DOCUMENT RESUME

ED 287 134 CG 020 263

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TITLE Gender Differences in Values and Their Impact on Academic Achievement.
PUB DATE Jul 87
NOTE 23p.; Paper presented at the Annual Meeting of the International Society of Political Psychology (10th, San Francisco, CA, July 4-7, 1987).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Affective Measures; Cognitive Processes; Higher Education; *Medical Students; *Sex Differences; *Student Motivation; *Values

ABSTRACT

Gender differences in academic achievement of students in the medical school at the University of Michigan were investigated in this study. Observed achievement differences were attributed to gender differences in values which influence student motivation. Three hypotheses were tested: (1) that men place more importance on mastery-related issues, while women have stronger person-related and social values; (2) that men will do better in purely knowledge-based achievement tests, and that women will do better in person-related tasks such as clinical performance; and (3) that women's achievement should be predicted better by taking person-related values into account, while men's achievement should be predicted better by using mastery-related values as predictors. Data from 885 male and 271 female medical students of the entering classes of 1976 through 1981 were analyzed. The results supported all three hypotheses. Findings can be interpreted as clear evidence of the importance of affective factors, especially values, in explaining gender differences in academic achievement. One's achievement reflects the fit between the person's cognitive and affective make-up and the demands of the environment. (NB)

Gender Differences in Values and Their Impact on Academic Achievement

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Paper presented at the Tenth Annual Meeting of the International Society of Political Psychology, July 4th - 7th, 1987, in San Francisco.

Abstract

This paper investigates gender differences in academic achievement in the Medical School at the University of Michigan in Ann Arbor. The observed achievement differences apparently are due to gender differences in values which influence the students' motivation. We hypothesize that men place more importance on mastery-related issues, while women have stronger person-related and social values (Hypothesis 1). Due to these gender differences in values we expect that men will do better in purely knowledge based achievement tests, and that women will do better in person-related tasks such as in their clinical performance (Hypothesis 2). On the whole, women's achievement should be predicted better by taking person-related values into account, while men's achievement should be predicted better by using mastery-related values as predictors (Hypothesis 3). Data from 885 male and 271 female Medical students of the entering classes 1976 - 1981 of the Medical School at the University of Michigan are analyzed. The results support all three hypotheses. We interpret these findings as clear evidence of the importance of affective factors, especially values, in explaining gender differences in academic achievement. One's achievement reflects the fit between the person's cognitive affective make-up and the demands of the environment.

Introduction

Throughout the nineteenth century and the early decades of this century gender differences in academic achievement were regarded as proving that women were intellectually inferior to men (Miles, 1935; Cole, 1979). With emergence of the women's movement this perspective shifted (Spence, Deaux & Helmreich, 1985). Women were no longer seen as intellectually inferior; it was argued instead that they handicap themselves by having lower expectations of success and by attributing success and failure in a self-destructive way: While men tend to attribute their successes to their own excellence and failures to external factors, women's attributions tend to be the other way around. Successes tend to be attributed externally ("I was lucky") and failures internally ("I am too stupid to do this better") (Dweck & Licht, 1980).

There is no doubt that these research findings concerning the importance of cognitive factors such as expectations and attributions captured an extremely important phenomenon. But we argue that these gender differences in cognitive factors provide only one part of the explanation of gender differences in academic achievement. Furthermore, we expect that gender differences in these cognitive factors will decrease as women's emancipation progresses, since women's expectations of success and their attributions for it will change gradually with increasing availability of female role models and changes in public opinion.

Thus far, in explanations of gender differences in academic achievement, affective factors have been neglected -- in particular, the values and motivations that lead to achievement. We argue that women and men in 1987

have equal intellectual ability to achieve in academic settings; and they may have equally clear expectations regarding their future careers; but there are gender differences in values which influence the motivation to achieve in different areas.

These gender differences in values quite obviously influence men's and women's career choices (see for example Stockard et al, 1980, who describe the distribution of men and women in such fields as architecture, business, engineering and the physical sciences). But even men and women who make the same career choice may hold very different values and thus be motivated differently (Eccles, 1986a, 1986b).

We argue that these motivational differences explain differences in the achievement in different aspects of the same career. A specific achievement, for example one's level of achievement in a basic science examination in Medical School, or one's achievement in clinical performance in Medical School, reflects the fit between the person and the environment. In particular, it reflects the congruence between the person's values and thus his/her motivation to succeed in certain tasks, and the characteristics of the task at hand. In general, the better the fit between the person's values and the situational demands, the better the achievement will be.

Furthermore, each achievement increases with an increase of motivation. Therefore, we argue that in order to predict the achievement of men and women, each group's most prominent values are the best predictors for the achievement of the respective group.

Analyses of gender-role stereotypes help us to predict more precisely how men and women might differ in their values and thus in their motivations (Spence, Deaux & Helmreich, 1985). A large number of studies indicate that men value mastery-related issues more than women, whereas women have stronger

social and person-oriented values than men (Eccles, 1986b).

These values are differentially associated with achievement motivation: Men should be more motivated to succeed in impersonal and challenging tasks than women; and women should be more motivated than men to achieve in tasks that involve personal contacts and cooperation. Consequently, on the whole, men's achievement should be better predicted by indicators of mastery-related values, while women's achievements should be better predicted by indicators of person-related and social values.

These gender differences in values influence the way men and women respond to atmospheric variables in the environment. If we assume that women are more person-oriented and less power-oriented than men, women might be more sensitive to pressure and competition than men. Therefore, women's academic achievement will be negatively related to perceptions of competitiveness and positively associated with perceptions of a warm and caring atmosphere. In contrast, men's achievement will not be affected by such perceptions of the atmosphere. In accordance with their mastery-related values they may even prefer clearly structured and task-oriented settings. These assumptions are supported by research findings of Eccles and her coworkers (Eccles, MacIver & Lange, 1986).

These general hypotheses are investigated in the specific area of achievement in a Medical School program. The men and women entering such programs are selected very carefully, and consequently should not differ in their prior academic achievement, as reflected in their undergraduate GPAs, or in expectations regarding their career. But we do expect gender differences in affective factors, mainly in values and in evaluations of the atmosphere in the Medical School environment. Women should have higher person-related and social values, while men should have higher mastery-related values (=

Hypothesis 1a). In accordance with these differences in values we also expect differences in their evaluations of the atmosphere in the Medical School environment. One and same environment will be regarded quite differently as a function of one's own values. We hypothesize that women will perceive the Medical School environment as more competitive and serious and as less relaxed than men (= Hypothesis 1b).

Due to these differences in values we expect gender differences in the different examinations in the Medical School Program. Men should do better than women in examinations dealing with basic science, while women should do better than men when person-related tasks are evaluated (= Hypothesis 2). Specifically, we expect that male students will have significantly higher scores than female students in the nationally administered National Board of Medical Examination I (= NBME-I). This examination is given in the third year of the Medical School Program and consists of subtests of basic knowledge in such areas as anatomy, physiology, biochemistry, pathology and microbiology. In the fourth year of the Medical School Program, the NBME-II is given, which is geared towards both clinical and medical knowledge. We do not expect clear gender differences in this examination, because both mastery-related as well as person-related values can lead to a high motivation to succeed in these subtests. Finally, each student's clinical performance is rated in each of the areas the students do their clerkships. We do expect clear gender differences in these ratings of clinical performance, because person-oriented values fit the situational demands of the clinical environment better than mastery-related values. Consequently, women should receive better clinical ratings than men.

Furthermore, when analyzing one specific kind of achievement (in this case: the NBME-I scores) the male students' scores should be predicted by

mastery-related values, and the women's scores should be predicted by person-related values (= Hypothesis 3a). An evaluation of the Medical School environment as competitive should have a negative impact on the women's achievement but not on the men's achievement (= Hypothesis 3b).

Method

Data from 1156 (885 male and 271 female) students of the Medical School program at the University of Michigan in Ann Arbor are analyzed. These are data from approximately 90% of the students from the classes entering the Medical School program in 1976 through 1981. The students were recruited in their classes and participated on a voluntary basis.

The first group of dependent variables are the indicators of academic achievement. The first indicator is the total score in the National Board of Medical Examinations-I (NBME-I) which is a measure of basic scientific knowledge and is taken in the third year of Medical School. The second indicator is the total score in the NBME-II which is given in the fourth year of the program. This score reflects the students' medical and clinical knowledge. The third indicator is a rating of the students' performance in their clinical clerkships. These ratings were coded from clinical faculties' written evaluations of performance in each of nine different areas, such as internal medicine, surgery, obstetrics / gynecology or neurology. Each of the nine ratings was weighted by the number of weeks a student spent in this specific rotation and an average score over all nine fields was then computed. The scores range from 24 (= marginal pass) to 54 (=outstanding pass, honors).

The second group of variables are the indicators of value orientations and of evaluations of the atmosphere in the program. These indicators were obtained from self-administered questionnaires completed by the students in the first year of the program.

The Undergraduate Total GPA and some other indicators of prior academic achievement plus answers to some questions about expectations regarding the future career were also included in the analysis.

Hypotheses 1 and 2 about gender differences in values and achievements were tested with anlyses of variance. The third hypothesis about the different predictors for academic achievement of men and women were tested in regression analyses.

Results

Our reasoning is based on the assumption that men and women have different value priorities and are motivated differently in life. Specifically, we argue that the male and female students entering Medical School do not differ in cognitive factors, such as in their prior achievement and their expectations, but that they do differ in their value priorities and in the evaluations of the atmosphere in this program. Hypothesis 1a states that women have stronger person-related values than men, and that men have stronger mastery-related values than women. In accordance with these values we also expect that women will evaluate the Medical School program as more competitive and less relaxed than men (= Hypothesis 1 b).

- Insert Table 1 about here -

Table 1 presents the results concerning our assumptions about gender differences in cognitive and affective factors. We see that in our sample the prior academic achievement of women, specifically their Undergraduate Total GPA was not only equal to, but slightly higher than that of the men (3.63 versus 3.68). As predicted, men and women do not differ significantly in their expectations regarding careers. But they do differ, as predicted, in their values and their evaluations of the program. Men place more importance on materialistic goals, student participation and political awareness, while women value intellectual growth, personal growth, human respect, empathy and responsibility more highly than men. These results support Hypothesis 1a.

According to Hypothesis 1b it is expected that women would describe the atmosphere of the Medical School on the whole as more competitive and as less person-oriented than men. The results presented in Table 1 support this hypothesis: Women describe the tone of the Medical School as more competitive and grade conscious, and as having a more intense atmosphere and higher standards than men do, while men see the Medical School environment as more friendly and supportive, as having more independence and freedom, and as being more relaxed, easy going, tolerant and open-minded than women do.

Our second hypothesis states that men should do better in purely knowledge-based examinations, while women should do better in person-related tasks. As can be seen in Table 2, this hypthesis is supported by our data. Men have a significantly higher NBME-I score (573 versus 547) than women, but women get better clinical ratings (men: 44.3 versus women: 45.8). In the NBME-II which tests medical and clinical knowledge there are no significant differences between men and women, which is consistent with our prediction.

- Include Table 2 about here -

In the second step of our analyses, we used indicators of prior academic achievement, expectations, values, and evaluations of the atmosphere in the Medical School to test our hypotheses that the male students' achievement is predicted better by using mastery-related values, while the women's achievement is better predicted by person-related values. Stepwise regression analyses were used to assess the predictive power of the various indicators.

As can be seen in Table 3, men's academic achievement (in this case, their NBME-I Total score), is predicted by a variety of different indicators. Their prior academic achievement, (specifically their Junior Non Science GPA and the number of Undergraduate Non Science hours) is a good predictor of their later academic achievement. An external factor, namely the degree to which financial matters were seen as a problem, also contributed to academic achievement. The more financial troubles these male students anticipated in their first year of Medical School, the worse was their NBME-I Total score in the third year.

In regard to cognitive factors we found that certain expectations were also good predictors of later academic achievement: The more these male students expected (a) not to do well in clinical experiences, (b) to do well in basic science, (c) that they would be satisfied with their social activities in the next years and (d) that reading and intellectual activities would be important later in their lives, the better was their academic achievement in the NBME-I. Furthermore, the more focused these male students were on entering medicine as a career during the last six months before the

interview was taken, the better their later academic achievement was. On the other hand, the later they decided to enter medicine as a career, the better they did. This is a sign that those students who decided in early childhood might not have the kind of motivation that leads to success in the academic examinations in Medical School.

The results concerning the affective factors that predicted later academic achievement supported our hypothesis: The less these male students were interested in the behavioral sciences and in clinical practice, the better they did in the NBME-I. Furthermore, the less they perceived the students in the program as motivated by humanitarian ideals and the more they believed that physicians in this country have a conservative orientation, the better they did academically.

On the whole, the male students that succeed in the NBME-I are clearly mastery-oriented; they were good and motivated students before who are not interested in the clinical and behavioral science part of their education, and do not even expect to do well in clinical settings. Instead they expect to do well in basic sciences and to place a lot of importance on intellectual activities. They firmly intend to become physicians and do not believe that students on the whole are guided by humanitarian ideals.

- Include Table 3 about here -

The results of the stepwise regression for the women are presented in Table 4. Again we find that prior academic achievement, here the Undergraduate Non Science GPA and the number of Undergraduate Non Science hours, is a good indicator of later academic achievement.

Other cognitive factors that were selected as good predictors of later academic achievement were the expectation to place importance on acquiring professional skills during the next two years, and the expectancy that reading and intellectual activities would not be important later in life. This last finding is interesting because it is opposite to the finding for male students: While male students who expected that intellectual activities would be important, did better academically, the opposite holds true for female students. This finding can be interpreted together with the kind of attributions for career choice that lead to better academic achievement. The less women believed that their own special abilities and interests led them to choose medicine as a career, the better they did in the NBME-I. Starting from our finding that women value empathy and personal growth more than men, one could argue that the more a woman sees her career choice as motivated by these values, the less well they will do academically. Their achievement motivation is not primarily fed by intellectual interest, but far more by person-related and social concerns.

This interpretation is also supported by the findings concerning values and evaluations of the atmosphere in the medical school. The less a woman values creativity and the less she is interested in the social sciences, the better she will do academically. Those women who worked a lot in service organizations during their undergraduate years, do less well academically later. The more a female student perceives the tone in the medical school as tolerant and open-minded, the less she sees the environment as clearly structured by the faculty members, and the more she sees that the administrators value professional knowledge, the better these women do in the NBME-I.

Two of the indicators selected in this stepwise regression analysis can

be interpreted as indicators of a social value. The more these women agreed with the statement that it would be better for society if physicians had salaried positions rather than receiving fees, and they more they agreed with the statement that most physicians in this country are active in community affairs, the better they did academically. These findings support our hypothesis that women's academic achievement is better predicted by person-related and social values than by mastery-related values. It seems that the more these women are interested in social values and the more they perceive other physicians as interested in these values, and also the more they realize the negative impact of competition on providing medical help, the better they do academically. These two predictors might also indicate that socially liberal women do better academically than more traditional women.

- Include Table 4 about here -

On the whole, we find that the women's academic achievement is also a function of prior academic achievement, but that their person-orientation might hinder their performance (see step 3, 5, 13), while socially-liberal values might actually promote better performance. On the whole, women's achievement can be seen as being influenced by perceptions of the atmosphere in the medical school environment.

Conclusions

These findings indicate that it is important to consider values and

affective factors when studying gender differences in academic achievement. It seems clear that there are gender differences in values. These gender differences in values lead to different motivations to achieve which in turn influence the level of achievement.

At this point let us describe some results from another study (Oggins, Inglehart, Brown & Moore, under review) which complement our findings in this paper. Oggins et al investigated whether our hypothesis that men's achievement can be predicted from different values than women achievements holds up when clinical performance ratings of Medical school students are considered. As can be seen in Table 2 in this paper, we find that women received significantly higher ratings on their clinical performance than did the male students. In separate stepwise regression analyses to predict men's and women's clinical ratings we found clear support for our general hypothesis that men's and women's success is related to different values and to different evaluations of the atmosphere in the program. We found in this analysis that women's person-related values predicted significantly how well they performed in the clinical setting, while men's mastery-related values predicted their success even in the clincial setting. Again, women's evaluations of the environment as being competitive was detrimental to their achievement.

Taking the results of these two studies together, we suggest the following two general points when taking values into account for predicting academic achievement: First of all, if women have other value priorities than men, we should expect different kinds of achievement motivations for men and women. Independent of the type of achievement, men's achievement should be best predicted by taking mastery-related values into account, while women's achievement should be better predicted when considering their person-related values.

Secondly, when women and men choose the same career they may succeed differentailly in distinct areas of this general career. In general, we emphasize the importance of considering the person-environmental fit in predicting achievement. Provided equal abilities we predict that the better the fit between a person's values and the situational demands, the better the achievement should be.

Closely connected with the importance of values for predicting gender differences in academic achievement is the role of the second group of affective factors that is considered here, namely the evaluations of the atmosphere in the environment. We argue that women on the whole are handicapped by perceiving an environment as competitive, while men may actually strive in an environment that is clearly structured. We find support for this hypothesis in this paper as well as in two other studies (Inglehart, Nyquist, Brown & Moore, 1987; Oggins, Inglehart, Brown & Moore, under review). This hypothesis needs to be investigated further. We are particularly interested in determining whether the sensitivity of women to the competitiveness of an environment is higher when women see themselves as being in a minority position.

It seems interesting that the role of affective factors in explaining gender differences in academic achievement has been relatively neglected. We attribute this to the dominance of cognitive theories in psychology. With a shift from a solely cognitive perspective in psychological research to an increasing interest in emotions and affective factors (see Zajonc, 1980), we can progress to a less one-sided understanding of human reactions.

Going beyond psychological research and looking at society as a whole, the "silent revolution" of value change (see Inglehart, 1981) has interesting implications. The apparent value shift in Western industrialized societies

from predominantly materialistic and achievement-oriented to more post materialistic and person-oriented priorities may enable women to succeed in a more person-oriented environment. For our findings indicate that the less competitive our environments become, the more chances women will have to live up to their potential.

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Table 1: Average prior academic achievement, expectations, values and evaluations of the program of male and female medical students

	Men	Women	p
Prior academic achievement:			
Undergraduate Total GPA	3.63 (N=866)	3.68 (N=267)	.01
Expectations concerning career:			
How many other fields did you consider? (1 = none to 5 = 4 or more)	1.6	1.5	ns
Expected satisfaction (1 = highest to 5 = lowest)	2.08	2.05	ns
Certainty (1 = very to 5 = not at all certain)	1.46	1.50	ns

Values: How much importance do you yourself place on the following value? (1 = very much to 5 = none)

	Men	Women	p
Materialistic things	3.35	3.49	.013
Intellectual growth	1.39	1.27	.005
Personal Growth	1.50	1.37	.004
Student participation	2.23	2.38	.011
Political awareness	2.52	2.74	.002
Human respect	1.36	1.24	.005
Empathy	1.68	1.42	.000
Responsibility	1.31	1.21	.011

Evaluation of the atmosphere of the Medical School: How well do you think each of the following phrases describes the tone of the Medical School? (1 = very much to 5 = not at all)

	Men	Women	p
Competitive, grade conscious	2.58	1.30	.0001
Intense atmosphere, high standards	2.01	1.88	.022
Friendly, supportive	2.53	2.66	.028
Independence, freedom	3.04	3.17	.037
Relaxed, easy going	3.83	4.03	.0003
Tolerant, open-minded	3.05	3.17	.043

Table 2: Average academic achievement in the different examinations / evaluations in the Medical School program

	Men	Women	p
NBME-I Total score	573	547	.000
	(N = 847)	(N = 258)	
NBME-II Total score	525	527	ns
	(N = 802)	(N = 244)	
Clinical Rating	44.3	45.8	.000
	(N = 774)	(N = 235)	

Table 3: Stepwise regression of the men's NBME-I Total scores using forward selection

Step		Partial	p
1	Junior Non Science GPA	.39	.000
2	Interest in behavioral sciences (1 = highest to 4 = lowest)	.21	.000
3	Interest in clinical practice (1 = highest to 4 = lowest)	.16	.000
4	Expectancy to do well in clinical experiences (1 = very to 5 = not at all)	.11	.006
5	Expectancy to do well in basic sciences (1 = very to 5 = not at all)	-.12	.004
6	Expectancy to receive satisfaction from social activities (1 = very to 5 = not at all)	-.11	.008
7	The students in the program are motivated by humanitarian ideals (1 = agree very much to 5 = do not agree at all)	.11	.008
8	Expectancy of later importance of reading and intellectual activities (1 = very much to 5 = not at all)	-.11	.008
9	Undergraduate Non Science hours	.10	.017
10	How many other fields besides medicine did you consider? (1 = none to 5 = 4 or more)	-.10	.023
11	Most physicians in this country have a conservative orientation (1 = agree very much to 5 = do not agree at all)	-.10	.024
12	Financial Matters will be a problem in the coming year. (1 = very much to 5 = not at all)	.09	.032
13	When did you definitely decide to enter medicine as a career? (1 = early childhood to 8 = still undecided)	.09	.039

N = 573 (out of 885); multiple R = .539; R^2 =.290

Table 4: Stepwise regression of the women's NBME-I Total scores using forward selection

Step		Partial	p
1	Undergraduate Non Science hours	.24	.002
2	Undergraduate Non Science GPA	.23	.003
3	Degree of participation in service organizations during undergraduate years (1 = very much to 5 = not at all)	.22	.005
4	Most physicians in this country are active in community affairs. (1 = agree very much to 5 = agree not at all)	-.20	.011
5	Importance of own special abilities and interests for own career choice (1 = very much to 5 = none)	.19	.016
6	Expectancy to place importance on acquiring professional skills in next years (1 = very much to 5 = not at all)	-.16	.039
7	Importance of creativity (1 = very much to 5 = not at all)	.17	.025
8	It would be better for society as a whole if physicians had salaried positions instead of receiving fees. (1 = agree very much to 5 = not at all)	-.18	.027
9	Tone in medical school: tolerant, open-minded (1 = very much to 5 = not at all)	-.16	.039
10	Faculty members are consistently clear in what they expect. (1 = agree very much to 5 = agree not at all)	.19	.015
11	Administrators' importance of professional knowledge (1 = very much to 5 = not at all)	-.20	.014
12	Expectancy of importance of reading, intellectual activities (1 = very much to 5 = not at all)	.18	.025
13	Interest in social science (1 = highest to 4 = lowest)	.18	.024

N = 166 (out of 271), multiple r= .629; R^2 =.396