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Making It in Academic Psychology:

Demographic and Personality Correlates of Eminence

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Making It in Academic Psychology

Abstract

Citations to published work, personality, and demographic characteristics were examined in a sample of male and female academic psychologists. A large sex difference was found in citations with men receiving significantly more recognition. Reputational rankings of graduate school and current institution were significantly related to citations, as were components of achievement motivation. Mastery and Work needs were positively related to citations while Competitiveness was negatively associated with the criterion. A model of attainment in psychology is proposed and possible explanations for the differential recognition of women are explored.
Making It in Academic Psychology: Demographic and Personality Correlates of Eminence

The present study explores the relationship between scientific eminence and several person and situation variables, using number of citations by others to an individual's published work as a measure of eminence.

Considerable evidence has been accumulated in support of the validity of citation measures, typically derived from the Science Citation Index (SCI) or the Social Science Citation Index (SSCI), as indices of scientific impact and influence (e.g., Clark, 1967; Myers, 1970; Cole & Cole, 1973; Wade, 1975; Garfield, 1977). Clark (1967), for example, obtained from a panel of expert psychologists nominations of the persons who had made the most significant contributions to their field and found a correlation of .67 between citations and number of nominations. In still another illustrative study, Cole and Cole (1973) reported a correlation of .57 between citations and number of awards received for scientific work. Suggestive evidence of the validity of citations as a measure of institutional quality has also been obtained. Endler, Rushton, and Roediger (1978) ranked psychology departments as a function of total citations of their members and found highly significant correlations with the Roose and Andersen (1970) reputational rankings of graduate departments and the Cox and Catt (1977) measure of departmental productivity (publications in APA journals). Although it is not without flaws or critics, the citations nonetheless provide a useful, objective measure of eminence that has substantial validity.
This study explores the relationships between citations and several personality variables in a sample of male and female social-personality psychologists in an attempt to replicate the findings of previous research conducted with male academic scientists from several disciplines (Helmreich, Beane, Lucker, & Spence, 1978). The influence of several other factors whose importance for attainment has been suggested by previous investigators was also determined. These included gender, quality of the graduate school department from which the individual obtained the doctorate, quality of the department in which the individual is employed, and a number of demographic variables such as marital status.

Personality Variables

The personality variables to be investigated were measured by two objective self-report instruments, the Personal Attributes Questionnaire (PAQ: Spence, Helmreich, & Stapp, 1975; Spence & Helmreich, 1978) and the Work and Family Orientation Questionnaire (WOFO: Helmreich & Spence, 1978). The PAQ was developed as part of a research program initially centering around self-reported sex differences in stereotypically masculine instrumental traits and stereotypically feminine expressive traits, and the implications of these two essentially orthogonal trait dimensions for other person and behavioral variables.

One line of investigation in this research program examined the relationship between achievement motivation (Spence & Helmreich, 1978) and instrumentality and expressiveness, as measured by the PAQ. The Work and Family Orientation Questionnaire (WOFO) was devised to explore
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this issue. One section of the instrument contains three motivational scales, labeled Mastery (preference for challenging, difficult tasks), Work (enjoyment of working hard), and Competitiveness (liking for interpersonal competition and the desire to better others). Data from samples of college students and middle-class adults indicate that the three components, while positively correlated in both men and women, nonetheless show substantial independence.

As anticipated, positive correlations have also been found in both sexes between self-assertive, instrumental characteristics (as measured by the PAQ Masculinity or M scale) and all three achievement scales, the strongest relationship being found with Mastery, followed by Competitiveness and Work. A modest positive relationship has been found between expressivity (as measured by the PAQ Femininity or F scale) and Work, and a slight negative correlation between this trait cluster and Competitiveness.

The implications of these achievement motives for achievement behaviors in several selected samples have also been investigated. In our initial study (Helmreich et al., 1978), the relationship was determined between achievement scale scores and citations (by others) to published work in a sample of male Ph.D. scientists at a major university. Subjects were assigned to groups according to their position, above or below the median, on the Competitiveness and the Work and Mastery scales. The lowest number of citations was obtained by the group low on Work, Mastery and Competitiveness, an unsurprising finding. The highest number of citations, however, was found in the group high in Work and Mastery but low in Competitiveness.
The seemingly deleterious effect of Competitiveness in those high in Work and Mastery needs was an unexpected finding. Similar results were found, however, in a sample of male businessmen, using salary as the criterion of attainment (Sanders, Note 1) and in samples of male and female undergraduates, using grade point average as the criterion measure (Helmreich & Spence, 1978). In each instance, a high degree of Work and Mastery, when combined with a low degree of Competitiveness, was associated with greater achievement than when combined with a high degree of Competitiveness. If Competitiveness had any facilitating effect on attainment, it was among individuals low in Work and Mastery. (In these studies, female scientists and businesswomen showed the same trends as their male peers but sample sizes were too small to permit independent statistical analyses.)

The present study was in part designed to determine whether the pattern of relationships between citations and achievement motives obtained with male scientists from various disciplines would be replicated in a national sample of personality-social psychologists that included adequate numbers of both sexes.

Quality of Graduate School and Present Institution

The association between scientific eminence and the quality of the graduate school department from which individuals receive their doctorate and the quality of the institution of employment has received considerable attention from sociologists of science in their discussions of social stratification and the accumulation of advantage (Merton, 1968; Crane, 1967; Cole & Cole, 1973). The notion of accumulative advantage suggests that, as a group, individuals who enter prestigious
graduate school departments have an initial advantage in aptitude, motivation, and quality of their undergraduate training over those admitted to less distinguished departments. Being trained by distinguished mentors in graduate departments with a scholarly climate that encourages intellectual development and positively values research gives these individuals still further advantage. With this headstart, graduates of prestigious departments have a greater probability than graduates of lesser programs of obtaining positions in distinguished graduate training institutions where they may be still further advantaged with superior research facilities, lighter teaching loads, and outstanding, research-oriented graduate students and colleagues.

In her study of Nobel laureates, Zuckerman (1977) found strong evidence for the accumulation of advantage. Of laureates educated in the United States, 55 percent received their baccalaureates from a mere ten colleges. The effect in graduate training is even more striking, with 85 percent of the laureates earning their doctorates from 13 elite institutions. Still further evidence is provided by Cole and Cole (1973) in a study of academic physicists. These investigators found significant correlations between both reputation of graduate school department and of current institution and various measures of eminence, including citations. Productivity is also related to quality of current institution (e.g., Crane, 1967; Sophie, 1974), those from more highly regarded departments publishing more. However, Cole and Cole (1973) provided analyses indicating that productivity per se has a relatively minor impact upon citations and other indices of scientific distinction. Thus, both rate of publication and impact of published work are
independently related to quality of institution.

These and other similar findings suggested that in studying factors related to eminence among psychologists, ratings of the quality of the graduate programs in which these psychologists earned their doctorate and of the academic department in which they are currently working would be valuable. It is recognized, of course, that the contributions of these positional variables reflect a complex of reciprocally interacting factors involving both qualities of the individual and of the institutional setting.

Gender

The failure of intellectually able women to succeed in academia at the same rate as their male peers has been well documented. Within psychology, as in other scientific disciplines, women have been less likely than men to apply to graduate school and those who enter have been less likely to complete their degree (Hirschberg & Itkin, 1978). Among those who have earned their doctorates and obtained academic positions, women have been less likely to be in distinguished departments, to show high rates of scholarly productivity, and to have their work cited. A comprehensive review of the many internal and external barriers that have been suggested as suppressing women psychologists' scholarly accomplishments and the empirical evidence relevant to these hypotheses has recently been prepared by the Task Force on Women Doing Research of APA's Division of the Psychology of Women (O'Connell, Alpert, Rotter, Ruble, & Unger, 1978). Only a limited set of variables bearing on gender differences in attainment was studied in the present investigation and our discussion here will be confined to
these variables.

**Personality factors.** Personality characteristics are among the factors often mentioned as contributing to sex differences in achievement. Hoffman (1972), for example, has proposed that the socialization experiences of females and the role pressures exerted on them result in women having stronger affiliative needs and less confidence in their own competence than men. These personality factors lead in turn to women’s failure to develop levels of motivation to achieve excellence as high as men’s. According to this view, women’s academic and vocational performance (in contrast to men’s) should be more motivated by the need for approval than by intrinsic pleasure in accomplishment and should reflect lower levels of aspiration.

These hypotheses, which apply to women in general, have been given limited support by research with the PAQ and the WOFO (Spence & Helmreich, 1978; Helmreich & Spence, 1978). Although there is considerable overlap between the sexes, women have consistently been shown to score lower than men on the PAQ M (instrumental) scale and higher on the F (expressivity) scale in samples of widely divergent age and socioeconomic status. In college samples, women have also been shown to score somewhat lower on the WOFO Mastery scale and markedly lower on the Competitiveness scale than men, but somewhat higher on the Work scale. However, women who were selected from highly achieving groups (e.g., Ph.D. scientists, varsity athletes) have been found to be significantly higher in masculine, instrumental characteristics than unselected women of the same age. Data on the WOFO achievement scales obtained from a small sample of women scientists (Helmreich & Spence,
1978) also indicated that their scores on Mastery and on Work were not only higher than those of college women but were also slightly higher than those of male scientists. (Both male and female scientists were lower on Competitiveness than same-sex college students.)

Still another internal barrier that has been suggested as an explanation of women's lower levels of achievement is "fear of success" (Horner, 1968). According to Horner, achievement-oriented women are fearful that their worldly ambitions are "unfeminine" and that their successes will elicit negative reactions from others. A fourth WOFO scale, labeled Personal Unconcern and tapping worry about the consequences of achievement, provides data relevant to the fear of success concept. Responses to the Personal Unconcern scale obtained from the sample of women scientists mentioned above showed that these women were somewhat less anxious about others' reactions to their accomplishments than their male peers.

These findings suggest that women scientists who have gained appointments at a major university do not compare unfavorably with their male colleagues in achievement-related personality characteristics. However, the sample was small. More adequate comparisons of males and females on the PAQ and WOFO scales were afforded by the samples tested in the present investigation, samples that are larger in size, more homogeneous in disciplinary specialty, and more heterogeneous in quality of the departments in which they are employed than in our previous study.

Specialty area. Safilios-Rothschild (1972) has presented data indicating that women in male-dominated professions disproportionately
specialize in areas within the profession that are lower in prestige. A related observation has been provided by Hoffman (1972) and Patterson (1973) who indicate that, even within academia, women psychologists have clustered in specialty areas in which there are relatively weak pressures to become involved in research. In the present study comparisons of the sexes in productivity and in citations were relatively unaffected by factors related to specialty since all members of the sample were identified within a specific subdisciplinary area, personality and social psychology. This branch of psychology is more strongly research-oriented than specialties with an applied, service-oriented emphasis but at the same time, is more attractive (and perhaps more hospitable) to women than areas such as experimental and physiological psychology. It is possible that within such an academically homogeneous group, sex differences in attainment might be minimal, at least among those in distinguished university departments in which research is an expected part of faculty members' activities. Some indirect support for this possibility is found in a study by McNeel, McKillip, DiMiceli, Van Tuinen, Reid, and Barrett (1975) in which male and female applicants for an assistant professorship in social psychology were compared on the number of publications and presented papers listed on their vitae. Among those whose degrees were from less prestigious graduate schools, women were less productive than men but no sex differences were found among those with degrees from distinguished departments.

**Competing role responsibilities.** Women's lower productivity has often been attributed to their greater marital responsibilities.
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Although men whose wives have full time careers undertake more household and childcare tasks than those whose wives are not working, career women still assume the major portion of these conventional responsibilities. Women are also likely to stop working or to work only part-time when their children are small, thus disrupting the momentum of their careers as well as the time devoted to them.

Role variables may also contribute to the disproportionate number of women to be found in two-year and four-year colleges in which teaching loads are heavy and research not encouraged. Women with heavy family responsibilities may seek positions in such institutions to reduce role overload or, by giving their husbands' employment decisions priority, may be forced to accept whatever position is available in the locality in which they find themselves.

Data reported by Cole and Cole (1973), obtained from samples from three disciplines, biology, chemistry, and psychology, suggest that these role variables have some influence on research accomplishments but less than is often assumed. In men, marital status and number of children were essentially unrelated to productivity and in women, these variables made a difference only in those with three or more children. In all categories of marital and family status, men published more than women. These sex differences in productivity continued to be found even when reputation of the department of employment was taken into account. While those of both sexes who were in prestigious departments published more than those in less distinguished departments, the magnitude of the difference between men and women did not vary as a function of institutional quality. Citation measures showed similar results.
Despite these essentially negative findings, it was deemed important to gather information on marital and family status in the present study to provide further evidence on their associations with scientific influence.

Birth Order

Beginning with Sir Francis Galton's (1874) finding that primogeniture is associated with eminence, researchers have looked at birth order effects in a variety of settings. Although many contradictory results have been obtained, some consistency in the relationship between ordinal position and attainment has emerged. Altus (1966), for example, reported that the percentage of first-borns among students at highly prestigious colleges is greatly elevated. Helmreich (1968) also found that among those selected to be astronauts and aquanauts by governmental agencies, first-borns were greatly over-represented. Because of continuing interest in the phenomenon, data on birth order were also collected.

Method

Sample

Because of differential publication and citation patterns across disciplines and even subdisciplines, the sample was restricted to those identified as personality or social psychologists. The sample was drawn from the 1975 membership roster of the Society of Experimental Social Psychology and the 1975 Biographical Directory of the American Psychological Association. In the former group, all U.S. resident members of the Society who had their doctorate for at least five years were included. Of the 190 individuals thus selected, 167 were men and
23 were women. In addition, names were randomly drawn from the list of members of the Division of Personality and Social of APA with the following procedural modification: if the name selected was not that of a U.S. resident or an individual more than five years postdoctorate, the next eligible name was chosen. To insure a balance between the sexes (of 3,520 Members and Fellows listed in Division 8 in 1975, approximately 80% were male), the next eligible member of the opposite sex was chosen if the random draw picked successive members of the same sex. A sample of 400 Ph.D.-holding psychologists was thus obtained, 274 of them men and 126 of them women.

In preliminary analyses the relationship between quality of present academic department and the citation measure was found to be very strong. To allow inclusion of this measure in multivariate analyses, a decision was made further to restrict the sample to those currently employed in U.S. academic departments of psychology. This reduced the original sample of 400 to 291, 212 male and 79 female academics. Of these, 141 males and 55 females completed a mail survey, described below.

Survey instrument. Each of the selected individuals was sent a questionnaire consisting of three parts. (These data were collected during 1976 and 1977.) The first section elicited demographic data including age and year of award of Ph.D., marital status and number of children, and birth order information. The other two sections consisted of the Personal Attributes Questionnaire and the Work and Family Orientation Questionnaire.

Personal Attributes Questionnaire. The 24-item Personal Attributes
Questionnaire (PAQ: Spence & Helmreich, 1978) is a self-report measure consisting of descriptions of socially desirable traits that stereotypically differentiate the sexes. The items are assigned to three eight-item scales. The Masculinity (M) scale contains socially desirable characteristics of an instrumental, goal-oriented nature (e.g., "independent," "active," "makes decisions easily"). The Femininity (F) scale contains desirable expressive traits reflecting an interpersonal orientation (e.g., "helpful to others," "warm in relations to others," "kind"). The third, Masculinity-Femininity (M-F), which contains attributes judged to be desirable for one sex but not the other, is more mixed in content. Several of the items deal with instrumentality ("aggressive" and "dominant"), and others reflect a lack of emotional vulnerability ("doesn't cry easily," "low need for security"). In unselected groups of subjects, varying in age from midadolescence to middle-age, significant sex differences have consistently been found on all three scales, males scoring higher on the M and M-F scales (scored in a masculine direction) and lower on the F scale (scored in a feminine direction) than women. Within each sex, M and F are essentially uncorrelated while M-F is positively related to M and negatively related to F.

Work and Family Orientation Questionnaire. The third section of the survey contained the 23 motivational items of the Work and Family Orientation Questionnaire (WOFO: Helmreich & Spence, 1978). These items are assigned to four scales labeled Work, Mastery, Competitiveness, and Personal Unconcern. The Mastery scale contains items describing a preference for difficult, challenging tasks, e.g., "I
more often attempt tasks that I am not sure I can do than tasks I believe I can do." The Work scale contains positive attitudes towards work, e.g., "I like to work hard." Competitiveness describes a desire to win in interpersonal situations, e.g., "I enjoy working in situations involving competition with others." The fourth scale, Personal Unconcern, is conceptually similar to Horner's (1968) notion of "fear of success," with a high score indicating a lack of concern with the negative reactions of others to personal achievement. A representative item is "I sometimes work at less than my best because I feel that others may resent me for performing well."

Other Measures

Citation analyses. Citation counts were obtained from the Social Science Citation Index (SSCI) for the entire sample, respondents and non-respondents to the mail survey. Two measures were obtained, citations by others (hereafter citations) and self-citations. Individual scores on each measure were the mean of citations for the years 1973-1975. The citation measures count only senior or single authored papers. However, as Endler et al. (1978) and Cole and Cole (1973) have noted, the correlation between senior authorship citations and total citations is high.

Productivity index. A measure of individual productivity, identified as publications, was also obtained from the SSCI. Using the SSCI Source Index, the number of papers authored by each individual was tabulated for 1973, 1974 and 1975. The index formed is the mean of publications for the three years. In this instance, credit was equally assigned for senior and junior authorship. The measure does not include
monographs or textbooks as recorded publications.

**Demographic data.** The following biographical data were taken from the 1975 APA Biographical Directory: age, institution granting the doctorate, year of doctorate (recorded as years of post-Ph.D. experience), and institution of current employment.

For each case in the sample, the institution awarding the Ph.D. was classified using the 1970 ratings of the American Council of Education (ACE: Roose & Anderson, 1970). Departments rated "Distinguished" were coded as 4, those rated "Very Good" as 3, those rated "Adequate" as 2, and those unclassified as 1. While these ratings post-date the graduate training of older subjects in particular, the stability of ratings is sufficient to justify their use. (Further evidence for the validity of the classifications will be seen in their relations to the citations criteria.)

For those in the final, restricted sample, departments in which the individuals were currently employed were similarly coded. In addition, the Cox and Catt (1977) productivity ranking of departments was recoded into a comparable 4-category system and the score assigned to each individual's department.

**Confidentiality of Data**

Citation and biographical data for each individual were assigned code numbers and were maintained without names in a computer-resident file. Institutions were identified only by rankings. When completed questionnaires were received, names were matched with a list of code numbers (subsequently destroyed), names were removed from the questionnaires, and the data were entered into the computer-resident
file. The resultant data archive thus contained no information allowing identification of individuals.

Results

Of the 297 cases in the final sample, usable questionnaires were available from 70% of the females and 67% of the males. The first analyses compared respondents with those who failed to return the instrument on those variables coded for the entire sample. Two (return vs. non-return) by two (sex) analyses of variance were conducted on age, years since Ph.D., reputational ranking of Ph.D. graduate institutions, reputational ranking of current institution, productivity ranking of current institution, citations, self-citations, and own publications. Respondents and nonrespondents were remarkably similar on demographic variables and on the citations and publications measures, none of the comparisons revealing a significant difference. Respondents, however, had significantly more self-citations, $F(1, 288) = 27.9, p < .001$, suggesting a greater willingness among self-citers to supply information about themselves. There were no significant interactions in any of the analyses.

Demographic and Citation Measures for Total Sample

Means and other statistics on the demographic and citation measures on the total sample are shown in Table 1. As the means suggest, the sample is solidly mid-career, with an average age of 45 (range 30-69) and 17 years of postdoctoral experience (range 6-45). Highly significant sex differences are found on a number of measures. These and other sex effects will be discussed in a separate section.
For the attainment measures, Table 1 reports the means of the total number of citations, self-citations and publications for the 3-year period. The distribution of citations was highly skewed; 11% of the sample received no citations during the three-year period, 25% averaged two or fewer per year, and 10% had a mean of more than 50 per year. The distributions of citations differ somewhat from that reported by Endler et al. (1978). In the latter study, 22% of the faculty at their top 100 rated universities had no citations during a single year and only 3% had more than 100. Much of the difference can be attributed to the greater time period covered in the present study and to the inclusion in the Endler et al. report of a large number of junior faculty whose work has had no opportunity for citation. These investigators also included self-citations.

A similar pattern was found in the distribution of the publications measure. The overall mean of publications for the three-year period was 1.4 per year with a range of 0 to 8.6. Sixteen percent of the sample had no publications in the three-year period, 43% averaged one or less per year, while 14% averaged three or more.

Because of the skewness in the citation and publication measures, they were subjected to a log transformation \[\log_e (X + 0.5)\]. All parametric statistics to be reported use the transformed indices.

Correlations among the measures. The interrelationships among the measures were computed separately for each sex and for the total sample. The correlations within each sex were almost identical; thus, for
simplicity, only correlations for the combined groups are shown in Table 2.

Of particular interest are the correlations among the publications index and the two citation measures. As expected, publications is positively related both to citations \((r = .47)\) and to self-citations \((r = .52)\). Being cited by others is also related to self-citations \((r = .60)\). Although these correlations are substantial, the measures have a good deal of unshared variance and their patterns of relationships to other theoretically important variables suggest that they may be measuring conceptually different constructs. These relationships, which will be described later, confirm the utility of maintaining distinctions among citations by others, citations by the self, and number of publications.

Paralleling the findings of Cox and Catt (1978), departmental productivity and departmental reputational ratings (Roose & Andersen, 1970) are highly correlated \((r = .84)\). More interesting are the significant positive correlations between the quality of the individuals’ graduate school and the reputational and productivity ratings of their current departments \((r's of .30 and .29)\). These findings are, of course, consistent with the notion of accumulative advantage. The relationship between quality of graduate school and quality of later employment is even more strikingly reflected in a 4 x 4 cross-tabulation of the quality ratings and of present department. The
results of this analysis were highly significant ($\chi^2 = 28.7, p < .001$). The pattern of results indicates that there is relatively little upward mobility in terms of going from a less prestigious graduate program to an appointment in a more highly rated department, but a great deal of stability and downward mobility. Perhaps the best representation of this is to examine the academic origins of those employed in the four categories of department. Of those employed in departments classified as "Distinguished," 65% received their degrees from departments similarly rated, 22% from "Very Good," departments and only 18% from the two lower classifications. Of those currently in departments rated as "Very Good," 39% held Ph.D.s from "Distinguished" departments and 32% from those rated "Very Good." Finally, 81% of those employed in "Adequate" departments and 87% of those in unrated departments received their degrees from higher rated departments.

Both the quality of the graduate department and the quality of current department related modestly but significantly to self-citations ($r$'s of .17 and .22, respectively), but much more strongly to citations ($r$'s of .41 and .42). It is noteworthy that the graduate department rating is as good a predictor of citations as current affiliation. Productivity shows moderate positive correlations with both the reputational and productivity ratings of current institutions ($r$'s of .21 and .28) but is unrelated to quality of graduate department ($r = .06$).

Age and experience are, of course, strongly related. Not surprisingly, those with more professional experience tended to receive more citations by others ($r = .34$), but experience was more weakly
related to self-citations ($r = .13$) and negatively correlated with Productivity ($r = -.22$). Age showed weaker relations with the citation measures but a stronger negative association with Productivity ($r = -.27$). Age at award of the doctorate was significantly and negatively related to quality of graduate school, to both measures of current employment, and to citations and publications. Late finishers thus appear to be disadvantaged professionally in comparison with their more precocious peers. (No information was available on date of entry into graduate school.) These negative relationships may thus reveal something about the attainments of those who take longer periods to complete their degrees or the reluctance of more visible institutions to accept older students and to hire older graduates. The negative relationship between age at Ph.D. and citations holds even when the effect of experience is controlled (partial $r = -.18$, $p = .026$).

Personal Characteristics of Respondents

Turning now to the 196 psychologists who returned the mail survey, data on marital and family status, birth order, and the personality variables are shown in Table 3. The great majority of the respondents are currently married and parents. A high proportion are first-born or only children (54% of the males and 62% of the females). Although there are large cohort differences in the percentage of first-borns, the percentage of first-borns in the cohorts sampled probably does not exceed 40% (Zajonc, 1976). This over-representation of first-borns in a sample of doctorate holding academics is consistent with the frequently reported superior attainment of first and only borns (e.g., Galton, 1874; Altus, 1966; Helmreich, 1968).
Sex differences. Before considering the personality correlates of the criterion measures and a more general model of attainment, the similarities and differences between the sexes on the various measures should be explored. Males and females in the sample were highly comparable in age and did not differ significantly in years' experience, although women received the Ph.D. at a significantly later age than their male counterparts ($p = .0009$). Males tended to hold Ph.D.'s from more prestigious graduate programs ($p = .10$) and to be currently employed at higher rated ($p = .01$) and more productive ($p = .05$) institutions. Some evidence for the impact of Affirmative Action is seen in the separate analyses of data from the 45 males and 24 females in the sample who were under the age of 40. In this subgroup of younger professionals there were no significant sex differences in the reputation or productivity of the departments where they were employed or the reputation of their graduate department.

Overall, males were more productive in terms of publications ($p < .0001$), were cited more by others ($p < .0001$), and cited themselves more ($p < .0001$). To investigate the possibility that the greater attainment of males on these indices was largely due to sex differences on other variables related to productivity and eminence, analyses of covariance were computed for each criterion measure. In the first set of analyses, years experience, age at Ph.D., reputation of graduate school, and reputation of current institution were run singly as covariates and finally combined as multiple covariates. On the publication and citation measures the sex differences in each case remained highly
significant, the $F$ for sex in the least significant analysis being greater than 30, $p < .001$.

Further examination of data from those under the age of 40 also indicated that the sex differences in citations, self-citations, and publications remained highly significant ($p < .001$) even in the absence of differences in quality of graduate training and current employment. It was earlier suggested that sex differences might be less among those employed in institutions in which research is expected and rewarded. The subsets of men ($N = 33$) and women ($N = 13$) currently in departments rated "distinguished" by Roose and Andersen (1970) were therefore examined separately. In this very selective subpopulation, the magnitude of sex differences in publications was reduced and did not reach significance ($p = .18$). However, the difference in citations by others remained highly significant ($p < .001$), even when experience and age at Ph.D. were added as covariates. Men's higher self-citations also remained significant, although attenuated ($p = .03$). Thus sex differences in attainment, especially in citations by others, appear to be quite robust, even when institutional and experience factors are controlled.

As we have noted, marital and childrearing responsibilities have also been invoked as causal factors in the lower achievement of women and could additionally be responsible for the greater age of women at completion of the doctorate. These factors were examined along with their relationships to institutional and attainment indices.

A comparison of men and women on marital status yielded a significant Chi square ($p = .036$). This reflects the fact that a higher
proportion of the women reported themselves as never married (9% vs. 2%) or as separated, divorced, or widowed (18% vs. 12%). A significant Chi square ($p = .003$) is also found for number of children, reflecting the fact that among the currently or formerly married, more women than men are childless (34% vs. 12%). While the norm for both sexes is to be married and parents, substantially more of the females are currently unmarried and/or childless.

Overall, marital status is not significantly related to age at completion of the Ph.D., but the simple effect is significant in women ($p = .001$). Inspection of the women's data shows that those who are divorced, separated or widowed received their degree at a markedly later age (36.0) than those who are currently married (27.9) or never married (28.4). Number of children was also significantly related to age at degree, with a stronger effect in women. In both sexes, those with three or more children were delayed in receiving the degree (average age 29.5 in males, 33.6 in females), suggesting that the responsibilities of a large family can slow the educational process. However, neither marital status nor number of children was related to quality of graduate school or quality of present institution in either sex ($F$'s less than 1).

Turning to the citation and publication measures, no significant relationships with marital status or number of children were found. The strongest effect ($p = .10$) was an interaction between respondents' sex and number of children on the productivity measure which reflected a different ordering of means in the two sexes. In males, the most productive were those with two children and the least were those with
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three or more children. In females, those with no children were most productive and those with two were least productive. However, the simple effects within sex were very weak (p's < .30). For citations, childless women received the greatest number, but this group was almost a standard deviation lower than the lowest male group.

In summary, there is little evidence for the influence of family status on the measures of employment and attainment. The next set of measures to be examined in terms of gender were the masculinity, femininity, and achievement motivation scales. The means on each of these measures and the results of ANOVAs are presented in Table 4.

Insert Table 4 about here

Considering first the PAQ measure of masculinity and femininity, inspection of Table 4 shows that the means of men and women were very similar on all three scales, the F's being less than 1. This lack of sex differences distinguishes this sample from other American populations we have studied (Spence & Helmreich, 1978). These results can be best be interpreted by comparing them with the data obtained from a sample of middle-aged adults of similar social class (Spence & Helmreich, in press). While the men in the present sample were highly similar on all scales to the comparison group of middle-class men, the women psychologists showed sharply elevated M and M-F scores and somewhat depressed F scores relative to the female comparison group. The women psychologists' elevation in M and M-F scores is similar to that noted earlier in samples of female varsity athletes and scientists.
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from several disciplines and suggests both self-selection in those choosing demanding, nontraditional roles and the strengthening of these "masculine" characteristics as a consequence of career attainment.

The significance of the lower F scores of the female psychologists is problematical, perhaps reflecting self-selection into academic life of those who are more attuned to instrumental achievement than to interpersonal relations. Some support for this notion may be found in the fact that women psychologists who never married tended to be lower in F than their currently or formerly married colleagues ($r = .10$).

In the case of the achievement measures, again no significant sex differences were found although women tended ($r = .06$) to score higher on Work. Because of the high correlation between Work and Mastery in this sample ($r = .58$), a composite Work-Mastery index (Work x Mastery) was computed and is shown in the table. Women scored higher than men on the composite, the difference approaching significance ($r = .09$).

Reference data for the achievement measures are available from a sample of 55 middle-class couples in their thirties and forties (Note 2) who were predominantly college educated. The male psychologists were comparable to their male counterparts on Mastery, Work and Personal Unconcern. They were, however, significantly lower in Competitiveness ($r < .01$). Thus, a sample of vocationally successful adult males was quite comparable to the scientist sample with the exception of elevated Competitiveness scores. In further comparison, a sample of unselected undergraduate males (Helmreich & Spence, 1978) scored significantly lower than the scientists on Mastery, Work, and Personal Unconcern, and significantly higher in Competitiveness (all $p$'s < .01).
The female psychologists were strikingly higher in Mastery ($p < .001$) and slightly higher in Work ($p < .10$) than the comparison group of middle-class women, but equal in Competitiveness and Personal Unconcern. Undergraduate women were also significantly lower than the psychologists on Work and Mastery ($p$'s $< .001$), but somewhat higher in Competitiveness ($p < .05$).

Overall, then, the males and females in this sample were remarkably similar on the measured aspects of personality. To the extent that these personal factors similarly account for individual differences in attainment within each sex, they cannot be used to account for the observed differences in productivity and influence between the sexes.

**Personal characteristics and attainment.** Correlations between the PAQ and WOFO and the measures of experience and attainment were computed for each sex and for the sexes combined. Because the correlations were highly similar in each sex, the correlations for the sexes combined are shown in Table 5.

```
Insert Table 5 about here
```

Scores on the PAQ scales did not correlate significantly with the two reputational measures of school quality and only minimally with the productivity and citation measures. Femininity ($F$) was negatively related to the latter (significant, $p < .05$, only for citations), suggesting a tendency for those who are less interpersonally oriented to produce more published and more cited work. Masculinity ($M$) was positively but nonsignificantly related to the productivity and citation
Except for Personal Unconcern, the achievement measures showed stronger and more consistent relationships. Mastery, Work, and the Mastery-Work composite were all positively and significantly related to all criterion measures. Competitiveness was negatively related to citations \((p < .001)\) and to quality of graduate school \((p < .05)\) but was positively \((p < .05)\) correlated with publications.

The next question to be addressed was the relationship between the attainment measures and the conjoint effects of the achievement measures as they operate within the individual. It will be recalled that in earlier investigations (e.g., Helmreich & Spence, 1978), a median split method was used to form four groups, representing those above or below the median on Competitiveness and on a Work-Mastery composite. It will also be recalled that in several samples differing in composition and criterion measures, a cross-over interaction was found, those low in both Work-Mastery and in Competitiveness having the lowest means and those high in Work-Mastery having the highest means. The citations and productivity measures of the present study were subjected to parallel analyses, using multiple regression with Work-Mastery as a continuous variable and Competitiveness dummy coded into quartiles. In the first analysis, the criterion was citations standardized within sex and the independent variables were Mastery-Work and the Mastery-Work by Competitiveness interaction. The obtained multiple \(R\) was \(.38\) \((F_{4,191} = 8.18, p < .001)\). The interaction is highly significant and is shown graphically in Figure 1. The figure shows the regression lines for the Mastery-Work on citations for four quartiles of Competitiveness. As the
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graph indicates, for those low in Competitiveness increases in Mastery-Work are strongly associated with being cited by others, while for highly competitive individuals, changes in Mastery-Work are essentially unrelated to citations. Again, the lowest number of citations was associated with scoring low on both dimensions of achievement motivation. The same analysis using unstandardized citations as the criterion and including sex as a predictor produces the same pattern of results, but the highly significant sex effect increases the $R$ to .57.

Insert Figure 1 about here

Analysis using productivity (standardized within sex) yields a much lower, though significant, $R$ of .22 ($F_{2,191} = 4.8, p < .01$). In this case, however, the interaction between Work-Mastery and Competitiveness was nonsignificant and only Mastery-Work was a significant, positive predictor ($\beta = .20$). Use of unstandardized productivity as a criterion with the addition of sex as a predictor gave an $R$ of .45.

Self-citations were modestly related to the achievement motivation measures, with an $R$ of .27. Of the main effect and interaction terms, only Mastery-Work was a significant predictor ($\beta = .21, p < .01$). The pattern thus parallels that for the productivity measure.

As both quality of graduate and of current department were related to recognition, additional regressions were computed, including these as predictors. These are summarized for citations and publications in Table 6. In the case of citations, the resultant $R$ was .70, with both
motivational and demographic factors contributing significantly to the prediction. When the same regressions were computed within each sex, the Rs were .65 for females and .58 for males. The results for productivity remain much weaker with only sex, quality of current department, and Mastery-Work accounting for significant variance.

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Insert Table 6 about here

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Birth order and attainment. Birth order was not related to sex or to the personality measures but was positively associated with age, a higher percentage of the older respondents being first or only born. To control for this cohort effect, analyses of covariance with age as a covariate were computed contrasting first-borns and later-borns on quality of graduate school, quality of current employment, productivity, and citations. Consistent with Altus' (1966) findings, there was a tendency for first-borns to have attended more prestigious graduate schools, but the relationships did not reach statistical significance ($p = .20$). Of the remaining comparisons, there was a significant birth order difference only for citations by others ($F = 6.3, p = .01$) with first-borns receiving more recognition. At least as far as citations are concerned, the primogeniture effect remains robust, if theoretically ambiguous.

A Model of Attainment

We attempt here to posit a causal model of motivational and situational factors leading to attainment as reflected in recognition of one's work through citations. Placing sex, quality of graduate school
and quality of current school in such a model presents no problem since they are temporally ordered and antecedent to the citations criterion. Publication rate can also be considered antecedent to citations. Entering motivational variables in such a model presents more of a problem since our assessment of these characteristics took place after the publication of scholarly works and subsequent citations of them, and it could be argued that differences in achievement motives are consequences rather than antecedents of attainment. It is our theoretical position, however, that the motivational attributes in question (specifically Work-Mastery and Competitiveness), while not invulnerable to life experiences, reflect relatively stable, internalized traits that in adults tend to persist over time (Helmreich & Spence, 1978; Spence & Helmreich, in press) and directly influence achievement behaviors. Longitudinal data are not available, but the stability of motivational scores across the lifespan is indirectly suggested by the similarity of scores in this and other samples among those of various ages. Evidence concerning the relationship between motivational factors and subsequent achievement is also found in a recent study by Hirschberg and Itkin (1978) in which peer ratings of the strength of first-year graduate students’ achievement motives were found to be related to their later graduate school and postdoctoral performance.

Acknowledging that the causal primacy of these motivational factors can only be established through longitudinal investigations, a path model was constructed with the explicit assumption that the exogenous variables employed can be considered as valid measures of antecedent
individual differences. The proposed model and obtained path coefficients are shown in Figure 2. As the achievement motivation measure, the Mastery-Work x Competitiveness term was employed. The numbers on the diagram are the significant, standardized path coefficients (Duncan, 1966). Two paths were nonsignificant and deleted. These were between publications and achievement motivation and publications and quality of graduate department. The $R^2$ for citations from the path model was .62, while that for publications was .22.

Insert Figure 2 about here

---

Inspection of the paths provides a clearer picture of the pattern of relationships demonstrated by the bivariate correlations. Mastery-Work x Competitiveness relates to both reputational measures and citations. The model also shows the strong and consistent links between graduate school, current institution, and citations. It is noteworthy that a stronger direct path exists between graduate school and citations than between current school and the criterion.

Sex was coded with male = 1, female = 2. Thus the accumulative disadvantage of women is clearly reflected in the significant negative paths to both graduate and current school as well as to publications and citations. Women tended, however, to score higher on the achievement motivation factor.

Discussion

Citations have sometimes been criticized as a byproduct of productivity and as reflecting nothing about quality of contributions or
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eminence. The data reported here provide strong support for the contention that citations by others represent a valid measure of individual attainment. That citations are not merely a measure of scholarly productivity is shown by the fact that the number of publications across a three-year period is only moderately correlated with recognition by others through citations and by the occurrence of stronger and theoretically meaningful relationships between citations and personality and demographic factors. An asymmetrical relationship exists between productivity and recognition; one must publish to be cited, but high productivity does not insure recognition by others.

The substantial relationships between citations and the two quality of department measures replicate the results of earlier studies (e.g., Cole & Cole, 1973). These relationships are determined by both situational and person variables, which may include achievement motivational factors. The latter possibility is supported by the pattern of correlations found between our achievement motivation measures and quality of both graduate department and current department. Since the relationships between the personality and citation measures remain even when the effects of the institutional variables are partialled out, motivational factors can be concluded to make a strong independent contribution to achievement behavior.

The latter contention could be challenged on the grounds that our motivational measures were obtained subsequent to the measures of attainment and hence may reflect only the consequences of successful achievement. This argument seems particularly plausible in the case of Competitiveness. Successful individuals may start out their careers
being highly competitive but as they begin to achieve and become eminent, the need and the desire to prove themselves better than others may decrease.

Several sources of evidence suggest that our measures of achievement motives represent relatively stable traits that are antecedents rather than merely consequences of attainment. First, the same interactive relationship between Mastery-Work, Competitiveness and performance that we have reported here has also been found in several studies in which the motivational measures were obtained prior to the occurrence of the criterion behavior. For example, scores on the WOFO scales in college students have been found to predict subsequent performance on laboratory tasks (Foushee, Note 3) and later academic performance, as reflected in upper-division grade point average (Helmreich & Spence, 1978). The capacity of measures of achievement motivation obtained during students' first year in graduate school to predict later scholarly performance has also been shown by Hirschberg and Itkin (1978).

Additionally, no differences in mean scores were found in the present study between young scientists early in their careers and more mature scientists and both groups showed the same interactive pattern between citations and Work-Mastery and Competitiveness. These data contradict in particular the hypothesis that competitiveness is reduced as a result of achievement. If a decrease in this personality variable followed successful attainment, as reflected in citations by others, the negative relationship should be found only in the older scientists.

Even if competitiveness is granted causal status, the reasons for its deleterious effects are not obvious. However, several explanations
for the competitiveness effect seem plausible. One is that the highly competitive individual may be less professionally persistent in the face of the inevitable setbacks and failures in research, choosing instead to express achievement needs through alternative outlets. The competitive individual might also choose "safer," less innovative research problems that are seen as having a higher probability of "success" and publication, but are less likely to be recognized as contributions by other scientists. It is also possible that the competitive individual may find it harder to establish effective collaborative relationships with both peers and students and may thus be robbed of intellectual stimulation. The competitive individual may also become involved in academic game-playing, trying to show up rivals or in rushing to conduct and publish research on "hot" topics before others in the field. The endproducts of these self-designated interpersonal contests may be of lesser quality than those in which the individual focuses more exclusively on the intellectual problem at hand. It is also possible that the nature of the influence of competitiveness on the quality of scientific work varies from one individual to another and may have negative consequences for some but not all individuals. Understanding of the nature, origins, and impact of competitiveness can only be gained through future longitudinal and cross-sectional research.

Sex differences. Despite the homogeneity of the sample in type of employment and subdisciplinary specialty, highly significant sex differences in favor of men were found on all three attainment measures, particularly citations by others, thus replicating previous studies. There was also evidence of cumulative effects operating to women's
disadvantage, with women tending to earn their degrees later and from less outstanding graduate departments than men and to be employed in departments of lesser reputation. However, these variables accounted for only a portion of the sex differences in attainment. In a selected subsample of men and women who were on the faculty of highly prestigious university departments, sex differences in productivity were minimal in comparison with the differences found among those employed by less outstanding departments. However, even in this highly selected subsample, women were cited significantly less often than men.

There was no indication that women's lower productivity and influence could be attributed in any superficially obvious way to the greater burdens they assume for family care. Childless women, whether or not currently married, were only slightly (and nonsignificantly) more productive than their female colleagues with children and their means remained below those of men in both publications and citations. These results are similar to those reported by Cole and Cole (1973). It would be fallacious to argue that married career women have no greater domestic responsibilities than married men or that these responsibilities do not have an impact on women's professional life. The data do indicate, however, that among highly selected groups of academics, striking sex differences in attainment remain even when family status has been taken into account.

The personality variables measured by the PAQ and WOFO scales also fail to account for the observed sex differences. Prior studies have shown that men tend to be higher in self-assertive, instrumental personality characteristics than women (Spence & Helmreich, 1978; in
press) and also tend to be higher than women in mastery and competitive motives, both of which are positively associated with instrumentality. In the present sample, however, no significant sex differences favoring men were found on these measures, either because women who reach this level of attainment had initially been selected by themselves or by others from among those who are unusually high in instrumentality and achievement motivation, or because their successful attainments have led to self-confirming experiences that strengthened these characteristics. Whatever the reason that this sample of women psychologists equals their male colleagues on these variables, their lower productivity and citations cannot be ascribed to their weaker mastery and work motives or to their lesser instrumentality, as measured by our instruments.

We can only speculate about other social-psychological factors that may account for the observed differences. As graduate students, men are more likely to have had prestigious male mentors whose proteges they become. Whether they are graduate students or faculty members, most men interact more freely and comfortably with male than female colleagues and are thus more likely to become engaged in informal intellectual exchanges and in formal professional collaborations with them. (The reverse might also be true for women.) Since women are in a distinct minority in most academic departments, they may, as a result, receive less social support and intellectual stimulation from their peers than men. Similarly, they may be more isolated from the national "old boy" network and thus out of touch with the "invisible college" through which much exchange of scientific information takes place.

Citation biases may also operate to women's disfavor. In most
scholarly publications, citations are selective rather than exhaustive, and authors often have discretion in choosing the particular scholarly works they include in their references. Other things being equal, individuals of higher visibility and status tend to be cited more frequently than others, as are friends and former students. Women are more likely than men to fall outside this charmed circle (Miller & Zeitz, 1978). Women may also be more reluctant than men to engage in self-promotional activities that will bring themselves to the attention of well-placed members of their profession (Cole, in press). The findings in the present study that women cited themselves disproportionately less than men may at least in part be indicative of women's greater reluctance to propell themselves into the limelight. Further, women may choose to work on problems that interest women more than men, a phenomenon particularly likely in "softer" areas such as personality-social psychology and as a consequence, tend to be cited primarily by a small group of other women. This constellation of interacting factors may thus exclude women from what Cole and Cole (1973) have described as the "scientific reward system," with the result being that their work is under-recognized and under-supported. This in turn can cause both the quantity and the quality of their research to suffer, ultimately if not early in their careers.

Sex differences in attitudes and values may also contribute to differences in achievement. As Cole (in press) has suggested, obtaining an advanced degree and a professional position are still unusual accomplishments for women and may be regarded as goals in themselves. For men, these attainments are more routine and in order to judge
themselves successful, they must aim higher. Observation suggests that for this and other reasons, men are likely to be more ambitious and single-minded than women in pursuit of their careers. Males in American society have been brought up both to recognize that they will be required throughout their adult lives to work in order to support themselves and their families and to know that for men (but not women), worldly success is a desirable, praiseworthy goal. Men are therefore likely to become heavily invested in their work roles and, particularly when their jobs are prestigious, challenging ones and to regard their careers as the most important, if not the all-consuming, aspect of their lives. Females' upbringing, on the other hand, has stressed their future roles as homemaker, wife, and mother, roles that have no symmetrical counterparts in men's expectations that they will become fathers and husbands. Even girls who are raised to believe that they have a right to work outside the home in vocations of their choice recognize that work is not an obligatory role for women and most girls expect to marry and have children, whether or not they also plan to pursue a career. Career women who by choice are without husband or children may devote more time to their work and place greater importance on it than other women, but because of their socialization histories they may be less likely than men to be totally committed to their work and more likely to value non-work related activities and goals. (In light of the physical and psychic costs that are often associated with intense and concentrated devotion to career success, women's possible "deficiencies" in this regard cannot necessarily be faulted.)

Still another factor that may differentiate men and women is
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willingness to take risks. In many areas, women tend to be more cautious than men, acting in a way that minimizes both the probability of loss or harm and the probability of gain. Perhaps because of lesser expectations of success or less egotism, women may also bring this caution to their intellectual work, being reluctant to stray too far from data and from accepted approaches into the realm of theoretical speculation. While journal editors and readers may thereby be spared a good deal of grandiose nonsense, they may also be deprived of creative ideas and syntheses that could be highly influential in stimulating other investigators.

It is likely that in today's world, differences in the characteristics of men and women and in the climate of their personal and professional lives that negatively affect women's attainments are all relatively small. It is also likely that not all factors operate in all women all of the time so the constellations of sex-linked variables operating in individual women may be quite variable. The substantial differences between men and women in attainment measures, particularly in citations, may thus represent the aggregate effects of a large number of relatively independent causes, each quite minor when considered by itself and whose impact may therefore be difficult to detect. As a consequence of affirmative action programs and changing conceptions of appropriate roles for women, young women just beginning their scientific careers may have fewer handicaps than those who came before them. Citations and other measures of attainment may be a sensitive index to the impact of these changes.
Reference Notes


2. Unpublished data from an ongoing project on the antecedents of masculinity, femininity and achievement motivation being conducted by the first and second authors.


Cole, J. R. Women's place in the scientific community. In press.


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O'Connell, A. N., Alpert, J. L., Richardson, M. S., Rotter, N. G., Ruble, D. N., & Unger, R. K. Gender-specific barriers to research in psychology. JSAS Catalog of Selected Documents in Psychology, 1978, 8, 80 (MS #1753).


Spence, J. T., & Helmreich, R. L. Comparison of masculine and feminine personality attributes and sex-role attitudes across age groups. Developmental Psychology, in press.


Wade, N. Citation analysis: A new tool for science administrators. Science, 1975, 188, 429-432.

Footnotes

1 The five year restriction was imposed because with the lag from research to publication to subsequent citing publication, it is unlikely that individuals less than five years from the doctorate will be cited.

2 Although non-U. S. and/or non-academic respondents had fewer citations, they did not differ significantly from the retained sample on any of the demographic or personality variables.

3 For a subset of cases, citation counts were also made from the Science Citation Index. Citations from each source correlated .97 with each other. This suggests that for this population the two indices are practically interchangeable.

4 This fact could have considerable influence on the mean number of citations received by departments. Institutions having a large percentage of more senior faculty would be greatly advantaged over those with a number of new Ph.D.s. This, along with problems cited by Endler et al., suggests caution in interpreting data on the citation patterns of aggregates of scientists.
## Table 1

Characteristics of the Sample of 212 Men and 79 Women Psychologists

<table>
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<tr>
<th></th>
<th>Men</th>
<th></th>
<th></th>
<th>Women</th>
<th></th>
<th></th>
<th>F^1</th>
<th>P</th>
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<td>Mean</td>
<td>Median</td>
<td>SD</td>
<td>Mean</td>
<td>Median</td>
<td>SD</td>
<td>P</td>
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<td></td>
<td>45.4</td>
<td>41.7</td>
<td>8.4</td>
<td>45.5</td>
<td>43.1</td>
<td>11.0</td>
<td>&lt; 1</td>
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<td>3.4</td>
<td>30.0</td>
<td>27.3</td>
<td>6.6</td>
<td>6.9</td>
<td>.009</td>
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<tr>
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<td>15.5</td>
<td>10.3</td>
<td>9.5</td>
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<td>n.s.</td>
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<td>3.3</td>
<td>.97</td>
<td>2.8</td>
<td>2.9</td>
<td>.99</td>
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<td>.10</td>
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<td>2.1</td>
<td>1.1</td>
<td>1.9</td>
<td>1.3</td>
<td>1.2</td>
<td>6.7</td>
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<td>2.4</td>
<td>1.1</td>
<td>2.1</td>
<td>1.4</td>
<td>1.2</td>
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<td><strong>Publications</strong></td>
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<td>1.4</td>
<td>0.7</td>
<td>0.7</td>
<td>0.4</td>
<td>0.9</td>
<td>39.0</td>
<td>.0001</td>
</tr>
</tbody>
</table>

^1 For all ANOVAs, df = 1/289.

^2 Higher scores indicate a more positive reputation or higher productivity.
<table>
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<td>.29**</td>
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<td>-.15**</td>
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<td>.34**</td>
<td>.41**</td>
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<td>.47**</td>
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<td>.13*</td>
<td>.17*</td>
<td>.22**</td>
<td>.28**</td>
<td>.52**</td>
<td>.60**</td>
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</tbody>
</table>

*p < .05

**p < .01
### Table 3

**Marital and Family Characteristics of the**

**141 Male and 55 Female Respondents**

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<thead>
<tr>
<th></th>
<th>Never Married</th>
<th>Married</th>
<th>Widowed, Separated, or Divorced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
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</tr>
<tr>
<td>Marital Status</td>
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</tr>
<tr>
<td>Widowed</td>
<td>2%</td>
<td>86%</td>
<td>12%</td>
</tr>
<tr>
<td>Never Separated</td>
<td>9%</td>
<td>73%</td>
<td>18%</td>
</tr>
<tr>
<td>Married</td>
<td>12%</td>
<td>44%</td>
<td>32%</td>
</tr>
<tr>
<td>Divorced</td>
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</tr>
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<td><strong>Females</strong></td>
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<td>Marital Status</td>
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<tr>
<td>Widowed</td>
<td>9%</td>
<td>73%</td>
<td>18%</td>
</tr>
<tr>
<td>Never Separated</td>
<td>12%</td>
<td>44%</td>
<td>32%</td>
</tr>
<tr>
<td>Married</td>
<td>35%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>Divorced</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No. of Children

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td>12%</td>
<td>12%</td>
<td>44%</td>
<td>32%</td>
</tr>
<tr>
<td>First-born or only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Order</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td>35%</td>
<td>14%</td>
<td>30%</td>
<td>21%</td>
</tr>
<tr>
<td>Later-born</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Excluding Never Married; N = 188.
Table 4

Means of Male and Female Respondents on Personality Variables and ANOVA Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Males</th>
<th>SD Males</th>
<th>Mean Females</th>
<th>SD Females</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masculinity (M)</td>
<td>23.2</td>
<td>3.7</td>
<td>23.0</td>
<td>3.7</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Femininity (F)</td>
<td>22.0</td>
<td>4.1</td>
<td>21.8</td>
<td>3.8</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Masc-Fem (M-F)</td>
<td>16.2</td>
<td>3.4</td>
<td>15.7</td>
<td>3.3</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Mastery</td>
<td>21.5</td>
<td>3.9</td>
<td>22.4</td>
<td>3.7</td>
<td>2.4</td>
<td>n.s.</td>
</tr>
<tr>
<td>Work</td>
<td>21.0</td>
<td>2.9</td>
<td>21.9</td>
<td>2.1</td>
<td>3.5</td>
<td>.06</td>
</tr>
<tr>
<td>Mast x Work Composite</td>
<td>459.6</td>
<td>141.1</td>
<td>495.1</td>
<td>105.4</td>
<td>2.8</td>
<td>.09</td>
</tr>
<tr>
<td>Competitiveness</td>
<td>11.7</td>
<td>3.6</td>
<td>11.1</td>
<td>4.7</td>
<td>1.03</td>
<td>n.s.</td>
</tr>
<tr>
<td>Personal Unconcern</td>
<td>11.6</td>
<td>2.2</td>
<td>11.4</td>
<td>2.5</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

¹ For ANOVAs, df = 1/194.
Table 5
Correlations Between Personality Measures and Indices of Attainment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>.02</td>
<td>.04</td>
<td>.02</td>
<td>.12</td>
<td>.12</td>
</tr>
<tr>
<td>F</td>
<td>-.02</td>
<td>.01</td>
<td>.03</td>
<td>-.08</td>
<td>-.14*</td>
</tr>
<tr>
<td>M-F</td>
<td>.12</td>
<td>-.05</td>
<td>.00</td>
<td>-.01</td>
<td>.09</td>
</tr>
<tr>
<td>Mastery</td>
<td>.12</td>
<td>.20**</td>
<td>.20**</td>
<td>.14</td>
<td>.21**</td>
</tr>
<tr>
<td>Work</td>
<td>.12</td>
<td>.16*</td>
<td>.14*</td>
<td>.06</td>
<td>.16*</td>
</tr>
<tr>
<td>Mast x Work Composite</td>
<td>.13*</td>
<td>.21**</td>
<td>.20**</td>
<td>.13*</td>
<td>.23**</td>
</tr>
<tr>
<td>Competitiveness</td>
<td>-.13*</td>
<td>-.04</td>
<td>-.09</td>
<td>.13*</td>
<td>-.24**</td>
</tr>
<tr>
<td>Personal Unconcern</td>
<td>-.16*</td>
<td>-.06</td>
<td>-.12</td>
<td>-.05</td>
<td>-.11</td>
</tr>
</tbody>
</table>

*p < .05

**p < .01
Table 6
Regression Results for the Prediction of Citations and Publications

Citations: $R = .70$, $R^2 = .49$, $F(7, 189) = 25.2$, $p < .001$

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>-.40</td>
<td>47.6</td>
<td>.000</td>
</tr>
<tr>
<td>Mastery-Work</td>
<td>.03</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Mastery-Work x Competitiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st Quartile</td>
<td>.23</td>
<td>12.2</td>
<td>.001</td>
</tr>
<tr>
<td>2nd Quartile</td>
<td>.16</td>
<td>4.8</td>
<td>.03</td>
</tr>
<tr>
<td>3rd Quartile</td>
<td>-.01</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Graduate Department</td>
<td>.26</td>
<td>21.3</td>
<td>.001</td>
</tr>
<tr>
<td>Current Department</td>
<td>.28</td>
<td>24.4</td>
<td>.001</td>
</tr>
</tbody>
</table>

Publications: $R = .48$, $R^2 = .23$, $F(5, 191) = 21.1$, $p < .001$

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>$F$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>-.39</td>
<td>36.0</td>
<td>.001</td>
</tr>
<tr>
<td>Mastery-Work</td>
<td>.14</td>
<td>4.3</td>
<td>.03</td>
</tr>
<tr>
<td>Competitiveness</td>
<td>.10</td>
<td>2.3</td>
<td>.13</td>
</tr>
<tr>
<td>Graduate Department</td>
<td>-.06</td>
<td>&lt;1</td>
<td>n.s.</td>
</tr>
<tr>
<td>Current Department</td>
<td>.18</td>
<td>7.3</td>
<td>.001</td>
</tr>
</tbody>
</table>
Figure Captions

Figure 1. Regression lines for Mastery-Work on citations at four levels of Competitiveness.

Figure 2. A path model of attainment in psychology. Numbers are standardized path coefficients.