social type

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occupations was 0.34 times that of a female. By 2012, the ratio of relative odds between sexes increased to 188% of the ratio in 1971.

### **Cognitive Complexity**

The trend in the annual average cognitive score of first-year female and male students' endorsed probable careers/occupations from 1971 to 2012 is presented in Figure 9. The cognitive complexity scores have a mean of 50 and a standard deviation of 10 in the general population. The annual average female and annual average male cognitive complexity scores between 1971 and 2012 vary within a few points. The annual average male cognitive complexity ranges from 66.7 in 2008 to 68.6 in 1982. The annual average female cognitive complexity ranges from 64.8 in 1971 to 67.2 in 1991. The annual average male cognitive complexity decreased 0.71 points to 66.88 from 1971 to 2012, while the annual average female cognitive complexity increased 1.81 points to 66.59 during that time period. In 1971, the average male cognitive complexity score was 2.8 points above the average female cognitive complexity score. In 2012, the average female cognitive complexity score was 0.29 points above the average female cognitive complexity score.

### **Discussion**

Human beings are shaped by an evolutionary, biological predisposition as well as an environmental, social influence that shapes their desires, beliefs, and values. It is difficult to isolate the effects of evolution from those of society. Biology has provided strengths for men and women to perform specific gender roles. On average, men have more muscle mass, which allows them to more easily perform heavy manual labor.

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Women have the ability to carry and breastfeed children, allowing them unique opportunities to bond with and care for their offspring. Jane Goodall (1986) observed that among our close primate relatives, the chimpanzees, the mother is the primary caregiver of the young, who depend on her for food, warmth, protection, and education of skills, giving support to a genetic predisposition of social behavior. It is not unique to our species for the female to be the primary caregiver. However, human beings also have cognition and will that make us more than just our genetic material. If we were products of only our genes, human civilizations across the country would be even more similar than they are already. Our environment provides a framework within which our beliefs, values and desires develop. The differences in these cultural frameworks are apparent in the varying social values of populations across the globe. Society has afforded certain opportunities to some individuals and not to others. Even within the United States of America, it was relatively recently that the enslavement of human beings was accepted as the norm, women were not able to vote, and any two consenting and capable adults could not be married. Not only were these limitations a societal consensus of opinion, but they were enforced institutionally and legally. If we were only products of our genes, the original status quo would have no impetus to evolve. The eradication of these examples of oppression represents how human beings are also influenced by current events, technology, the economy, education and globalization.

Throughout the history of America, the needs of society, and thus the employment opportunities, has transformed. In 1790, only 5% of Americans lived in cities, while in 1900, this increased to 40% and in 2010 to 81% (U. S. Census Bureau, 2012). This represents the industrialization and modernization of our country and the advancement in

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the needs of the job market from farms to factories to offices. As the needs of the market changed, the roles of the workers had to adjust, potentially creating periods of time in between when the aspirations of the population were incongruent with the new employment opportunities.

The hypotheses that female first-year college students would increasingly endorse the stereotypically male occupation types of Realistic, Investigative, Enterprising and Conventional, that male first-year college students would increasingly endorse the stereotypically female occupation types of Social and Artistic, and that the average female first-year college student expected occupation complexity would increase from 1971 to 2012 were not confirmed by the data. Male and female percentages for the Investigative, Enterprising, and Social occupations followed the same trends, with higher percentages of males endorsing the Investigative and Enterprising occupations, and higher percentages of females endorsing the Social occupations. The Conventional male and female trends were similar, but intersected at two points with females overtaking males in 1978 and males overtaking females in 2002. For the Realistic trends, the percentage of females did not increase, as predicted, but the percentage of males decreased, thereby lessening the gap between sexes. The trends for both sexes appeared stable for the Artistic occupation type, with males overtaking females from 1991 to 1999.

Based on the similar patterns in the male and female trends in probable occupations, particularly for the Investigative, Enterprising and Social occupation types, the occupation interests of first-year college students of both sexes appear to be more influenced by events in history than simply by reflecting a decrease in sex stereotypes over the years.

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While the percentage of females who endorsed the Realistic, Investigative, Enterprising and Convention occupation types did not increase, and the percentage of males who endorsed the Social and Artistic occupation types did not increase, it appears that the gap between males and females for the Realistic, Investigative, Enterprising and Social occupation types decreased from 1971 to 2012, although males were consistently higher for the Realistic, Investigative, and Enterprising types, and females were consistently higher for the Social type. This may suggest while the differences still exist, they are narrowing with time.

### **Realistic**

The female trend in Realistic type occupations remained consistent from 1971 to 2012. The male trend was a decrease from 1971 to the late 1980s, after which it appears to have stabilized. The most popular occupation of the Realistic types was military service (career). In the early 1980s, the Armed Forces were not expected to expand through the 1980s, which may account for the decrease in the male trend compared to the female trend, since the majority of members of the Armed Forces are men (U.S. Bureau of Labor Statistics, 1981). In the 1990s, the sharp decline in the birth rate in the 1970s meant that the pool of 18- to 24-year olds decreased (U.S. Bureau of Labor Statistics, 1991). The Armed Forces expected to strengthen incentives for enlistment through the 1990s to compensate for the expected decline, potentially resulting in the stabilization of the male Realistic trend.

### **Investigative**

The female and male trends in Investigative type occupations followed a similar pattern from 1971 to 2012, with the sex gap narrowing, but the male trend being



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consistently higher. Both trends experienced peaks in the early 1980s, followed by dips in the late 1980s and peaks in the mid-1990s. The most popular Investigative occupation in the 1980s and 1990s was Engineer. In the early 1980s, employment of engineers was based on the growing demand for industrial machinery and machine tools, and the increasing complexity of industrial machinery, and the computerization of equipment, potentially resulting in the spike of interest in Investigative careers (U.S. Bureau of Labor Statistics, 1981). In the early 1990s, employment of engineers was expected to increase faster than the average through 2000 due to growth of research and development as companies updated and improved products more frequently (U.S. Bureau of Labor Statistics, 1991). By the late 1990s, engineering jobs were expected to increase about as fast as the average, with many of the jobs focused on repairing deteriorating roads, bridges, water and pollution control systems, and other public facilities (U.S. Bureau of Labor Statistics, 1995). The expectation of employment in the 1990s may account for the increase in interest Investigative occupations in the early 1990s, and the decrease in interest afterwards.

### **Enterprising**

The female and male trends in Enterprising occupations followed a similar pattern from 1971 to 2012, with the sex gap narrowing, but the male trend being consistently higher. Both trends increased through the late 1980s and then decreased to the mid-1990s. The most popular occupation in the 1970s and 1980s was business executive.

As business was expected to grow in the 1980s, employment was expected to grow faster than average through the mid-1990s, as sales and finance were expected to expand, which corresponds with the rise in interest in Enterprising occupations through

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the late 1980s (U.S. Bureau of Labor Statistics, 1985). Then, after the corporate boom of the 1980s, expectations of growth slowed back to the average rate of growth for all occupations through the 1990s, which may account for the sharp decline in Enterprising aspirations in the early 1990s (U.S. Bureau of Labor Statistics, 1991).

### **Conventional**

The female and male trends in Conventional type occupations followed a similar pattern from 1971 to 2012, with the female and male trends intersecting. From 1971 to 1977 and from 2002 to 2012, the percentage of male students aspiring to Conventional type occupations, while from 1978 to 2001, the percentage of female students was higher. The male trend peaked in the late 1970s, while the female trend peaked later in the mid-1980s. Both declined through the early 2000s. The most popular Conventional occupation was accountant or actuary, which most likely captured accountants, which are more common than actuaries. In conjunction with the increase in popularity of the Enterprising occupations, employment of accountants was expected to increase rapidly from the 1970s through the mid-1980s as businesses and government agencies continued to expand in size and complexity as the economy thrived (U.S. Bureau of Labor Statistics, 1975). Interest in accounting may have risen as a result of the expected economic upturn in the 1980s, but then waned later as did interest in the Enterprising fields.

### **Artistic**

The female and male trends in Artistic type occupations appear to have remained fairly constant from 1971 to 2012, with the female and male trends alternating. The female trend was slightly higher with the exception of the time in between 1991 and

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1999, although the difference was less than one percentage point. The most common Artistic occupation in the HERI survey list is Architect or urban planner. Although employment of architects was expected to be greater than average through the 1990s with the construction of nonresidential structures such as shopping and business centers, it was expected to be cyclical depending on the economic cycles in various geographic locations, which corresponds with the relatively consistent interest in Artistic occupations (U.S. Bureau of Labor Statistics, 1991).

### **Social**

The female and male trends in Social type occupations followed a similar pattern from 1971 to 2012, with the sex gap narrowing, but the female trend being consistently higher. Both trends decreased through the early 1980s. The most common Social occupation was teacher or administrator. Elementary and secondary school teachers were expected to have more difficulty finding jobs from the 1970s through the 1980s due to the number of qualified teachers exceeding the number of positions (U.S. Bureau of Labor Statistics, 1975; U.S. Bureau of Labor Statistics, 1981).

Rather than examining the trends of either sex independently, it is, in this case, more useful to compare the two trends, and recognize that other factors in society affect both men and women. In order to determine if women are increasingly aspiring to the traditionally male-dominated fields and men are increasingly aspiring to the traditionally female-dominated fields, it is necessary to establish whether the gap between sexes is decreasing. From 1971 to 2012, in the case of Realistic, Investigative, Enterprising, and Social type occupations, the gap between sexes decreased, suggesting that first-year

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college students may have become more comfortable crossing the gender barrier as it pertained to their occupational expectations.

### **Cognitive Index**

From 1971 to 2012, the annual average male cognitive complexity score was consistently above that of women. However, the difference was 2.8 points in 1971, which decreased to less than one point in 2012. The annual average male cognitive complexity score decreased 0.71 points to 66.88, which is still slightly above that of women. From 1971 to 2012, the annual average female cognitive complexity score increased 1.81 points to 66.59. The annual average female cognitive complexity score increased from 1971 through the early 1980s, after which it remained consistent around 67, suggesting that the early 1970s may have been a time when first-year college women's occupational expectations were changing. Contrasted with the slight decrease in the annual average cognitive complexity of male aspirations, the slight increase in the annual average cognitive complexity of female aspirations was likely independent of that of males.

### **Limitations**

Limitations are largely based on the nature of the available data. The data were gathered only from first-year college students, which limits the generalizability to those who have entered college, as well as to those college students with limited college experience. The results reflect only the aspirations of college students in their first year. Given that college students' interests evolve as they progress through college, their ultimate interests and career choices may differ from those initial aspirations (Pierson, 1962). The first-year college student demographic has changed over the 42 years of available data, gradually including more people of color, more women, and more people

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with documented disabilities, among other indicators of diversity. Thus, the annual demographic composition of those surveyed has not been constant.

The Higher Education Research Institute does not claim that the institutions sampled are representative of the entire American college and university population. Nor have all institutions that have ever participated done so in every year over the study period. Therefore, there is selection bias based on the universities that have chosen to participate each year.

The data were collected from reports that only report statistics up to the tenth of a percentage. The effects of other influential factors, such as socioeconomic status, parents' jobs, parents' education level, and race cannot be removed. Nevertheless, with such a large number of institutions and students surveyed, the results provide a plausible portrait of trends over time in the occupational aspirations of college-going women and men.

The Holland coding of the occupations was not an exact science. There were instances when the method of weighting the codes produced a nonsensical result and had to be changed. There were other instances when the occupations that comprised the item's category were not in the originally selected section of the Dictionary of Occupational Codes, and another section had to be used. It is possible that another rater would have categorized the occupational categories differently.

### **Virtues and Implications**

The limitations notwithstanding, the results of this study have value in how they shape the understanding of evolution of first-year college students' occupational aspirations over four decades. This information can be used by those in a position to guide and support students in their career development.

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The findings of this analysis provide a longitudinal context for psychologists, counselors, other mental health professionals, and educators who work with children and adolescents. In general, it provides an understanding of the social change over the last four decades as it pertains to gender norms in occupational interests and aspirations.

Mental health professionals may utilize the findings to understand the social context in which children and adolescents develop their occupational expectations and interests. Psychologists and counselors may use this understanding of occupational interests, and the associated social expectations, to help children and adolescents navigate the development of their own occupational interests, especially in the context of the adults in their lives whose expectations and opinions have been shaped by a different generation's social norms.

With the feedback on social change, educators have a framework in which to develop a self-awareness of how they can influence and encourage students to pursue their strengths and interests, particularly when those strengths and interests are contrary to their gender norm. Educators at all levels, from elementary school through higher education, may use the findings to develop programs and initiatives that are appropriate to encourage and support students given the changes and trend in occupational interests over the years. Future research may focus on the correlation between students' aspirations and ultimate career choices, and thereby the success of students in the achievement of their goals, in order to determine the need for programs to support students in the completion of their course of study.

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**Appendix A: Tables**

Table 1.

*Freshman Survey occupations within each Holland occupational code*

Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Conservationist or forester	College administrator/ staff	Actor or entertainer	Clergy (minister, priest)	Business executive (management, administrator)	Accountant or actuary
Farmer or rancher	Computer programmer or analyst	Architect or urban planner	Clergy (other religious)	Business owner or proprietor	Business (clerical)
Military service (career)	Dentist (including orthodontist)	Artist	Clinical psychologist	Business salesperson or buyer	
Skilled trades	Engineer	Interior decorator (including designer)	College teacher	Foreign service worker (including diplomat)	
	Lab technician or hygienist	Musician (performer, composer)	Dietitian or nutritionist	Lawyer (attorney) or judge	
	Optometrist	Writer or journalist	Homemaker (full-time)	School principal or superintendent	
	Pharmacist		Interpreter (translator)		
	Physician		Law enforcement officer		
	Scientific researcher		Nurse		
	Statistician		Policymaker/Government		
	Therapist (physical, occupational, speech)		School counselor		
	Veterinarian		Social, welfare, or recreation worker		
			Teacher or administrator (elementary)		
			Teacher or administrator (secondary)		

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Table 2.

*Proportion and odds of students who endorsed Holland occupational types*

Sex	Year	Proportion endorsing	Odds of endorsing	Relative odds 2012 to 1971	Relative odds male to female	Ratio of relative odds from 2012 to 1971
Realistic						
Female	1971	0.006	0.006	1.673		
	2012	0.010	0.010			
Male	1971	0.079	0.086	0.461	14.210	0.275
	2012	0.038	0.040		3.911	
Investigative						
Female	1971	0.133	0.153	2.185		
	2012	0.251	0.335			
Male	1971	0.283	0.395	1.299	2.573	0.595
	2012	0.339	0.513		1.530	
Artistic						
Female	1971	0.087	0.095	0.913		
	2012	0.080	0.087			
Male	1971	0.073	0.079	0.927	0.826	1.015
	2012	0.068	0.073		0.839	
Social						
Female	1971	0.470	0.887	0.382		
	2012	0.253	0.339			
Male	1971	0.139	0.161	0.719	0.182	1.883
	2012	0.104	0.116		0.343	
Enterprising						
Female	1971	0.046	0.048	2.748		
	2012	0.117	0.133			
Male	1971	0.194	0.241	0.912	4.992	0.332
	2012	0.180	0.220		1.657	
Conventional						
Female	1971	0.040	0.042	0.641		
	2012	0.026	0.027			
Male	1971	0.043	0.045	0.927	1.078	1.447
	2012	0.040	0.042		1.561	



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## Appendix B: Figures

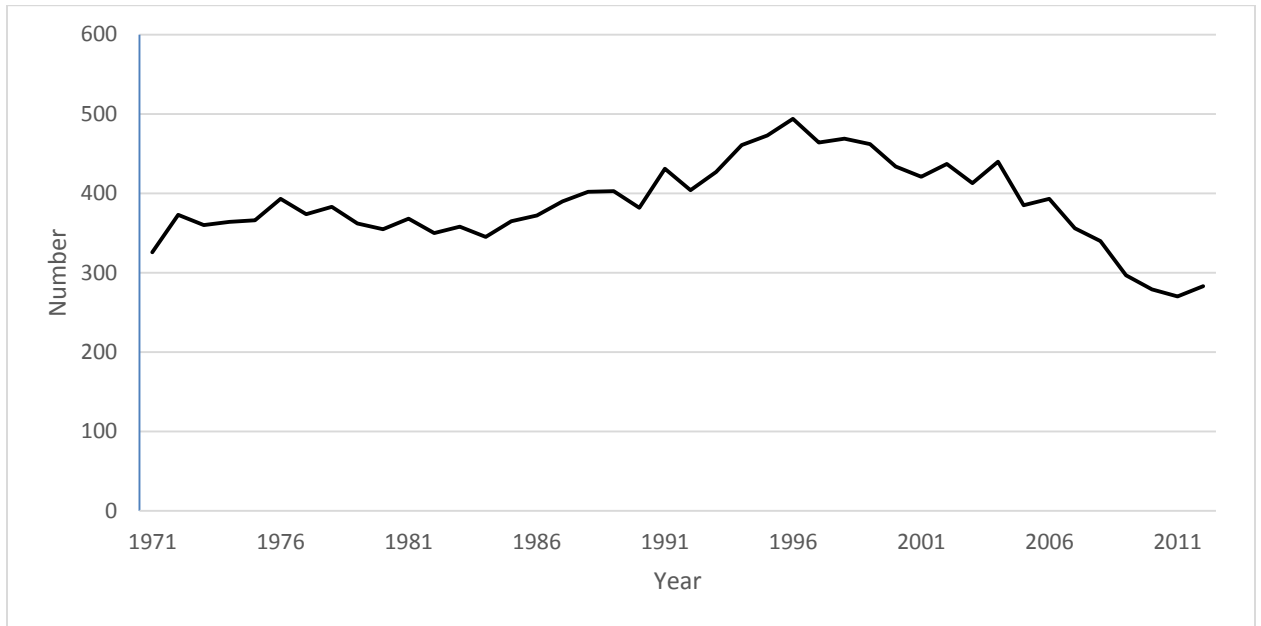


Figure 1. Annual number of participating universities, 1971-2012.

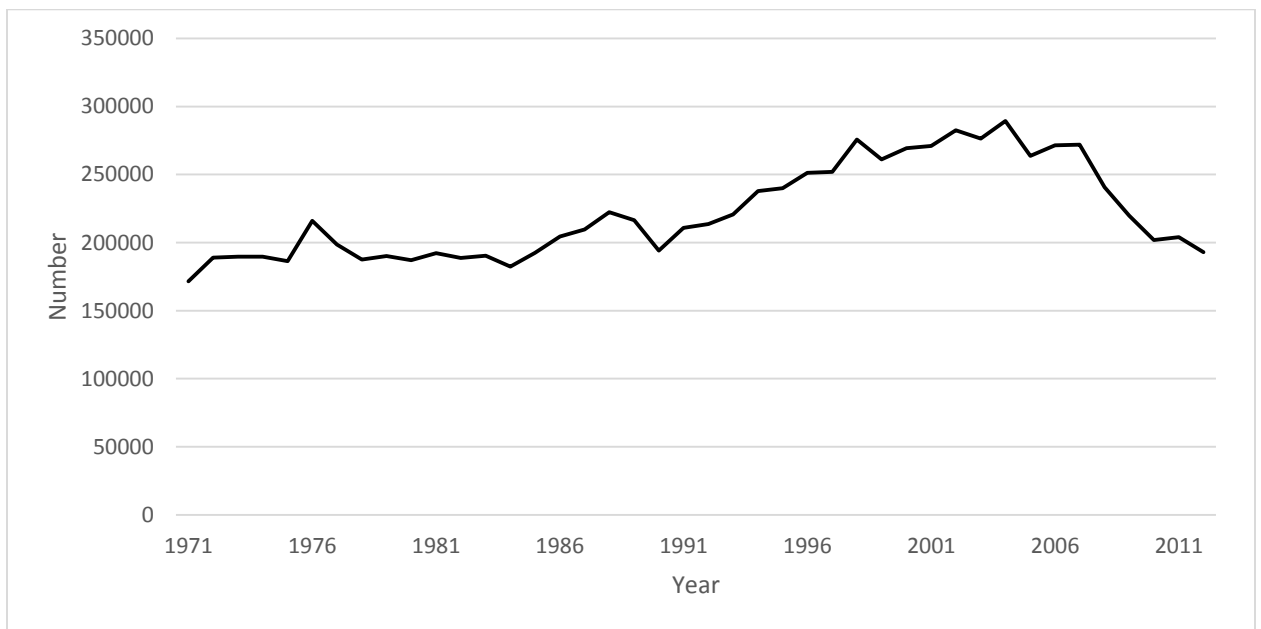
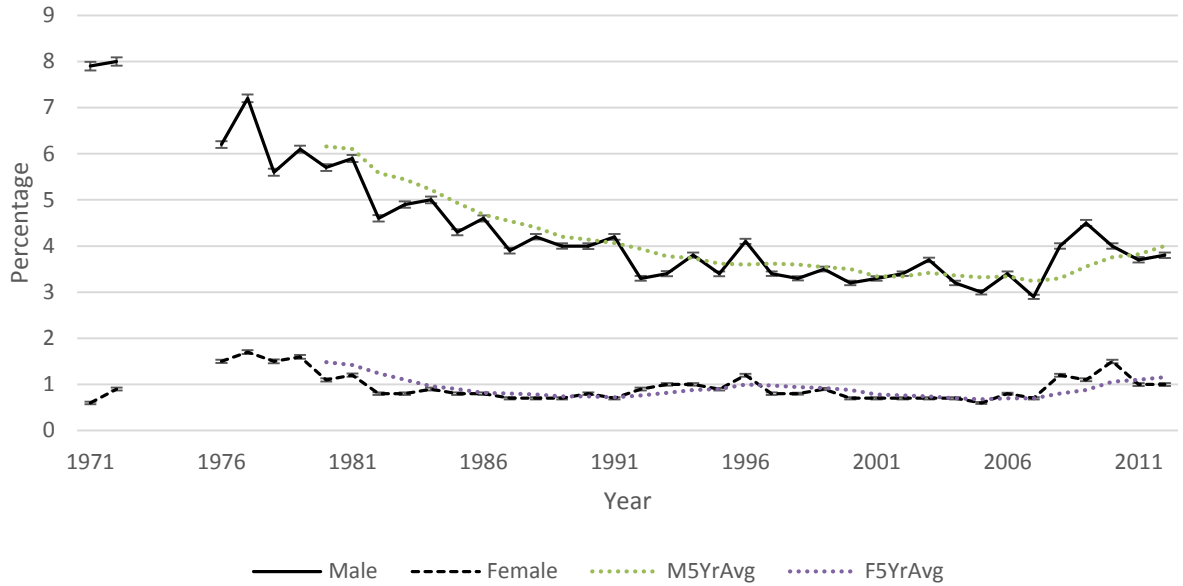


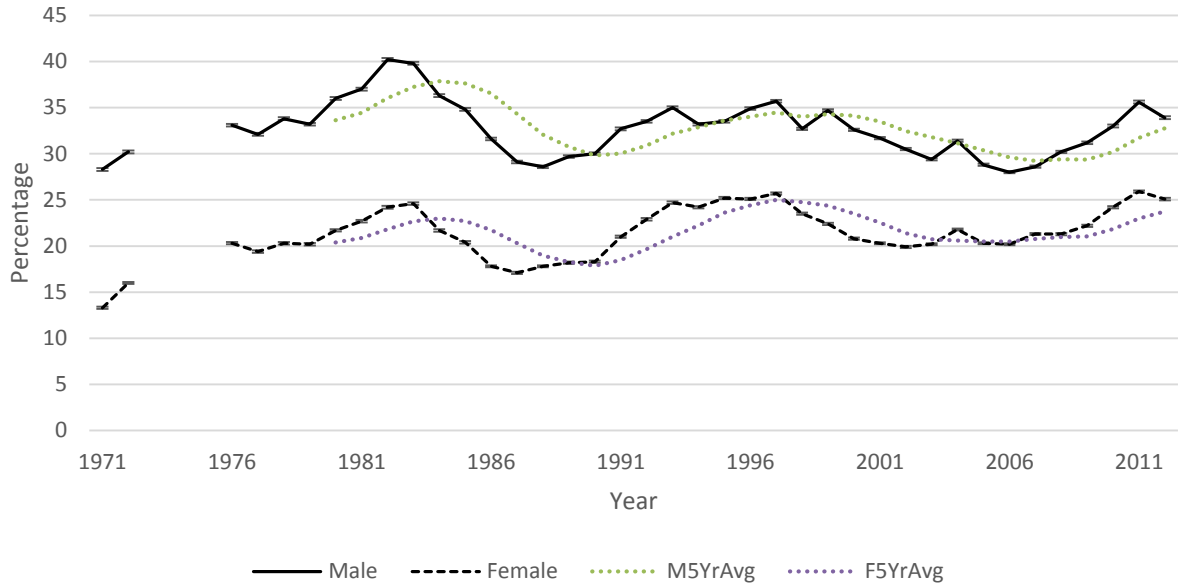
Figure 2. Annual number of participating first-year students, 1971-2012.

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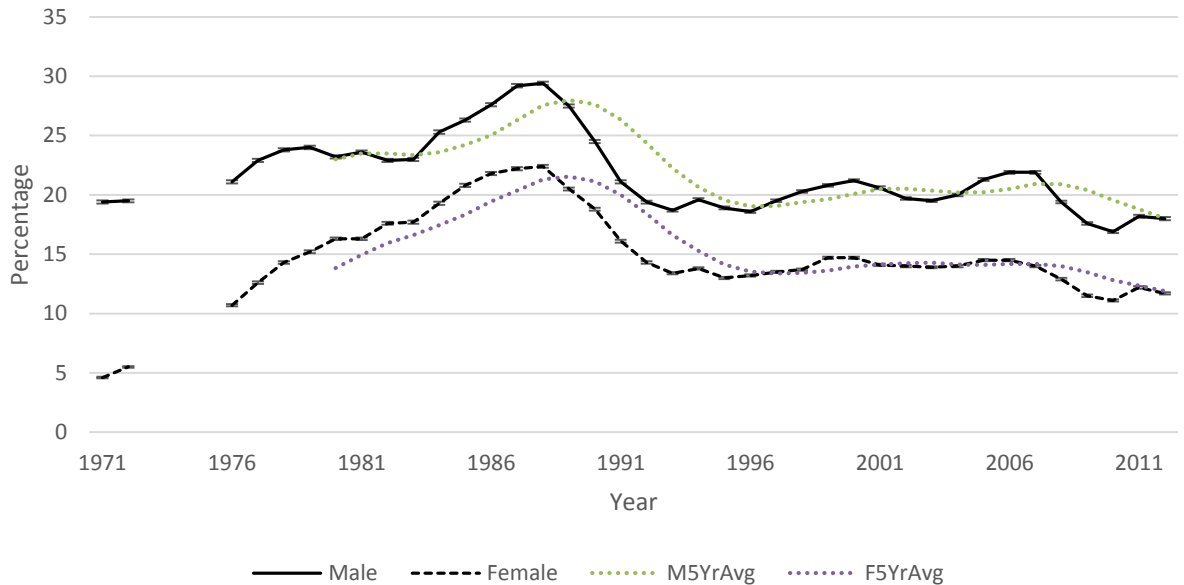
*Figure 3.* Percentage of male and female first-year students who endorsed probable Realistic careers/occupations, and the rolling 5-year average, 1971-2012. Error bars indicate the standard errors of percentages each year with variance of error increased by a factor of 2. Male: annual percentage of male students who endorsed Realistic occupations, Female: annual percentage of female students who endorsed Realistic occupations, M5YrAvg: rolling 5-year average of male students who endorsed Realistic occupations, F5YrAvg: rolling 5-year average of female students who endorsed Realistic occupations.

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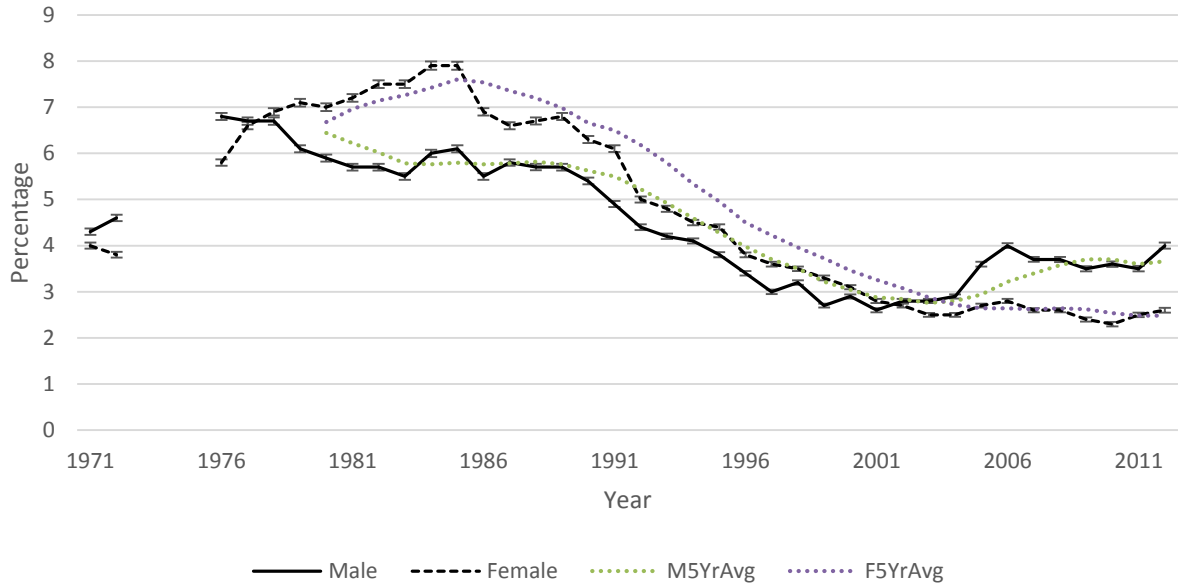
*Figure 4.* Percentage of male and female first-year students who endorsed probable Investigative careers/occupations, and the rolling 5-year average, 1971-2012. Error bars indicate the standard errors of percentages each year with variance of error increased by a factor of 2. Male: annual percentage of male students who endorsed Investigative occupations, Female: annual percentage of female students who endorsed Investigative occupations, M5YrAvg: rolling 5-year average of male students who endorsed Investigative occupations, F5YrAvg: rolling 5-year average of female students who endorsed Investigative occupations.

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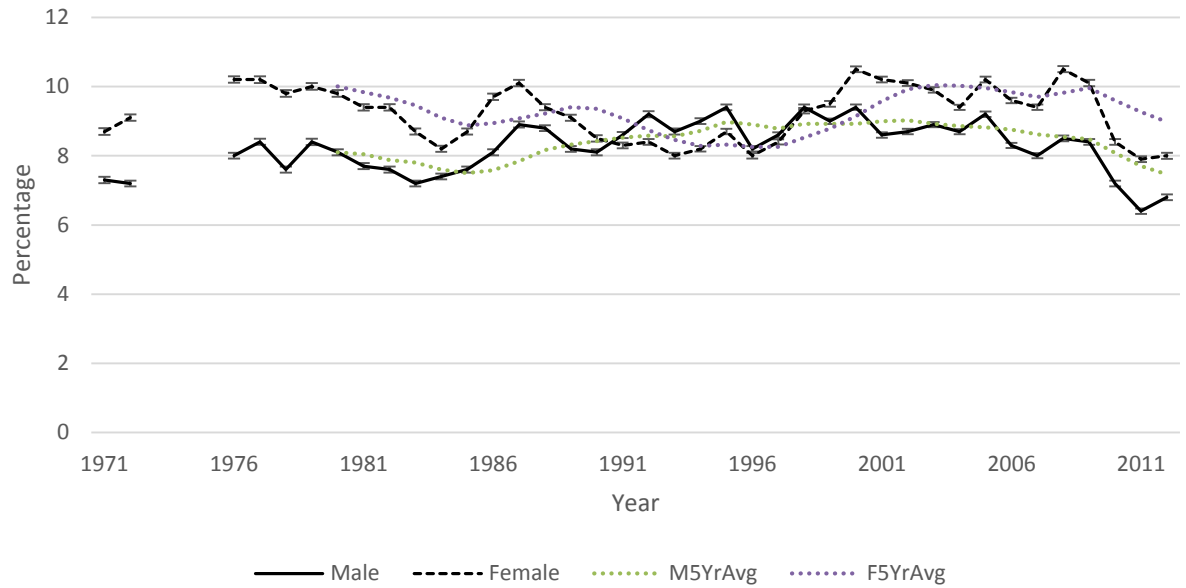
*Figure 5.* Percentage of male and female first-year students who endorsed probable Enterprising careers/occupations, and the rolling 5-year average, 1971-2012. Error bars indicate the standard errors of percentages each year with variance of error increased by a factor of 2. Male: annual percentage of male students who endorsed Enterprising occupations, Female: annual percentage of female students who endorsed Enterprising occupations, M5YrAvg: rolling 5-year average of male students who endorsed Enterprising occupations, F5YrAvg: rolling 5-year average of female students who endorsed Enterprising occupations.

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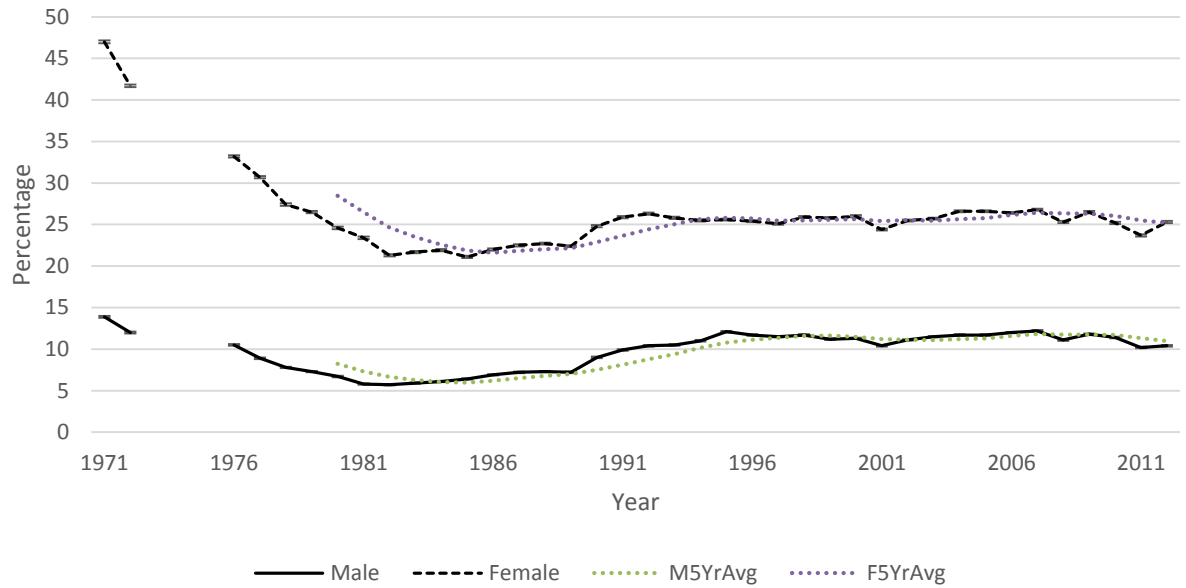
*Figure 6.* Percentage of male and female first-year students who endorsed probable Conventional careers/occupations, and the rolling 5-year average, 1971-2012. Error bars indicate the standard errors of percentages each year with variance of error increased by a factor of 2. Male: annual percentage of male students who endorsed Conventional occupations, Female: annual percentage of female students who endorsed Conventional occupations, M5YrAvg: rolling 5-year average of male students who endorsed Conventional occupations, F5YrAvg: rolling 5-year average of female students who endorsed Conventional occupations.

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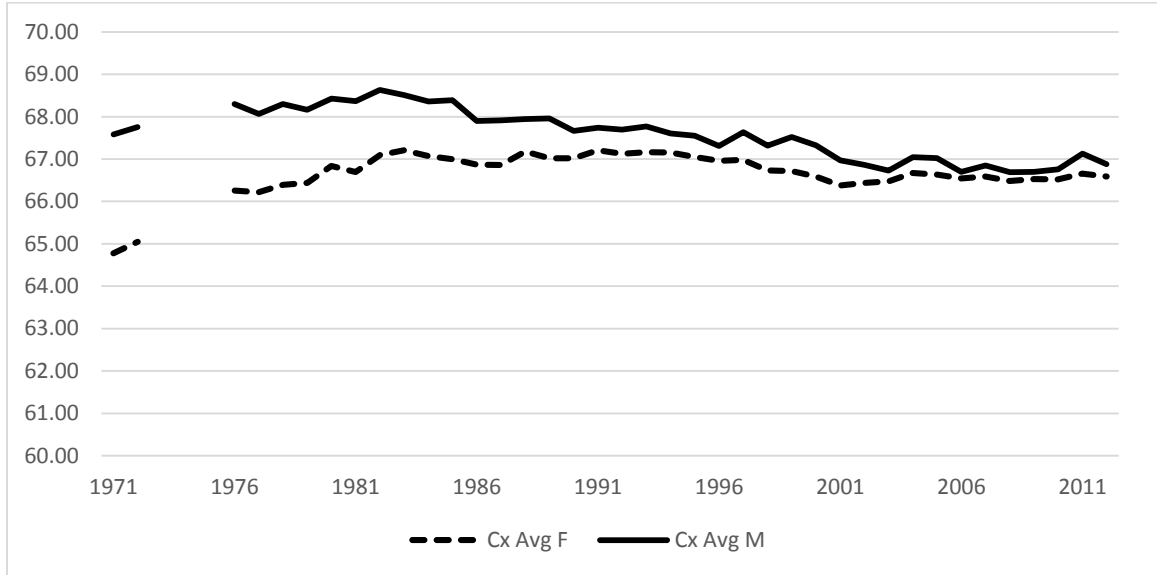
*Figure 7.* Percentage of male and female first-year students who endorsed probable Artistic careers/occupations, and the rolling 5-year average, 1971-2012. Error bars indicate the standard errors of percentages each year with variance of error increased by a factor of 2. Male: annual percentage of male students who endorsed Artistic occupations, Female: annual percentage of female students who endorsed Artistic occupations, M5YrAvg: rolling 5-year average of male students who endorsed Artistic occupations, F5YrAvg: rolling 5-year average of female students who endorsed Artistic occupations.

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*Figure 8.* Percentage of male and female first-year students who endorsed probable Social careers/occupations, and the rolling 5-year average, 1971-2012. Error bars indicate the standard errors of percentages each year with variance of error increased by a factor of 2. Male: annual percentage of male students who endorsed Social occupations, Female: annual percentage of female students who endorsed Social occupations, M5YrAvg: rolling 5-year average of male students who endorsed Social occupations, F5YrAvg: rolling 5-year average of female students who endorsed Social occupations.

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*Figure 9.* Annual average cognitive complexity score of first-year female and male students' endorsed probable careers/occupations, 1971-2012. CxAvgF: annual average cognitive complexity score of female students, CxAvgM: annual average cognitive complexity score of male students.



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