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Why Don't They Want a Male-Dominated Job? An investigation of young women who changed their occupational aspirations

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We examined 2 hypotheses regarding why some young women do not maintain their espoused occupational aspirations in male-dominated fields from late adolescence through young adulthood. The first hypothesis concerns attitudes towards math and science; the second concerns the desire for job flexibility. The sample of young women ($N = 104$) was taken from a larger longitudinal investigation of approximately 1,000 young women from a midwestern metropolitan area in Michigan, USA, who were followed from age 18 (in 1990) to age 25 (1997). Findings suggest that desire for a flexible job, high time demands of an occupation, and low intrinsic value of physical science were the best predictors of women changing their occupational aspirations out of male-dominated fields. These results suggest that despite the women's movement and more efforts in society to open occupational doors to traditional male-jobs for women, concerns about balancing career and family, together with lower value for science-related domains, continue to steer young women away from occupations in traditionally male-dominated fields, where their abilities and ambitions may lie.

Introduction

Although women made tremendous gains in entering traditionally male-dominated professions during the 20th century, gender differences persisted through the turn of the millennium in adult occupational pursuits (National Center for Education Statistics [NCES], 2002). By the end of the 1990s, women were receiving more

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bachelor's degrees than men but were still underrepresented in many traditionally male-dominated occupational fields, such as engineering (18%), physical science, (37%), mathematical/computer science (34%), chemistry (26%), and law (27%) (Bureau of Labor Statistics, 1998; NCES, 1997, 2002). In the mid-1990s, women represented 46% of the nation's labor force but only 9% of engineers, 29% of computer and math scientists, and 22% of physical scientists (NCES, 2002). Many women were still concentrated in traditionally "feminine" occupations with low status and low pay (Bureau of Labor Statistics, 1998). While these statistics are informative, they do not shed light on possible reasons behind this pattern. Specifically, they do not tell us about young women who at one time aspired to occupations in these fields, but changed their occupational aspirations to other fields. This article investigates a cohort of young women who, when they graduated from high school in 1990, held male-dominated job aspirations (occupations held by 30% or fewer women). Seven years later, the majority of these women aspired to either female-dominated (occupations made up of 70% or more women) or neutral jobs (occupations made up of 31 – 69% women).

Not only are females less likely to *choose* careers in those fields (Jacobs, Chhin, & Bleeker, this issue; Watt, this issue), but when they do, they are more likely than males to "drop out" of these fields (Mau, 2003; National Science Foundation, 1999). At each successive educational level, girls are more likely than boys to opt out of math and science. This pattern of women leaving male-dominated occupations, which has been called the "leaky pipeline" (NCES, 1997; Oakes, 1990), has been repeatedly found in studies that examine gendered occupational aspirations in the traditionally male-dominated fields of mathematics, physical science, and engineering. This "leak" of women from the pipeline toward male-dominated fields suggests that some women who once aspired to a career in these fields did not achieve their aspirations or fulfill their potential in these areas of interest. This pattern can be both personally dissatisfying and economically costly in terms of personal and societal investment in their training (Carr, 1997; Oakes, 1990).

In this study, we use longitudinal data to investigate two hypotheses to explain the exodus from male-dominated occupational aspirations among this sample. We hope to add to the literature by illuminating some of the reasons for this pattern, and provide longitudinal data to sort out the many hypotheses put forth to explain this pattern that have been posited in the literature.

Hypotheses

Several theories have been proposed to explain the dearth of women in male-dominated fields. In this paper, we focus on two major explanations, young women's: (1) attitudes towards math and science; and (2) desire for an occupation that will allow them to combine a career with a family. We chose these two because our longitudinal dataset of young adults lent itself to examining these particular issues in depth.

Perception of lack of ability and/or intrinsic value.[1] Some researchers have suggested that women's underrepresentation in male-dominated fields is due to the fact that women do not feel smart enough in or do not value math and physical science. Research supports these theories: There are gender differences in self-concept of ability (and the related construct, expectancy for success[2]) and value of these areas, and these differences predict gender differences in subsequent achievement-related behaviors. For example, research has shown that from early adolescence through college, boys have higher ability self-concepts and place more intrinsic value on math than girls (Eccles (Parsons) et al., 1983; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Watt, 2004).[3] In addition, females tend to underestimate their abilities in math even when objective test scores show no gender differences in ability (Betz & Hackett, 1983; Eccles (Parsons) et al., 1983; Frome & Eccles, 1995; Updegraff, Eccles, Barber, & O'Brien, 1996).[4] In addition to the gender differences in self-concept of ability, there are also gender differences in interest in math and physical science. Researchers have found that girls show less interest than boys do in math and science (Jozefowicz, Barber, & Eccles, 1993; Watt, 2004; but see also Jacobs et al., 2002). Further, 12th-grade boys report enjoying science more than 12th-grade girls (although they reported similar levels of enjoyment in math [Jacobs et al., 2002; NCES, 1997]).

These gender differences in ability self-perception and intrinsic value are important because they relate to students' achievement-related decisions. Self-concept of ability and expectancies for success in math are significantly related to intentions to take future math courses, the number of math courses actually taken, and aspirations to a career in math or science (Eccles (Parsons) et al., 1985; Feather, 1988; Updegraff et al., 1996). A positive attitude towards math and high self-concepts of ability in math and science are related to majoring in science in college and aspiring to a career in math or science (Ware & Lee, 1988; Watt, this issue), and college women's career goals relate significantly to their valuing of math (Eccles, 1994). Self-efficacy in traditionally male occupations is related to the amount of intrinsic value placed on and consideration of these occupations (Betz & Hackett, 1983; Larose, Ratelle, Guay, Senécal, & Harvey, this issue; Nagy, Trautwein, Baumert, Köller, & Garrett, this issue).

These findings lead to our first hypothesis: Females' lower intrinsic value of and lower self-concept of ability in mathematics and science may explain why many talented women eventually decide not to choose careers in male-dominated fields (Eccles, 1987).

Combining a career with a family. For many women, occupational choice involves weighing the perceived costs and benefits to family life (Eccles, 1987; Hayes & Watt, 1998; Novack & Novack, 1996). It has been suggested that one reason why women choose traditionally "female" professions is that these occupations allow women to combine work and family roles more easily than "male" professions (Eccles, 1994; Ware & Lee, 1988). One reason for this is that unlike male-dominated occupations, female-dominated (such as nursing or teaching elementary school) or neutral occupations (such as teaching high school) may appear more flexible (Farmer, 1997).

High school girls are also more likely than boys to expect to make sacrifices in their professional life for the needs of their family (Jozefowicz et al., 1993). Ware and Lee (1988) found that female college students who placed a high priority on future family and personal life were less likely than their female peers to choose a major in science and were less academically oriented in general.

These findings lead to our second hypothesis: Females who believe that occupational flexibility is important when trying to combine a career with childcare may be more likely to change their aspirations out of male-dominated occupations because of the association of those occupations with lack of flexibility. Society's expectations for women's adult lives, combined with many women's knowledge that they will be expected to be the primary caretaker of the home and children, may serve to funnel women into fields perceived to be more flexible and "disposable" for the sake of family. Does this desire for occupational flexibility predict whether young women "drop out" of traditionally male-dominated fields after high school?

In addition to examining the above mentioned theories on (1) self-concept of ability and interest in math and science and (2) the perceived "cost" to family life as barriers to women's choosing occupations in male-dominated fields, it is also important to examine characteristics of the occupations themselves. We examined objective characteristics of the occupations, specifically two objective, job-related factors: (1) the amount of math/physical science content of the job; and (2) the occupational flexibility of the job (measured in two ways: the years of education required for a job and the average number of hours worked annually for that job). We predicted that young women would be more likely to drop out of male-dominated occupations that (1) contain a high level of math and physical science content; and (2) are low in occupational flexibility.

Focus of this Study

We were interested in exploring two hypotheses about why young women with male-dominated career aspirations "drop out" of these pursuits in young adulthood. We studied a group of females who aspired to male-dominated occupations in the 12th grade. This is an important group to examine because as high school seniors, these young women reported that they would like to have occupations in these fields, possibly indicating an interest in and high self-concept of ability in male-dominated fields.[5]

Eighty-three percent of the females in our sample who had male-dominated occupational aspirations in the 12th grade switched to female-dominated or neutral occupational aspirations 7 years later. Was it the math/physical science content that scared them away? The potential conflict of the demands of such occupations with their future roles as wives and mothers? Or something else altogether?

Method

The data were collected as part of a larger multiple-wave longitudinal investigation (the Michigan Study of Adolescent Life Transitions [MSALT]). The first wave of

data used in this study was collected in 1990, when the participants were in the 12th grade (hereafter referred to as ''12th grade''). The second wave of data used here was when the subjects were on average 25 years old (hereafter referred to as ''age 25''). Due to attrition between the waves, the sample size of women who aspired to male-dominated occupations in 12th grade and who had valid job aspiration data at age 25 dropped from 208 to 104. Only the 104 who remained in the sample across both waves are used in the longitudinal analysis. Their characteristics are described below, with a note about how they differ from those who did not remain in the sample.

Sample

Participants were 104 females from 12 low- to middle-income communities located within a 50-mile radius of a large industrial Midwestern city in Michigan, USA. Ninety-three percent of the participants were European-American, 1% were African-American, 4% were Asian-American, and 2% were of other races/ethnicities. By age 25, 6% had earned a high school diploma, 4% had obtained some post-high school vocational training, 25% had some college but no degree, 6% had an Associate's degree, 43% had a Bachelor's degree, 14% had 1 or 2 years of graduate school, and 2% had a Master's degree.[6]

Measures

Occupational aspirations were measured at both time points. At 12th grade, participants were asked, ''If you could have any job you wanted, what job would you *like to have* when you are 30?'' At age 25, participants were asked, ''What job would you *most like to have* when you are 30?'' These open-ended responses were coded according to the US Census occupational codes. Each occupation was further coded as either male-dominated, neutral, or female-dominated, based on the percentage of incumbents of that occupation that were female according to the 1990 Census. Occupations that were made up of 30% or fewer women were categorized as ''male-dominated'', occupations that were made up of 31 – 69% women were categorized as ''neutral'', and occupations that were made up of 70% or more women were categorized as ''female-dominated''. Male-dominated occupations include: engineer, architect, and pilot; neutral occupations include: accountant, manager, and pharmacist; female-dominated occupations include: bookkeeper, nurse, and secretary.

To code the level of the math/physical science content in an occupation, the occupational aspirations of the sample were divided into three groups. The first group included occupations where one's key or central tasks would involve math/physical science; the second included occupations where one may perform tasks in math/physical science from time to time or where training for this occupation may involve coursework in these areas; and the third group included occupations where one's occupational tasks and training would not involve math/physical science. Examples of occupations with a high level of math and physical science include: engineer, chemist,

and accountant; examples of occupations with a medium level of math and physical science include: dentist, health managers, and health technicians; examples of occupations with a low level of math and science include: lawyer, counselor, and office clerk.

Self-concept of ability in and intrinsic value of math and physical science were measured in 12th grade. Two items were used to measure self-concept of ability in math (Cronbach's alpha = .84) and two items were used to measure self-concept of ability in physical science (Cronbach's alpha = .86) in 12th grade. One item each was available to measure participants' intrinsic value of math and physical science (see Appendix A for actual items).

Twelfth-grade beliefs about the importance of a family-flexible occupation were measured by five items (Cronbach's alpha = .84). These items tap the value the respondent places on having a career that accommodates fulfilling family responsibilities, such as a flexible working schedule or being able to take time off for family responsibilities (Jozefowicz et al., 1993). All of the above items were created by Eccles and colleagues, and all items were answered on 7-point Likert scales (see Appendix A for actual scale items).

Job demandingness was measured using two items. The first item is the normative amount of education held by occupational incumbents, according to the 1990 Census. For each occupation, the mode for level of education of the incumbents in each occupation (regardless of gender or age) was coded as follows: 1 = less than high school; 2 = high school; 3 = some college; 4 = bachelor's degree; 5 = PhD or professional degree. The second item, time demands, is the average number of annual hours worked by year-round, full-time, occupational incumbents, according to the 1990 Census. The 1990 census was used because that is when the participants were completing the survey in 12th grade. Since this information was given in categories divided by gender and age groups, we used the averages given for women age 30 – 34, who are likely to have young children.[7]

Results

The focus of this study is the subsample of 104 young women who indicated male-dominated occupational aspirations in the 12th grade and were still in the study at age 25. This main subsample was divided into two groups, the ''stable'' group (those young women who continued to have male-dominated occupational aspirations at age 25) and the ''change'' group (those young women who had male-dominated occupational aspirations in their senior year of high school but who switched their occupational aspirations to female-dominated or neutral by age 25). Nineteen young women were in the ''stable'' group (18%) and 85 were in the ''change'' group (82%, 55% changing to ''neutral'' and 27% to ''female-dominated'' occupations).

We used logistic regression, which regresses a categorical outcome variable on continuous independent predictors, to test the predictive strength of young women's self-concepts of ability in math and physical science, the intrinsic value they place on math and physical science, the importance they placed on job flexibility, the typical

amount of education required for the job they aspire to, and the typical number of hours worked annually for the job that they aspire to on the outcome variable of either stability (0) or change (1) from male-dominated occupational aspirations.

Math and science self-concepts of ability were included in separate analyses from the math and physical science interests because incorporating them in one model resulted in suppression effects due to their high intercorrelation within each subject area ($r = .76$ in math, $r = .78$ in physical science), producing estimates for both constructs that were positive rather than negative (.04 for interest in math and .29 for self-concept of ability in physical science). We therefore estimated one model containing the self-concept of ability in math and self-concept of ability in physical science variables excluding the interest variables, and another model containing the interest in math and interest in physical science variables excluding the self-concept of ability variables. Our estimates for self-concept of ability and interest effects should therefore not be interpreted as unique effects since they were not simultaneously estimated. Correlations among all variables are presented in Table 1.

We used a stepwise method of entering the predictors into the model in order to examine the effects of each type of predictor separately as well as together in the full model. We were looking not only for which variables significantly predicted the outcome, but also the relative strength of each of the predictors.

In the self-concept of ability model (see Table 2), a lower desire for a family-flexible job was the only significant predictor of maintaining a male-dominated occupational aspiration. There was a trend such that both a higher self-concept of ability in math and a lower number of hours worked annually predicted maintaining a male-dominated occupation (these are all in the hypothesized direction). The overall model was significant.

In the intrinsic value model (see Table 3), the strongest predictor of maintaining a male-dominated occupational aspiration was a lower number of hours worked annually of the job to which they aspired. Other significant predictors of maintaining a male-dominated occupational aspiration were a higher intrinsic value placed on physical science and a lower desire for a family flexible job. The overall model was significant.

In sum, the analyses demonstrate that in this sample a higher desire for a family-flexible job, aspiring to a job with higher occupational time demands, and a lower intrinsic value placed on physical science spurred young women to change their aspirations away from male-dominated occupational fields. The most consistently strong, significant predictor was a desire for a job that allowed for the flexibility for them to have a family.

Discussion

What are the factors that lead to young women to change their aspirations out of a male-dominated occupation? In our sample, which we acknowledge is small and may not be representative of the general population, we tested two factors: attitudes towards math and physical science (which are likely to be found in many

Table 1. Correlations of outcome and predictor variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Change (0) vs. stable (1)	1.00								
2. Self-concept of ability in math	−.27**	1.00							
3. Self-concept of ability in physical science	−.19*	.36***	1.00						
4. Intrinsic value of math	−.22*	.76***	.25**	1.00					
5. Intrinsic value of physical science	−.29**	.25**	.78***	.23*	1.00				
6. Math/physical science content of job	−.25**	.26**	.49***	.25**	.48***	1.00			
7. Desire for flexible job	.20*	.13	−.03	.13	−.08	.07	1.00		
8. Education required	.06	−.06	.20*	−.11	.06	.19	−.02	1.00	
9. Annual hours	.20*	−.17	.27**	−.28**	.16	/17	.04	.68***	1.00

Note: $N = 104$. *$p < .05$. **$p < .001$. ***$p < .001$.

Table 2. Statistics for the final logistic regression model (step 5-full model)—includes self-concept of ability

Predictors	Standardized B (B)	$p >$ Chi sq	Standard error	Wald Chi-square	Exp (B) [Odds Ratio]
12th-grade self-concept of ability in math	−.36 (−.41)	.08	.24	1.18	.66
12th-grade self-concept of ability in physical science	−.12 (−.14)	.57	.25	.32	.87
Level of math/physical science in job aspiration	−.19 (−.49)	.24	.41	1.40	.62
12th-grade beliefs about the importance of a family-flexible occupation	.41 (.61)	.02	.25	5.81	1.83
Educational requirements for job aspiration	−.13 (−.32)	.57	.56	.33	.72
Number of hours needed to be worked annually for job aspiration	.43 (0.0)	.09	0.0	2.86	1.00

Note: $N = 104$. R-Square = .19. Testing Global Null Hypothesis: Chi-Square = 21.68. $df = 6$, $p = .002$.

Table 3. Statistics for the final logistic regression model (step 5-full model)—includes intrinsic value

Predictors	Standardized B (B)	$p >$ Chi Sq	Standard error	Wald Chi-square	Exp (B) [Odds Ratio]
12th-grade intrinsic value of math	−.14 (−.12)	.47	.17	.53	.88
12th-grade intrinsic value of physical science	−.43 (−.44)	.05	.23	3.8	.64
Level of math/physical science in job aspiration	−.10 (−.26)	.55	.44	.35	1.62
12th-grade beliefs about the importance of a family-flexible occupation	.33 (.49)	.04	.24	4.13	1.63
Educational requirements for job aspiration	−.24 (−.57)	.34	.60	.92	.56
Number of hours needed to be worked annually for job aspiration	.51 (.00)	.05	0.0	3.70	1.00

Note: $N = 104$. R-Square = .19. Testing Global Null Hypothesis: Chi-Square = 22.06. $df = 6$, $p = .001$.

male-dominated occupations) and desiring a family-flexible job. We found that desire for a family-flexible job, having aspired to a job with high time demands, and having a low intrinsic value for physical science led to failure to maintain a male-dominated occupational aspiration. On the other hand, young women who had male-dominated occupational aspirations in 12th grade, who had low desire for a job that would allow flexibility, and placed high intrinsic value on physical science were less likely to ''leak out'' of the math/physical science pipeline.

These findings add to the literature by examining several types of attitudes in one longitudinal analysis and by using objective measures of time demandingness and educational requirements of occupational choices to show the combination of factors that may lead young women to abandon their initial job aspirations. Others have found similar patterns: Holland & Eisenhart (1990) found that as young women get older, they are more likely to conclude that it is harder to place a career in a male-dominated field second to a family than a career in a female-dominated or neutral field. Information (both accurate and inaccurate) that young women gather regarding the flexibility of a job schedule, and the ability to combine certain occupations with family responsibilities, may lead young women to conclude that combining work and family will be difficult (Gottfredson, 1981).

It is unfortunate and unacceptable that many male-dominated fields are still inflexible in practice (even if not in ''official policy'') at the turn of the new millennium. Girls and young women are not able to follow through with their plans because of the barriers (e.g., lack of affordable childcare, lack of schedule flexibility) that have always been there, despite the rhetoric. The reality is that they cannot pursue and be successful in the same types of careers that men can if they want to have a family and be the primary caregiver. Baruch and Barnett (1986) reported that women in dual-career couples assume major responsibility for their families and household, and the pattern of returning home from work and beginning to take care of the family has been named women's ''second shift'' (Hochschild, 1989).

Probably because they learn early that they need to be flexible if they want to have children, girls have been found to be interested in a greater number of different careers than boys and also to show more gender-role flexibility, whereas the aspirations of boys require more education on average and have higher prestige levels than those of girls (Mendez & Crawford, 2002; Shapka, Domene, & Keating, this issue). Meinster and Rose (2001) found that high school girls' career interests became increasingly traditional from freshman to senior year. Hallett and Gilbert (1997) found that, among college women who planned to be part of a dual career couple, those who expected to share roles with their spouses had higher self-esteem, higher levels of instrumentality, and higher commitment to a lifelong career than those who expected to have a conventional dual-career marriage (with traditional divisions of household labor).

In sum, we have added to the literature our findings of continuing circumscription of occupational aspirations for the sake of family among a cohort of young women moving into adulthood in the 1990s. In the long term, our ongoing research will examine the socioeconomic and mental health consequences of these changes.

Carr (1997) found that midlife women who fell short of their career goals showed lower levels of "purpose in life" and higher levels of depression than those women who attained their earlier career goals. If young women do not receive support in household and childcare duties from their employers and spouses in the future, they may be less likely to fulfill their occupational aspirations in male-dominated fields. In future research, it would be beneficial to test these hypotheses on a larger sample: (1) because our stable group of young women was small; and (2) because a larger sample would allow us to test for the predictive strength of interactions between our variables.

In the short term, we suggest four types of interventions: (1) go beyond encouraging girls to take high-level courses in math and physical sciences and show them real role models who are living proof that many male-dominated careers are compatible with family goals (i.e., find the exceptions to the "rule" and publicize them widely); (2) continue to press employers to provide child care and a flexible working schedule without compromising other benefits or promotions; (3) conduct interventions with young men that focus on taking equal responsibility for childcare and household responsibilities; and (4) to continue to work on developing methods and interventions to target girls' and women's underestimation of their abilities in math and physical science, and the lower value that they place on these domains relative to males. These are some of the ways that women will be able to achieve both their family and their career aspirations and stop leaving male-dominated jobs.

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Notes

1. The phrase "intrinsic value" is often called "interest"; intrinsic value (or interest) is one of the three major components of task value (Eccles & Wigfield, 1995; Meece, Eccles Parsons, Kaczala, Goff, & Futterman, 1982).
2. Research has shown that self-concept of ability in an area is a proximal predictor of expectancy for success in that area (Eccles (Parsons) et al., 1983). However, Eccles and Wigfield (1995) found that these measures were not empirically distinguishable.
3. With the exception of gifted high school students (Alfeld-Liro, 1999).
4. Some researchers suggest that girls may be more realistic (rather than underestimating) in their estimation of their math abilities (e.g., Crandall, 1969; Watt, 2005).
5. Although we are not proposing that male-dominated occupations are superior to female-dominated or neutral occupations, we do believe it is important to determine which factors serve to constrict the vocational options that young women perceive to be available to them, particularly because of the possible emotional, economic, and human capital losses associated with not fulfilling one's aspirations (Carr, 1997; Eccles, 1994; Oakes, 1990).

6. Of the 208 females with male-dominated job aspirations in 12th grade, similar to the attrition sample of 137, 91% were European-American, 4% were African American, and 2% were Asian. Also, similar to the attrition sample, 2% did not have a high school diploma at age 25, 12% had a high school diploma, 5% had obtained some post-high school vocational training, 33% had 1 to 3 years of college, 35% had a Bachelor's degree, 10% had 1 or 2 years of graduate school, and 2% had a Master's degree. Correlations between the variables for the truncated sample are similar to those in the full sample.
7. This age group was chosen instead of women in their twenties in order to include women who delayed having children until after establishing themselves in a career.

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Appendix A

Self-Concept of Ability in Math ($\alpha = .84$)

How good at math are you? 1 "not at all good" . . . 7 "very good"
How good do you think you would be in a career requiring good math skills? 1 "not at all good" . . . 7 "very good."

Intrinsic Value of Math

How much do you like doing math? 1 "a little" . . . 7 "a lot."

Self-Concept of Ability in Physical Science ($\alpha = .86$)

How good at physical science are you? 1 "not at all good" . . . 7 "very good"
How good do you think you would be in a career requiring good physical science skills? 1 "not at all good" . . . 7 "very good."

Intrinsic Value of Physical Science

How much do you like doing physical science? 1 "a little" . . . 7 "a lot."

Importance of a Family-Flexible Occupation ($\alpha = .84$)

Scale: 1 "not at all" . . . 7 "a lot"
Please indicate how much you would like a job with each characteristic.
"has a flexible working schedule you can adjust to meet the needs of your family"
"does not require you to be away from your family"
"leaves a lot of time for other things in your life"
"allows you to be at home when you children are out of school (like teaching)"
"makes it easy to take a lot of time off for family responsibilities."