Effects of Gender, Socioeconomic Status, and Early Academic Performance on Postsecondary Educational Choice

Jerry Trusty, Chester R. Robinson, Maximino Plata, and Kok-Mun Ng

National data were used to study the effects of gender, socioeconomic status (SES), and 4 types of eighth-grade academic performance on postsecondary educational choices at late adolescence. Educational choices were classified by predominant Holland type (R, I, A, S, E, C). Gender had strongest independent influences on educational choice. Gender also interacted with SES and academic performance. Relationships between SES and educational choice were stronger for women than for men. For women, eighth-grade reading scores were the strongest predictor of educational choice, whereas for men, mathematics scores were the strongest predictor. Implications for theory and counseling practice are discussed.

Postsecondary educational choices of students are a salient juncture in the career development process. These choices serve to either expand or limit the range of subsequent vocational choices that young people make (Gianakos & Subich, 1988). Educational choices and vocational choices are inherently connected (Eccles, 1994), and it seems valid to view educational choices as a means for implementing vocational choices (Lent, Brown, & Hackett, 1994; Wallace & Walker, 1990).

Several studies (e.g., Dawson-Threat & Huba, 1996; Hackett, 1985; Hannah & Kahn, 1989; Harren & Biscardi, 1980) have examined the effects of background variables (gender, socioeconomic status, academic performance) on choice of college major or occupation. Few studies, however, have incorporated more than one or two of these variables. In addition, few studies have examined interactions between or among independent variables. There is, however, evidence of interaction effects of these background variables on career-related choices (Maple & Stage, 1991).

Most studies of career-related choices have used limited and nonrandom samples. That is, samples were limited to students in one or two universities in one geographical area, and samples were convenience (nonrandom) samples. Samples in most studies were limited to 4-year colleges and universities and did not include young people who chose other postsecondary educational options.

Therefore, there is evidence that gender, SES, and academic performance interact to shape postsecondary educational choices, but there is a broad gap in the literature. No studies were found that investigated the effects of these background variables and their interactions on the various types of educational programs that high school graduates choose. Several studies (Betz & Hackett, 1983; Eccles, 1994; Hackett, 1985; Maple & Stage, 1991; Ware & Lee, 1988) have examined choices of mathematics/scientific versus non-mathematics/scientific college majors, but little is known, for example, about the relationship of these background variables to the choice of artistic or social fields of study.

Because career theorists have long accepted the salient influences of demographics and academic performance on career choice (e.g., Gottfredson, 1981; Holland, 1997; Lent et al., 1994; Super, 1990), our study is important for the advancement of theory. In addition, knowledge of the effects of these variables could provide practical implications for counselors and educators in K–12 schools and in postsecondary educational institutions. For example, if eighth-grade achievement measures emerge as important predictors of educational choice, then Krumboltz's (1996) learning theory of career counseling would be particularly applicable to career counseling and programming in K–12 schools and in college counseling centers. Furthermore, if the influences of early achievement are conditional on gender and SES, then those particular contexts are important to application of career counseling theories (see Herr, 1996).

We studied the effects of gender, SES, and early (eighth-grade) test scores (mathematics, reading, science, and history/geography) on postsecondary educational choices. We used data from the National Education Longitudinal Study of 1988

***Jerry Trusty** is a professor, **Chester R. Robinson** is an assistant professor, and **Kok-Mun Ng** is a doctoral graduate, all in the Department of Counseling, Texas A&M University–Commerce. **Maximino Plata** is a professor in the Department of Psychology and Special Education and is Director of Student Assessment at Texas A&M University–Commerce. Correspondence regarding this article should be sent to Jerry Trusty, Department of Counseling, Texas A&M University–Commerce, Commerce, TX 75429 (e-mail: Jerry_Trusty@tamu-commerce.edu).*

(NELS:88; National Center for Education Statistics [NCES], 1996). Postsecondary educational choices were operationalized by assigning the predominant Holland type (see Holland, 1997) to students' fields of study. We investigated the following research question: What are the independent, correlated, and interaction effects of gender, SES, and four types of eighth-grade test scores on choice of postsecondary educational major, as classified by Holland type?

BACKGROUND LITERATURE

Gender

Much of the research on postsecondary educational choices has focused on traditional versus nontraditional gender-based choices (e.g., Betz & Hackett, 1983; Dawson-Threat & Huba, 1996; Eccles, 1994; Hackett, 1985; Hannah & Kahn, 1989; Helwig, 1998; Maple & Stage, 1991; Ware & Lee, 1988). When comparing the nontraditional choices of males and females, research has generally shown that females are more nontraditional. Over the last three decades, the number of women choosing high-skilled fields such as engineering and business has increased (Eide, 1994). Hannah and Kahn (1989) found that high school girls were more likely than boys to express interest in gender-nontraditional occupations. Gianakos and Subich (1988), using a sample of first- and second-year college students, reported that women were more likely to choose nontraditional college majors. Research on children's occupational aspirations (see Helwig, 1998) reveals a general trend—over the last three decades—that girls are becoming less stereotypical than boys in their occupational aspirations. However, women and men continue to choose careers traditionally associated with their gender (Eccles, 1994; Hannah & Kahn, 1989; Helwig, 1998).

Models have been developed to explain these gender differences. Eccles (1994) developed a social-psychological model of educational and occupational choices. The model focuses on selection of low-status versus high-status (physical sciences, engineering, applied mathematics) college majors and careers. Eccles contended that individuals develop *subjective task values* for various achievement-related contexts. Subjective task values develop within a socialization milieu and directly affect educational and occupational plans and choices. Females tend to place higher value on language-related abilities and tasks, whereas males place higher value on mathematics abilities and tasks. Women often choose low-status majors and occupations based on their subjective task values. These gender differences in subjective task values persist despite females' high levels of confidence in their mathematics abilities and high performance in mathematics (Eccles, Adler, & Meece, 1984; Eccles, 1994).

Gottfredson's (1981) developmental model of occupational aspirations is similar to Eccles's model in that social and psychological variables are included. In Gottfredson's model, values are a component of the self-concept. As the person and the self-concept develop, possible occupations are progressively eliminated based on the self-concept. Gender roles develop early and are a primary basis for the elimination of occupations. When educational or occupational choices are later being implemented and compromises are necessary, gender roles are last to be compromised. That is, in Gottfredson's model, people generally forsake their interests first, their desired prestige/ability level second, and their gender-related choices last.

Holland (1966, 1997) classified occupations and postsecondary education majors into six types: realistic (R), investigative (I), artistic (A), social (S), enterprising (E), and conventional (C). There are six corresponding personality types of occupation/education seekers. Holland (1966, 1997) provided descriptions of the types. Regarding gender and Holland type, Gottfredson (1981) reported that female-traditional occupations were concentrated in the C Holland type, whereas male-traditional occupations were concentrated in the R, E, and I types. A and S types were balanced between the genders. Giankos and Subich (1988) found that men and women were fairly balanced in A and E types of college majors. More men were in I and C majors, and more women were in S majors. Frequencies in the R category were too small for analyses. The high-skilled mathematical and scientific postsecondary majors studied frequently by researchers (e.g., Betz & Hackett, 1983; Eccles, 1994; Hackett, 1985; Maple & Stage, 1991; Ware & Lee, 1988) are I Holland-type majors. The high-skilled business majors described by Eide (1994) are mostly E Holland-type majors (see Rosen, Holmberg, & Holland, 1997). In light of recent observations and trends, therefore, we expect to find more women in S and C majors, and more men in I and R majors. In addition, we expect relative gender balance in E and A majors.

SES

SES has strong influences on the amount of education that adolescents expect to achieve after high school (Hanson, 1994; Trusty, 1998) and on postsecondary educational attainment (Hanson, 1994; Sewell, Haller, & Portes, 1969). SES also has effects on the occupations that young adults choose. Gottfredson (1981) classified Holland-types of occupations according to prestige level. I occupations are the most prestigious. E, A, and S occupations have roughly average levels of prestige, and R and C occupations have the lowest level of prestige. People generally choose occupations consistent with their social class (Gottfredson, 1981; Hannah & Kahn, 1989; Sewell et al., 1969). Therefore, we expect to find positive independent effects of SES on choice of I majors, and negative effects for R and C majors.

Interactions between SES and gender are reported in the literature. Hannah and Kahn (1989) found that among all gender/SES groups, high SES girls were most likely to prefer gender nontraditional occupations. Findings of Ware and Lee (1988) differed. That is, Ware and Lee—in a study of high-ability students—found that SES was a positive predictor of choice of a science major for men but not for women. Therefore, the literature provides no consistent direction regarding a Gender × SES interaction in predicting educational choice.

Academic Performance

In research and theory on career choice, several descriptors of academic performance emerge, including achievement (e.g., Holland, 1997; Super, 1990), ability (e.g., Eccles, 1994), and intelligence (e.g., Gottfredson, 1981). Within Gottfredson's model, possible occupations are continuously evaluated according to the individual's self-concept of abilities, and intelligence determines the rate of development of career-related self-evaluations.

Super's (1990) model stresses the interaction of individuals' developing abilities, values, and interests in social and economic environmental contexts. This interaction results in special abilities and achievements (interpreted broadly) that become a basis for subsequent career-related choices. Academic performance and beliefs and values are also components of Holland's (1997) model of personality development. Holland stressed the interaction of individuals and environments in producing the six personality types mentioned earlier.

Krumboltz (1979) identified achievement experiences as axiomatic in the career choice and career development process. Krumboltz (1979) posited that an individual's collection of learning experiences leads to *self-observation generalizations* and skills. These self-observation generalizations and skills, in turn, influence decisions and subsequent career development. Opportunities for learning experiences depend largely on the social, cultural, and economic conditions in which individuals develop. In connecting this theory to counseling practice, Krumboltz (1996) proposed a learning theory of career counseling. Through this theory, Krumboltz asserted that career counselors should be focused on facilitating clients' learning. Career counselors, therefore, do more than help clients find a match between current interests and the world of work. They take on the proactive role of educator and mentor and help clients find new learning experiences. Krumboltz (1996) stated, "Skills, interests, beliefs, values, work habits, and personal qualities are all subject to change as a result of subsequent learning experiences" (p. 61).

According to Eccles's (1994) model of achievement-related choices, personal abilities influence early achievement experiences. These achievement experiences, along with socialization experiences, influence beliefs and self-perceptions. From these, subjective task values develop. In the Eccles model, differences in achievement-related choices for females and males can be explained, in part, by subjective task values. As stated earlier, females tend to place more value on language-related abilities, and males on mathematics-related abilities. Self-efficacy and outcome expectations are also components of this and other models of career-related choice (e.g., Lent et al., 1994). Self-efficacy and outcome expectations are also influenced by early achievement experiences (Eccles, 1994; Lent et al., 1994). Whereas Lent et al. asserted that self-efficacy is the primary variable in the career-choice process, Eccles's research suggested that effects of subjective task values are stronger. If, as Eccles purported, females value language-related tasks more and males value mathematics-related tasks more, we would expect to find that females tend to base educational choices on language achievement and males on mathematics achievement (i.e., a Gender × Academic Performance interaction).

Research by Maple and Stage (1991) suggested interactions among gender, SES, and academic performance in predicting educational choice. Maple and Stage studied the longitudinal effects of several variables on students' choices of mathematics/science majors. They used a global measure of ability that comprised vocabulary, reading, mathematics, and science test scores. Test scores influenced the number of mathematics and science courses completed in high school, which in turn had direct effects on choice of mathematics/science majors. There were varying effects of academic performance and SES by racial/gender subgroups.

METHOD

Participants

The NELS:88 was conducted by NCES (1996) and began in 1988 with surveys of eighth graders and their parents. Surveys were administered thereafter at 2-year intervals. For the present study, we used a subsample of 7,645 participants from the 1988 to 1994 panel sample of the NELS:88. In 1994, participants were 2 years beyond high school. We used all students in the panel sample who were enrolled in a nonmilitary postsecondary institution for at least 2 months from June 1992 to August 1994 (approximately 65% of the panel sample). Students who were enrolled in a postsecondary institution but did not indicate a major field of study (approximately 8%) were excluded. A few students (less than 1%) listed *interdisciplinary* or *area studies* as their major, and these were excluded. Our sample, therefore, represents U.S. students who indicated a specific major field of study at a postsecondary institution when they were 2 years beyond high school.

NCES calculated weights to correct for nonresponse bias and for oversampling of particular populations. From the 1988 to 1994 panel weight, we calculated a relative panel weight for use in our analyses. This redistributed the sample to correctly represent the U.S. population and set the number of participants to the original number.

Variables

The dependent variable was from the Third Follow-up Student Questionnaire administered in 1994 when participants were 2 years beyond high school. Participants indicated one of 112 postsecondary major fields of study. We used the Educational Opportunities Finder (Rosen et al., 1997) from the Self-Directed Search to classify the 112 majors into one of the six Holland types. We used the predominant

Holland type (the first letter of the three-letter Holland type). This procedure for classifying major fields is similar to the method used by Gianakos and Subich (1988) and Miller, Heck, and Prior (1988) and is consistent with much of the research on Holland's typology (see Holland, Fritzsche, & Powell, 1997). R-type major fields of study included areas such as forestry, medical technology, and other technologies. Examples of I-type majors were engineering, medicine, and sciences. A-type majors included literature, journalism, and arts. S-type majors included education, nursing, and ethnic studies. Examples of E-type majors were business administration, cosmetology, and law. C-type majors included accounting, secretarial, and business support. Of the 7,645 participants, 499 (6.5%) were in R fields; 2,391 (31.3%) in I; 607 (7.9%) in A; 2,084 (27.3%) in S; 1,569 (20.5%) in E; and 495 (6.5%) were in C majors. Participants attended various types of postsecondary institutions, including 4-year public and private colleges/universities, 2-year colleges, and public and private vocational/technical schools.

Predictor variables were gender, SES, and eighth-grade academic performance. These variables came from student and parent questionnaires and tests administered when students were in the eighth grade. SES was a composite variable developed by NCES, consisting of (a) family income, (b) parents' educational levels, and (c) parents' occupational prestige (see NCES, 1996). Academic performance variables were scores on four 8th-grade cognitive tests: (a) mathematics, (b) reading, (c) science, and (d) history/geography. We ranked the continuous predictor variables (SES and test scores) and split them into four groups (levels) based on quartiles, with *1* representing the lowest group for each variable. This ranking procedure preceded selection of the subsample of participants who attended a postsecondary institution. Therefore, SES and academic performance categories (levels) represent the general population of U.S. students.

Data Analysis

A relatively new method of segmentation analysis, Chi-Squared Automatic Interaction Detector (CHAID; Magidson, 1993), was used for data analysis. CHAID builds models by segmenting the sample into homogeneous groups based on the relationship of independent variables to a dependent variable. The person is the unit of analysis.

CHAID offers many advantages above traditional forms of predictive analysis. Through CHAID, models are generated that show the relationships of multiple independent (predictor) variables to a polytomous nominal dependent variable. Because CHAID uses chi-square tables and statistics, linear and nonlinear relationships are revealed. CHAID also reveals the presence and nature of interactions directly. The assumptions required for traditional analyses (e.g., normality, linearity) are not required for CHAID. CHAID actively analyzes missing data. That is, if there are missing data on any predictor variable, CHAID automatically creates a *missing* category for that variable. The missing group is thereafter included in analysis. If particular categories of predictor variables do not differ—based on their relationship to the dependent variable—CHAID automatically merges (combines) adjacent categories. The missing category may be merged with any category.

In CHAID, interactions are determined though objective comparison of the strength, direction, and nature of relationships across segments. In addition, if there are different predictors for segments of a particular independent variable (e.g., genders), an interaction is evident (see Magidson, 1993; Trusty, 1998).

The order of variable entry into the CHAID model was based on temporal sequence and on the literature on educational/occupational choice. The sample was segmented first by gender because of the primal influences of gender roles. The genders were next segmented by SES because SES has subsequent influences on achievement (Sewell et al., 1969). After these segmentations, we selected the most highly predictive type of eighth-grade academic performance (mathematics, reading, science, history/geography test scores) and entered it into the model.

RESULTS

The CHAID tree diagram is presented in Figure 1. Each predictor variable (node) is enclosed in a rectangle. The words, numbers, and letters that are not enclosed in Figure 1 represent categories of predictor variables. Numbers of participants in each segment are enclosed in parentheses underneath categories. For each predictor variable, CHAID produced a chi-square cross-tabulation between the particular predictor and the dependent variable, Holland type of major. Chi-square statistics are presented in Table 1. The chi-square tables themselves are not reported. However, we use the chi-square tables to describe the nature and strength of relationships between predictors and the dependent variable. First we report the parent node (gender by Holland type). Then we follow the tree down each branch, starting at the left of Figure 1, and proceed to the terminal (ending) nodes.

Parent Node

The parent node was gender. Chi-square statistics for the gender by Holland Type cross-tabulation—and all subsequent cross-tabulations—are in Table 1. There were slightly more women (53%) than men (47%) in the sample. In the cross-tabulation, largest differences between men and women were in the S category, in which 28% were men and 72% were women. There were also large differences in the R and C categories, with more R majors that were men (70%), and more C majors that were women (65%). In the I category, there were somewhat more men (58%) than women (42%). The A and E categories were fairly balanced between men and women. Across the various Holland types, frequencies of majors for men were I (39%), E (23%) and S (16%), R (10%), A (8%), and C (5%). Frequencies for women were S (37%), I (25%), E (19%), C (8%), A (8%), and R (4%). Due to rounding, percentages do not total 100%.

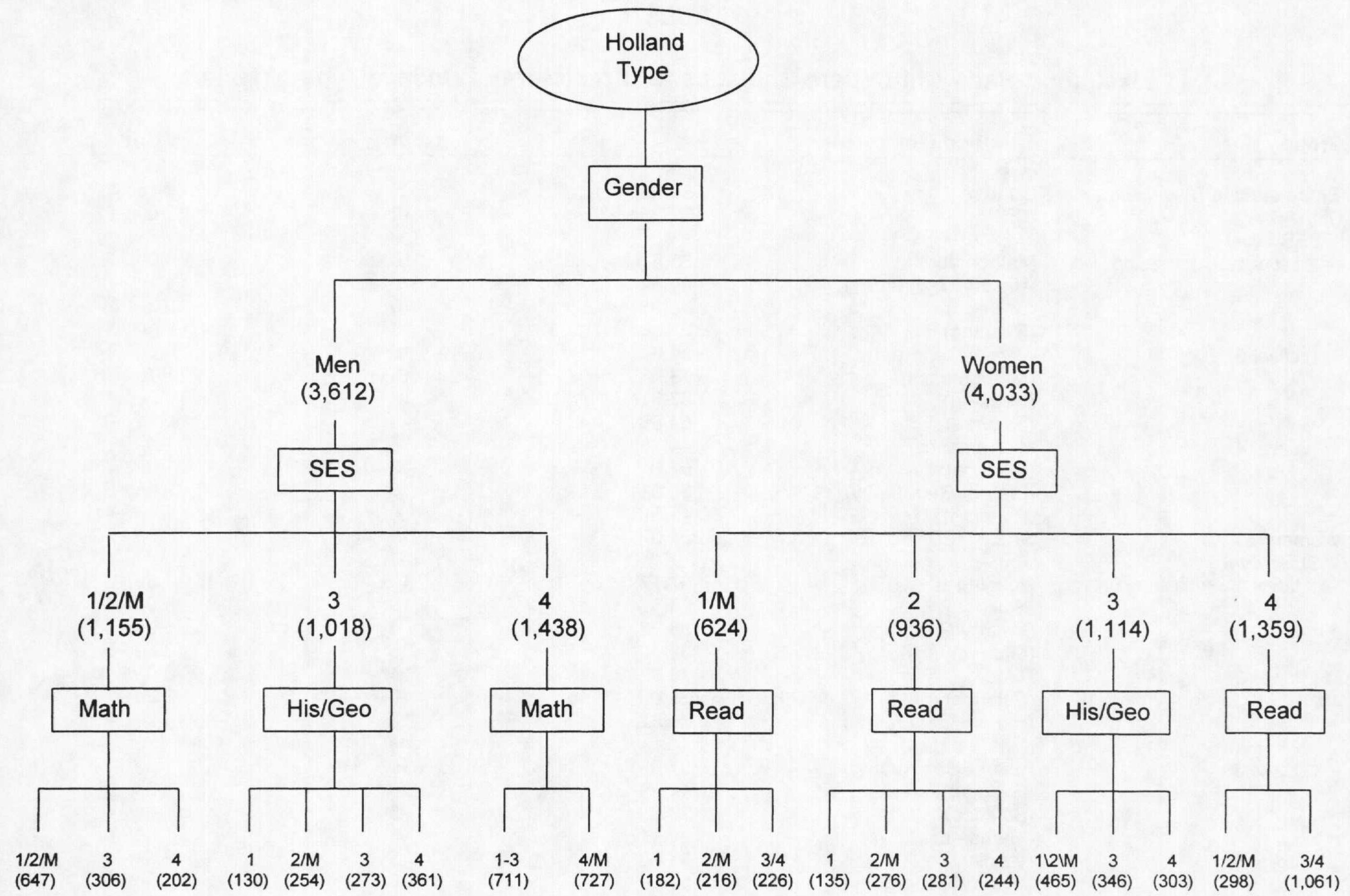

FIGURE 1

CHAID Tree Diagram Depicting Segmentation Based on Prediction of Holland Type of Postsecondary Major

*Note. n*s are in parentheses. CHAID = Chi-Squared Automatic Interaction Detector; SES = socioeconomic status; M = Missing; Math = Mathematics; His/Geo = History/Geography; Read = Reading.

Male Branch

Following the tree in Figure 1 down the left-most branches, men were next segmented by SES. Levels 1 and 2 of SES (the lowest levels of SES) and the missing category of SES were merged (see Figure 1). Strongest relationships between SES and Holland type of major were in the R, A, and I types. For the R type, the relationship was negative. That is, increases in SES resulted in decreases in the choice of R majors. For A and I types, the relationship was positive. That is, increases in SES were associated with increases in the choice of A and I majors. These relationships were basically linear. Increases in SES were associated with slight increases in the choice of C and E majors and a slight decrease in the choice of S majors.

For men in the merged Level 1/2/Missing SES category, the most significant eighth-grade academic performance predictor was mathematics. Men at the two lowest levels of mathematics scores and those with missing scores were merged (see Figure 1). In the R Holland type, the relationship was negative and strong. That is, increases in mathematics scores were associated with dramatic decreases in the choice of R majors. Increases in mathematics scores were associated with moderate increases in the choice of I and C majors. Regarding S-type majors, increases in mathematics scores resulted in moderate decreases in the choice of S majors, a moderate negative relationship.

For men at Level 3 of SES, the strongest academic performance predictor of Holland type of major was history/geography scores. Men with missing data on history/geography were merged with Level 2. Strongest relationships were in the R, I, and A types. For the R Holland type, the relationship was curvilinear. An increase in history/geography scores from Level 1 to Level 2/Missing produced a decrease in R

TABLE 1

Likelihood Ratio Chi-Square Statistics for Predictors of Holland Type of Major

Group	Predictor	χ^2	*df*	*p*[a]
Entire sample (*N* = 7,645)	Gender	580.62	5	3.1e –123
Men	SES	132.23	10	2.0e –22
SES Level				
Level 1, 2, & missing	Mathematics	55.51	10	3.0e –7
	(History/Geography)	54.84	10	4.1e –7
	(Science)	52.91	10	9.3e –7
	(Reading)	27.56	5	3.1e –4
Level 3	History/Geography	99.84	15	9.8e –14
	(Mathematics)	98.62	15	1.7e –13
	(Reading)	87.31	15	2.2e –11
	(Science)	64.86	10	5.2e –9
Level 4	Mathematics	44.38	5	1.4e –7
	(Science)	57.04	10	1.6e –7
	(History/Geography)	33.22	5	2.4e –5
	(Reading)	41.50	10	1.1e –4
Women	SES	221.07	15	7.5e –38
SES Level				
Level 1 & missing	Reading	57.17	10	1.5e –7
	(Science)	48.57	10	5.0e –6
	(History/Geography)	35.39	5	6.9e –6
	(Mathematics)	32.60	5	3.2e –5
Level 2	Reading	78.82	15	8.0e –10
	(Science)	38.00	10	2.3e –4
	(History/Geography)	35.62	10	5.9e –4
	(Mathematics)	*ns*	*ns*	*ns*
Level 3	History/Geography	57.08	10	1.5e –7
	(Reading)	44.49	10	3.2e –5
	(Science)	29.23	5	1.5e –4
	(Mathematics)	29.11	5	1.5e –4
Level 4	Reading	57.76	5	2.5e –10
	(History/Geography)	67.64	10	1.5e –9
	(Mathematics)	49.99	5	9.8e –9
	(Science)	49.60	10	3.8e –6

Note. See Figure 1 *Note*. Unselected predictors are in parentheses.
[a]Probabilities are expressed in shorthand notation. To transfer to typical notation, move the decimal in the first number to the left the number of places indicated by the last number. For example, for women at SES Level 4, Science: 3.8e –6 = .0000038.

choices; an increase from Level 2 to Level 3 resulted in a sharp increase in R majors. An increase in history/geography scores from Level 3 to Level 4 resulted in a sharp decrease in R majors. In I and A Holland types, increases in scores produced increases in the frequency of I and A majors, positive relationships. There was a curvilinear relationship between history/geography scores and choice of S majors. Increases in scores from Level 1 to Level 2 to Level 3 were associated with an increase in the choice of S majors, but an increase of scores from Level 3 to Level 4 resulted in a decrease in S majors. There was a weak negative relationship between history/geography scores and choice of C majors, and there was little relationship between scores and choice of E majors.

For men at Level 4 of SES, mathematics scores were the strongest of the academic performance predictors. For this segment, Levels 1, 2, and 3 of mathematics scores were merged, and the missing category was merged with Level 4. At this high level of SES, there were negative relationships between mathematics scores and Holland type in R, A, S, and E types; that is, higher scores resulted in decrease in the choice of majors in those types. Relationships were positive in I and C types. Higher mathematics scores resulted in an increase in the choice of I and C types, especially for I-type majors.

Female Branch

Women were first segmented by SES. The missing category of SES was merged with Level 1 (lowest SES). Strongest relationships between SES and Holland type were in A, R, C, and I Holland types. Increases in SES resulted in sharp increases in the choice of A majors. In the R type, there was a curvilinear relationship. Increases from Level 1 to Level 2 resulted in an increase in the choice of R majors, but increases from Level 2 to Level 3 and from Level 3 to Level 4 resulted in sharp declines in the choice of R majors. There was a fairly strong negative relationship between SES and choice of C majors for women; that is, increases in SES produced decreases in the choice of C majors. Increases in SES resulted in moderate increases in the choice of I majors. Increases in SES were associated with a slight decrease in the choice of S majors, and there was little relationship of SES to choice of E type majors.

Women at SES Level 1/Missing (the lowest level) were next segmented by eighth-grade reading scores. The missing category was merged with Level 2, and Levels 3 and 4 of reading scores were merged because they did not differ significantly from one another in Holland type of major. There were very few women in R and A majors at this low level of SES, and therefore, relationships in these categories are not presented. There was a fairly strong linear positive relationship between reading scores and choice of I-type majors. There was a curvilinear relationship between reading and choice of a C major. An increase from Level 1 to Level 2/Missing of reading scores resulted in a distinct increase in the choice of C majors, but an increase from Level 2/Missing to Level 3/4 resulted in a decrease in choice of C majors. There was little relationship between reading scores and choice of S or E majors.

For women at Level 2 of SES, the strongest academic performance predictor of Holland type was reading scores. The missing category was merged with Level 2 of reading scores. Strongest relationships of reading scores to Holland type were in the R and A categories. Increases in reading scores produced decreases in the choice of R majors, a negative relationship. For A types, the relationship was curvilinear. Increases across Levels 1, 2/Missing, and 3 of reading scores had little relation to the choice of A majors. However, an increase to Level 4 of reading scores resulted in a sharp increase in the choice of A majors. The number of women who chose R and A majors was relatively small, and therefore, findings are more subject to chance variation. There was a moderate positive relationship of reading scores to choice of I majors, and there was a weak negative relationship between reading scores and choice of C majors. There was a moderate curvilinear relationship for S type majors. Increases across the lowest three levels of reading scores were associated with a moderate increase in the choice of S majors. Increases to Level 4 of reading scores, however, resulted in a decline in the choice of S majors. There was little relationship for E types of majors.

The strongest eighth-grade academic performance predictor for women at Level 3 of SES was history/geography scores. Levels 1, 2, and the missing category were merged. Of the Holland types, relationships were strongest in the A, R, and I types. The relationship was strong and positive for A types. There was a curvilinear relationship between history/geography scores and choice of an R major. An increase from Level 1/2/Missing to Level 3 resulted in a decrease in the choice of R majors. An increase from Level 3 to Level 4, however, resulted in an increase in R majors. This finding may be spurious due to relatively small numbers of R majors in the SES Level-3 category for women. There was a positive relationship between history/geography scores and choice of an I major. This relationship was somewhat curvilinear in that the positive relationship became weaker as scores increased. There was a moderate negative relationship for C majors, and weak negative relationships for S and E majors. That is, for C, S, and E majors, increases in scores resulted in decreases in the choice of those majors.

For women at the highest level of SES (Level 4), the strongest academic performance predictor of Holland type of major was eighth-grade reading scores. Levels 1, 2, and the missing category of reading scores were merged; and Levels 3 and 4 were merged (see Figure 1). The number of women at Level 4 of SES who chose R majors was small, and we will not present those results. Strongest relationships of reading scores to Holland type were in A and E types. For the A type, the relationship was positive; for the E type, the relationship was negative. Increases in reading scores resulted in more A majors and fewer E majors. Relationships were moderate in the I and S categories. Increases in reading scores resulted in increases in I majors and decreases in S majors.

Interactions

Several interactions emerged from the CHAID analysis. First, in comparing the chi-square values and probability levels, SES was a stronger predictor for women than for men, therefore a Gender × SES interaction; that is, the effects of SES on Holland type of major were conditional on gender. The nature of the relationship also differed for genders.

There was an obvious Gender × Academic Performance interaction. Reading scores were a stronger predictor for women, whereas mathematics scores were a stronger predictor for men. We considered the possibility that one or more of the eighth-grade academic performance measures may have discriminated better than others for men as compared with women. However, our examination of the distributions of scores for men and women revealed only small differences. Mean scores for men and women were also very close to one another.

The strength of academic performance effects across SES levels was fairly consistent, yielding little evidence of an SES × Academic Performance interaction. There was some evidence of a three-way (Gender × SES × Academic Performance) interaction; that is, the strength, direction, and nature of some effects of test scores did differ across some SES segments by genders. The nature and strength of interactions are discussed in the following section.

DISCUSSION AND IMPLICATIONS FOR COUNSELING

The population to which findings are generalized is U.S. students who were 2 years beyond high school, had enrolled in a nonmilitary postsecondary institution, and had a major field of study. These choices of majors reflect students' initial or early postsecondary choices. Major fields of study were classified by predominant Holland type (R, I, A, S, E, C; see Holland, 1966, 1997).

In our model we segmented participants first by gender, then by SES, and then by eighth-grade academic performance. However, in strength of prediction of individual variables, gender was strongest, eighth-grade academic performance was next strongest, and although SES was a fairly strong predictor, it was the weakest of the three. The fact that gender was such a strong predictor of Holland type of major is consistent with much of the literature on gender-based career choices (e.g., Eccles, 1994; Gianakos & Subich, 1988; Gottfredson, 1981; Helwig, 1998). Women were concentrated in S-type majors, but many women had chosen I and E majors, majors that have been traditionally chosen by men. If I, E, and R majors are assumed to be traditional majors for men (e.g., Eccles, 1994; Eide, 1994; Gottfredson, 1981), and S and C majors are assumed to be traditional for women (Gianakos & Subich, 1988; Gottfredson, 1981), then more women (48%) than men (21%) were in gender-nontraditional majors. This finding is consistent with recent literature (Gianakos & Subich, 1988; Hannah & Kahn, 1989; Helwig, 1998).

As expected, SES was a fairly strong predictor of choice of college major for both men and women. The relationship, however, was stronger for women. There were similarities and differences between these relationships for men and women. For both men and women, there were strong relationships between SES and choice of R majors, but the relationship was negative for men and negative/curvilinear for women. Increases in SES resulted in increases in the choice of A majors for both men and women. There were positive relationships between SES and choice of I majors for both genders, but the relationship was stronger for women. Increases in SES resulted in small decreases in the choice of S majors. Increases in SES resulted in an increase in the choice of C majors for men but a decrease in the choice of C majors for women. This result may be related to the observation that C majors were mainly accounting and business operations (clerical). Perhaps higher SES men choose accounting more often than higher SES women.

The aforementioned differences for men and women are evidence of a Gender × SES interaction. It seems that higher SES contributes to nontraditional choices for women more than for men, based mainly on comparative findings in the I Holland type. This is consistent with results reported by Hannah and Kahn (1989). As Hannah and Kahn noted, there has been social and political effort encouraging women to choose gender-nontraditional majors and occupations, but there is little incentive for men to choose gender-nontraditional fields. Our findings regarding gender and the Gender × SES interaction, along with previous evidence (Farmer, 1985; Hannah & Kahn, 1989; Henderson, Hesketh, & Tuffin, 1988), point toward differential patterns of environmental influences on educational/occupational choice for genders. This warrants some adjustment to the Gottfredson (1981) model. Specifically, SES seems to influence women's postsecondary educational choices more than men's choices, and higher SES women seem least rigid in gender role based choices. Holland (1997) described a dynamic interaction between individuals and their environments. Our findings that SES effects are conditional on gender reflect an aspect of this dynamic interaction; that is, contemporary social and economic forces may influence women to choose high-status majors.

Our results regarding the genders and influences of types of academic performance are intriguing. Of the four types of eighth-grade academic performance, mathematics was the strongest predictor of choice of major for men at three of the four SES levels, and in the fourth, mathematics was the second strongest predictor. For men, reading was the weakest of the academic performance predictors at three SES levels, and reading was the second weakest predictor at the remaining SES level. For women, reading was the strongest predictor at three of the four SES levels and the second strongest predictor at the remaining SES level. For women, mathematics was the weakest of the academic performance predictors at three of the four SES levels, and mathematics was the second weakest predictor at the remaining SES level. This clearly indicates a Gender × Academic Performance interaction.

This finding supports Eccles's (1994) theory on differential subjective task value attached to ability and achievement by gender: That women value language-related tasks more, and men value mathematics-related tasks more. More precisely, our findings support the notion that across all Holland types, men use mathematics more as a basis for their initial postsecondary educational choices, whereas women use reading more as a basis for choices.

However, interpretation of these findings is complicated somewhat by the fact that all four types of academic performance were related to one another. For example, women's early reading scores were negatively related to the choice of R and S majors and positively related to the choice of I majors; however, for all women except the Level 2 SES group, mathematics scores were most strongly related to the choice of I majors. Therefore, the reader must not assume that any particular academic performance domain is singly responsible for observed relationships. Although reading and mathematics are different domains in theory, individuals who perform well in one area often perform well in the other. Furthermore, no major field of study is purely reading related or mathematics related. It is likely that a complex combination of academic strengths and obstacles leads women and men toward some majors and away from others. In addition, socialization and developing values seem to exert influences on choices.

Findings regarding the Gender × Academic Performance interaction and the independent effects of academic performance carry implications for practitioners. First, our findings emphasize the significance of early achievement experiences in later educational choices. Counselors should assess students' perceptions, beliefs, and values regarding their varied academic achievement experiences and their performance-related bases for their choices. One qualitative career-counseling method, the Life Career Assessment

(LCA; see McDaniels & Gysbers, 1992) assesses these areas directly. Few of the available qualitative or quantitative instruments that tap individuals' career values focus on domain-specific academic performance. However, assessments of individuals' perceptions and beliefs regarding various areas of academic performance could easily be added to most qualitative career-counseling assessments or interview structures. Our finding of differential effects of academic performance for genders implies that counselors should explore the effects of gender role socialization on achievement-related perceptions and beliefs.

The utility of Krumboltz's (1996) learning theory of career counseling is supported by our results. Krumboltz focuses on development through learning. Not only should counselors assess clients' perceptions of prior learning experiences, but counselors should work to help clients discover and engage in new learning experiences. Assessments, therefore, become learning tools themselves. Clients and students are facilitated in creating their lives through learning experiences. Operating from Krumboltz's (1996) perspective, counselors become educators and clients become learners. Educational interventions assume a salient role in counseling. Career education is endorsed across all educational levels, including the infusion of career education into the curricula of schools and career development programming. For example, group or class activities that expand available learning opportunities seem efficacious. Krumboltz's (1996) theory also addresses our findings regarding gender and SES. Social, economic, and gender socialization forces can either limit or expand learning opportunities. Counselors should use these contexts for conceptualizing clients/learners and designing appropriate interventions and programming.

There are other general and specific observations regarding the four academic performance variables. Higher academic performance, in all areas, was almost invariably related to not choosing R-type postsecondary majors. Regarding the I Holland type, the higher the performance, the more men and women chose I majors. It is surprising that this relationship was evident across various areas of academic performance, but it was strongest overall for mathematics. Increases in academic performance—especially reading and history/geography—were associated with more frequent choice of A-type majors, with one exception. For men at Level 4 of SES, higher levels of academic performance were associated with not choosing an A major. Perhaps there are gender-stereotypical influences regarding majors in the arts at high levels of SES, with A majors being socially approved for high-achieving women but not for high-achieving men. This finding is evidence of a three-way interaction of gender, SES, and academic performance.

In general, increases in academic performance resulted in small decreases in the choice of S-type majors. As SES increased, these relationships became somewhat stronger in this negative direction. For some gender/SES groups, relationships were positive/curvilinear. That is, increases in academic performance were associated with increases in the choice of S majors until the highest level of academic performance, at which S majors decreased.

Weakest relationships between academic performance and choice of major were in the E Holland type. The one exception was at high SES levels for both men and women. At the highest level of SES, increases in academic performance resulted in moderate decreases in the choice of E majors. Perhaps E majors reflect middle-class values, and if high SES individuals have the academic potential, they gravitate away from E majors. Relationships between academic performance and choice of a C-type major depended largely on the type of academic performance. That is, increases in mathematics scores resulted in increases in the choice of C majors, but increases in other types of scores resulted in decreases in the choice of C majors. In addition, we noted that for reading and history/geography scores, relationships to Holland type of major were more likely to be curvilinear. Relationships of mathematics and science scores to Holland type of major were more likely to be linear.

It is encouraging that there was little practically significant SES × Academic Performance interaction; that is, regardless of SES level, increases in academic performance resulted in increases in choices of the more academically intensive and economically rewarding postsecondary majors. However, there was evidence of a slight interaction for men. For men at low and high levels of SES, the relationship between academic performance and Holland type of major was weaker than for men at middle SES levels. Perhaps for men, social pressures at high and low SES levels dampen the effects of early academic performance, and economic pressures at low SES levels dampen the effects of early performance. That is, socioeconomic selection processes may influence low and high SES men more than middle SES men.

The preceding observations reveal the varying conditional influences of gender and SES. Counselors, therefore, should expect that gender and social class have influenced clients' prior learning experiences. In addition, gender and social class roles tend to perpetuate themselves through socialization, and it seems that these pressures exist at all social strata. When counselors and clients have accurately conceptualized the connections of gender, social class, and achievement experiences, the basis for further career development is set.

Because our results revealed interactions of gender with SES and gender with academic performance, it seems that separate models of educational/occupational choice for men and women are needed. However, there is contemporary movement toward unifying models or comprehensive theories of career development (see Isaacson & Brown, 1997; Lent et al., 1994). In contrast to this movement, Herr (1996) suggested that we should abandon the idea of creating one universal career theory. This would allow counselors to connect career theory more closely to counseling practice. Herr suggested that we should develop segmented theories that allow flexibility for conceptualizing and working with clients in various contexts. Our observed interactions support that notion. Many contemporary models of career choice ignore the effects of gender and SES. Some models include gender only as a variable within the particular model. Only the Eccles (1994) model considers domain-specific achievement and values by gender. The dynamic relationships found in this study can only be illuminated when genders are studied separately. At the very least, models should include terms for the interactions found herein.

We have offered a glimpse at the dynamic influences of different types of early academic performance on educational choice. It seems theoretically and practically significant that this early academic performance influenced choices 6 years later. The influences of early ability and achievement have long been assumed to affect career-related choices, but ability and achievement have often been considered a one-dimensional construct and behavior. Our study highlights the importance of domain-specific achievement not only for career development theory but also for counseling and educational practice. It also illuminates the complex conditional effects of gender, SES, and academic performance in shaping educational choices.

Our study focused on students' initial choices, and students often change majors. Studies that examine the effects of gender, SES, and academic performance on persistence in majors are needed. Our study focused on early academic performance. To make a choice, students must rely on their perceptions of that performance. Study of domain-specific achievement-related perceptions and values could shed light on career-related choice processes for men and women.

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