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Associations between women's retention in STEM or STEM-related fields and their spouses' occupations and majors

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There is a growing awareness of the impact of women in science, technology, engineering, and mathematics (STEM) or STEM-related fields and the influence of marriage on women's retention in those fields. This study examines the relationship between the continued employment of married women with STEM or STEM-related majors in relevant occupations and their spouses having the same field of occupation/major, as well as the difference in this association when considering the presence of children. This study analyzed a sample comprising 147,467 married college-educated women aged 25–55 years. The analysis was restricted to women with a STEM or STEM-related major and a spouse who was college-educated and employed. All the data were drawn from the 2015–2019 waves of data released by the American Community Survey (ACS). The results reveal that spousal occupational similarity is positively associated with married women's retention in STEM and STEM-related (healthcare) occupations. Moreover, the presence of children is a moderator variable in the relationship between women's employment in STEM or STEM-related occupations and their spouses' having STEM or STEM-related occupations. This study aims to provide information for research on spousal homogamy, women's career development, and women with STEM or STEM-related majors and their families.

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Introduction

Background of women in the U.S. labor force. The labor force participation rate for women in the United States (U.S.) has increased since the 1920s, and the massive influx of women into the labor force is considered one of the most important social and economic trends in modern U.S. history (U.S. Bureau of Labor Statistics, 2021). Women made up ~20% of the U.S. labor force in 1920 but accounted for ~47% of the U.S. labor force in 2021 (Women's Bureau, n.d.).

After peaking at 60% in 2000, the labor force participation of women in the U.S. has been trending downward, which has increased the level of media attention given to the conflicts between work and family faced by professional women whose husbands often also have professional careers (Kahn and Ginther, 2017). In 2018, 57.1% of women in the U.S. participated in the labor force, and in 53% of married couples, both the wife and husband generated earnings (U.S. Bureau of Labor Statistics, 2021).

Marriage status and women's careers. Spousal support (assisting one's spouse behaviorally and psychologically), gender-role attitudes (people's opinions on the proper roles for men and women), work–family conflicts (the tension between participation in the work and the family role) and other factors related to marriage and family may influence a married woman's career (Michalos, 2014, p. 171; Pitt-Catsouphes et al., 2015). There is a growing awareness of spousal and marital effects in terms of both demographic trends and economic theory. Some studies have focused on how these effects differ between men and women. Dougherty (2006) argued that while a marriage premium contributes to married women's earnings, the effect is not as distinct as it is for married men. McKinnish (2008) revealed that married women with college degrees are often unable to make optimal career location decisions because of family-related issues, and as a result, their earnings suffer. Simultaneously, some studies have focused on spouses' influence on occupational development. According to Bernardi (1999), husbands' careers and occupational resources negatively affect their wives' employment in the labor force but have positive impacts on wives' career attainment. Wallace and Jovanovic (2011) investigated the influence of occupational similarity among lawyers in Canada and found that the study participants received more informational support but not more emotional support from their spouses when they had the same occupation. According to Amin et al. (2017), support from a spouse promotes career success, whereas work–family balance is the mediator that links spousal support with subjective success. Pluut et al. (2018) indicated that a spouse's career aspirations have a greater influence than an individual's own motivation when pursuing a specialist or managerial position.

Women's underrepresentation in STEM and STEM-related fields. Numerous studies have emphasized women's substantial underrepresentation in science, technology, engineering and mathematics (STEM) and STEM-related fields, which may be a significant cause of the insufficient diversification and inadequate talent utilization in the STEM workforce (Beede et al., 2011; Jean et al., 2015). Some studies have examined why women in STEM and STEM-related areas generally leave these fields more frequently. For instance, environmental factors such as gendered stereotypes, cultural norms, dynamic information and academic climates have been demonstrated to be the reasons why women are underrepresented in STEM or STEM-related disciplines (Cheng et al., 2020; Bloodhart et al., 2020; Casad et al., 2021; García-Holgado et al., 2019; Kahn and Ginther, 2017). According to some studies on women's retention in STEM occupations, women in STEM fields are more likely to leave than women in other professions (Glass et al., 2013). Moreover, it is more difficult for women in STEM jobs to return once they quit (Mavriplis et al., 2010). Because there is a greater loss of female workers in STEM fields than in other professions (Glass et al., 2013), occupational choices are more critical for women in STEM fields.

Romantic relationships and women in STEM or STEM-related fields. Work–family conflicts have also been identified as an important problem that negatively impacts women's retention in STEM or STEM-related fields. Jean et al. (2015) emphasized that women in STEM fields face special family-related problems, particularly conflicts between career advancement and their own pregnancy, childbirth and caregiving for family members. Another study related the persistence of women in STEM fields to the importance of women's expectations and coping strategies (Thoman et al., 2022). Moreover, previous research has analyzed the connection between women's choices of academic majors and romantic relationships as they relate to STEM fields. For example, Park et al. (2011) discovered conflicts between maintaining a positive attitude toward a STEM career and pursuing romantic goals. In contrast, another study has shown that successful women with STEM majors are more likely to find partners who support their educational and career goals (Barth et al., 2016).

Furthermore, women in STEM fields hold less stereotypical views about gender and STEM careers than women in female-dominated majors, even when women in STEM fields hold a traditional feminine role in their families (Dunlap and Barth, 2019). Sassler et al. (2017) revealed different attitudes toward families among men and women in STEM fields.

In addition, the phenomenon of educational and occupational similarity among couples in some fields has also been mentioned in many studies; this phenomenon may also exist for women who major in STEM or STEM-related fields. For example, Case (2013) noted spousal homogamy among people with doctoral degrees in science and engineering. Blossfeld (2009) and Arum et al. (2008) also revealed several possible reasons for spousal homogamy in terms of educational background and social class.

STEM and STEM-related fields. Although a previous study demonstrated the positive association between women's retention in STEM fields and their spouses' STEM employment (Glass et al., 2013), few studies have distinguished between STEM and STEM-related fields when studying either this topic or other problems with STEM employment. According to the classification put forth by the Standard Occupational Classification Policy Committee in 2018, life and physical and social science, engineering, mathematics, and information technology occupations are classified as STEM fields, while architecture and health occupations are classified as STEM-related fields (U.S. Bureau of Labor Statistics, n.d.b). However, after the Carl D. Perkins Career and Technical Education (CTE) Act was passed by the U.S., the House of Representatives officially and legally recognized architecture as a STEM field in 2018 (American Institute of Architects, 2018). Therefore, this research defines the life and physical and social science, engineering, mathematics and information technology and architecture degree fields and related occupations as STEM fields and healthcare degree fields and related occupations as STEM-related fields. Similarly, two other previous studies on STEM and STEM-related careers also listed STEM fields and healthcare fields separately (Berk et al., 2014; Min and Jang, 2015).

Present study. Only a few studies have taken spousal occupations into account when analyzing the continued employment of married women who majored in STEM or STEM-related fields. None of them distinguished between women in STEM fields and those healthcare fields or pooled the two subsamples. The purpose of this study is to fill these gaps and provide a new perspective on the relationship between marriage and retention in original occupation fields among women with STEM or STEM-related educational majors. The study analyses the impact of spousal occupation on married women in STEM or STEM-related occupations and whether they remain in their initial careers, which may link spousal occupation to the impact of family factors on career development in women who initially pursue positions in STEM or STEM-related fields.

When a spouse has a similar occupation or educational major, it is possible that shared professional pursuits among the couple can contribute to a woman's continued development in STEM or STEM-related fields. Alternatively, according to a related survey, people in STEM or STEM-related occupations are thought to earn relatively high pay, but they are not widely believed to have more flexibility in relation to their family (Funk and Parker, 2018). Hence, a spouse's STEM or STEM-related occupation may lead him or her to spend less time with his or her family, thereby negatively affecting the woman's retention in STEM or STEM-related occupations. Therefore, this study focuses on how spouses' occupations and majors influence the retention of women in STEM or STEM-related careers. The study also intends to provide useful information to women with STEM or STEM-related majors and their families.

The main question addressed in this research is as follows: what is the relationship between spouses' having a STEM or STEM-related occupation/educational degree and married women with STEM or STEM-related majors remaining in such occupations? To further explore the mechanism underlying this possible link, this study also explores the relationship between marital status and continued employment in STEM or STEM-related occupations for all women who majored in those fields. In addition, the study examines the association between spouses' STEM or STEM-related occupations/educational degree fields and the employment of married women with STEM or STEM-related majors. Another topic for investigation is the relationship between spouses who have the same type of occupations/majors and women's retention in the fields they, which is assessed in the STEM and healthcare subsamples. Finally, the study examines the effect of spouses' STEM or STEM-related occupations/educational degree fields on women's continued employment in STEM or STEM-related occupations when children are considered. Based on previous studies (Arum et al., 2008; Blossfeld, 2009; Case, 2013; Glass et al., 2013; Wallace and Jovanovic, 2011), the current study hypothesizes that having a spouse with a STEM or STEM-related occupation/major is positively associated with married women's retention in STEM or STEM-related occupations. Data from the American Community Survey (ACS), which is gathered by the U.S. Census Bureau, are used to explore this question via logistic regression (Ruggles et al., 2022). This survey includes detailed information on each participant and their spouse's occupation, educational background, children and other demographic information. The ACS is a good data source for exploring the link between married women's retention in STEM or STEM-related fields and their spouses' occupations and educational backgrounds.

Data and measures

Data. The main data source for this analysis consists of the 2015–2019 waves of data released by the ACS (an ongoing national survey that annually gathers demographic information from people in all 50 U.S. states and the District of Columbia and Puerto Rico to better understand communities); these data are collected by the U.S. Census Bureau (the official agency that provides quality data on the U.S. population and economy) (Ruggles et al., 2022; U.S. Census Bureau, 2023a, 2023b). The dataset is cross-sectional and covers only the population of the U.S. This dataset is used because it boasts a large sample, it includes an individual's occupation and educational major, and its data not only are updated yearly but is also accessible, especially when compared with alternative data sources from other surveys.

The sample that was used only in the first group of regressions includes 159,290 women aged 25–55 years who had previously received a bachelor's degree in STEM or STEM-related fields, and all were included regardless of marital status. The main sample used in the second, third and fifth regression groups is restricted to 147,467 married women. The main sample of this study was selected in several steps. First, survey participants who were female, 25–55 years old and married were chosen from among all participants. Second, only those with a college education or higher and at least one bachelor's degree in a STEM or STEM-related field, as defined above, were retained in the dataset from this subset of survey participants. Third, only survey participants whose spouse's employment status was employed and whose education level is bachelor's degree or above were included in the final sample. In addition, in the fourth group of regressions, the main sample was divided into two subsamples based on the degree fields: a STEM subsample (92,551 women) and a healthcare (STEM-related) subsample (56,829 women). Some women could be included in both subsamples because they have at least two different majors.

Measures. For this study, the recommendations of both the Standard Occupational Classification (SOC) Policy Committee in 2018 and the Carl D. Perkins Career and Technical Education Act were considered when identifying STEM and STEM-related degree fields and occupations (American Institute of Architects, 2018; U.S. Bureau of Labor Statistics, n.d.a). The key variables are dummy variables with values of 1 and 0 (1 indicates that something is true or present) (Gould, n.d.). Accordingly, the key independent variables indicate whether a woman's spouse has a STEM or STEM-related occupation and whether a woman's spouse has a degree in a STEM or STEM-related field. The key dependent variable indicates whether the woman is involved in a STEM or STEM-related occupation.

Table 1 lists all the STEM and healthcare degree fields (IPUMS U.S.A., n.d.a; IPUMS U.S.A., n.d.b).

Table 2 lists all the STEM and healthcare occupations in the 2015–2017 waves of data released by the ACS. Table 3 lists all the STEM and healthcare occupations in the 2018–2019 waves of ACS data.

The control variables include the census year; the woman's age, race, birthplace (whether she was born in the U.S.), and state of residence; the educational level of both the woman and her spouse (if she or he has a degree above a bachelor's degree); the specific major(s)/field(s) of study for the most advanced degrees earned by the woman and her spouse; the spouse's sex; whether they live in a metropolitan area; the number of children; and the number of children under five years of age. These variables allow us to test whether a spouse's influence on a woman's retention in her original field is a reflection of the spouse's STEM, STEM-related or non-STEM occupation/degree field or whether there are other factors that impact whether a married woman with a STEM or STEM-related degree stays in a STEM or STEM-related occupation.

Table 1 STEM or STEM-related degree fields of the ACS.

Science, Technology, Engineering, and Mathematics (STEM) or STEM-related degree fields
STEM degree fields
Biology and Life Sciences
Engineering
Computer and Information Sciences
Physical Sciences
Mathematics and Statistics
Agriculture
Architecture
Environment and Natural Resources
Engineering Technologies
Communication Technologies
Transportation Sciences and Technologies
Construction Services
Nuclear, Industrial Radiology and Biological Technologies
Electrical and Mechanic Repairs and Technologies
Military Technologies
STEM-related (healthcare) degree field
Medical and Health Sciences and Services

Table 2 STEM or STEM-related occupations from the 2015–2017 waves of data released by the ACS.

Science, Technology, Engineering, and Mathematics (STEM) or STEM-related occupations
STEM occupations
Computer and Mathematical Occupations
Architecture and Engineering Occupations
Life, physical and Social Science Occupations
Computer and Information Systems Managers
Architecture and Engineering Managers
Natural Science Managers
Sales Engineers
STEM-related (healthcare) occupations
Healthcare Practitioners and Technical Occupations
Medical and Health Service Managers

Table 3 STEM or STEM-related occupations from the 2018–2019 waves of data released by the ACS.

Science, Technology, Engineering, and Mathematics (STEM) or STEM-related occupations
STEM occupations
Computer, Engineering and Science Occupations
Computer and Information Systems Managers
Architecture and Engineering Managers
Natural Science Managers
Sales Engineers
STEM-related (healthcare) occupations
Healthcare Practitioners and Technical Occupations
Medical and Health Service Managers

Methods

To measure the relationship between spouses' occupations/majors and married women's retention in STEM or STEM-related occupations, several groups of logistic regression models (models used to calculate the probability of a discrete outcome given an input variable) were analyzed (Edgar and Manz, 2017). Since most key variables are dummy variables, logistic regression is a suitable method for modeling (Hilbe, 2011). The Stata statistical software package was used to calculate descriptive statistics, create figures, and run logistic regressions in this study.

In the first group of regressions, the dependent variable is whether the woman is working in a STEM or STEM-related occupation (if she is not employed, she is not considered to be in a STEM or STEM-related occupation). The key independent variables are dummy variables indicating the woman's marital status (married with a spouse with a STEM or STEM-related occupation/degree field, married with a spouse without a STEM or STEM-related occupation/degree field, separated, divorced or widowed, or never married).

In the second group of regressions, the dependent variable is whether the woman is working in a STEM or STEM-related occupation. The key independent variable is a dummy variable indicating whether a woman's spouse has a STEM or STEM-related occupation/major. Two key control variables were subsequently added: the total income of the woman's spouse (wages and salary income; the unit is $10,000) and the usual number of hours the spouse works per week. These controls make it possible to consider how a woman's continued employment in a STEM or

Table 4 Percent of married women with STEM or STEM-related majors by degree field.

Science, Technology, Engineering, and Mathematics or STEM-related degree fields	Percentage of women in the degree field
STEM-related degree field	
Medical and Health Sciences and Services	37.26%
STEM degree fields	
Biology and Life Sciences	19.89%
Engineering	12.93%
Computer and Information Sciences	8.18%
Physical Sciences	8.02%
Mathematics and Statistics	4.76%
Agriculture	2.80%
Architecture	2.15%
Environment and Natural Resources	2.07%
Engineering Technologies	1.09%
Communication Technologies	0.37%
Transportation Sciences and Technologies	0.22%
Construction Services	0.13%
Nuclear, Industrial Radiology, and Biological Technologies	0.10%
Electrical and Mechanic Repairs and Technologies	0.02%
Military Technologies	0.01%

STEM-related occupation is influenced by a spouse's income and working hours, possibly owing to an increase in work–family conflicts and/or a reduction in the importance of the woman's earnings to her household income. However, despite these influences, a woman's decision to stay in a STEM or STEM-related occupation could still be positively affected by her spouse's STEM or STEM-related occupation, especially when her spouse provides STEM-specific information and resources.

Recognizing that a woman may not be working in a STEM or STEM-related occupation either because she is not working at all or because she is working in a non-STEM field, the third group of regressions was adjusted to reflect whether the woman is employed instead of whether she is in a STEM or STEM-related occupation to distinguish between these two cases.

To analyze the STEM and healthcare subsamples separately, a fourth group of regressions was used. The dependent variable is whether the woman is working in the STEM/healthcare field in which she originally majored. The key independent variable is whether the woman's spouse has a STEM/healthcare (the same field as the woman majored in) occupation/major.

To consider the impact of having children and further understand the effect of the spouse's STEM or STEM-related occupation/major, the last group of regressions was introduced. These additional regressions reflect whether the woman has children. Interaction terms were added, and demographic controls pertaining to children were deleted.

Preliminary analysis

Table 4 reveals the distribution of majors for married women with a STEM or STEM-related degree, listing their percentages in each degree field.

This table shows that for the 2015–2019 waves of data, as the only STEM-related degree field, medical and health sciences and services is the most popular among married women in STEM or STEM-related fields. Overall, 37.26% of the married women chose this health services field, far more than for any of the STEM degree fields. However, it should be noted that only 14.94% of the married women in the STEM-related (healthcare) subsample reported working as dentists, physicians, surgeons, and podiatrists. In contrast, 46.30% of them reported being employed in relatively less prestigious, less powerful, and lower-paying professional job categories, including registered nurses, nurse anesthetists, nurse practitioners, nurse midwives, licensed practical and licensed vocational nurses, and dental hygienists. Traditionally, these latter positions have been filled almost exclusively by women rather than by men.

The most popular STEM degree field for married women is biology and life sciences, which account for 19.89% of the total. Each of the remaining STEM fields represents less than 15% of the total, with only 0.02% majoring in electrical and mechanical repair and technology and 0.01% majoring in military technologies.

Table 5 shows the average values for certain variables based on subsamples of married women with STEM or STEM-related majors whose spouses work in STEM occupations versus those whose spouses are not in STEM or STEM-related occupations. For example, 56.63% of women whose spouses were in STEM or STEM-related occupations were themselves in a STEM or STEM-related occupation, whereas 47.01% of women whose spouses were not in STEM or STEM-related occupations were in a STEM or STEM-related occupation. For the selected category of women in the–2019 sample, 40.8% of women's spouses were in STEM or STEM-related occupations, and 59.2% were in other occupations (calculated from the bottom row of Table 5). Women whose spouses were in STEM-related occupations were slightly younger than those whose spouses were in non-STEM occupations, although the difference was less than one year. The percentage of women who chose to pursue education beyond a bachelor's degree was greater among those whose spouses had a STEM or STEM-related occupation than among those whose spouses were in a non-STEM occupation. In addition, there is no significant difference found in the variables related to spouses' sex or children for families, regardless of whether the spouse was involved in a STEM or STEM-related occupation. Although women whose spouses were not in STEM or STEM-related occupations were more likely to be employed, for couples in which spouses were in a STEM or STEM-related occupation, both usually worked fewer hours per week and earned more than couples in which spouses were not in a STEM or STEM-related occupation.

Figure 1 depicts the percentage of married women who remained in STEM or STEM-related occupations, and groups are categorized by whether their spouses were also in STEM or STEM-related occupations and whether they had children. The likelihood that a woman who majored in STEM or STEM-related fields remains in a STEM or STEM-related occupation was distinctly greater if her spouse was also in a STEM or STEM-related occupation. The presence of children decreased the probability that these women would remain in STEM occupations; however, the effect of this factor was not as distinct as the impact of their spouses' occupations (STEM or STEM-related versus non-STEM). However, these analyses do not control for other possible confounding factors. Therefore, the next section further explores this research question using logistic regression models.

Results

Marital situation and women's retention in STEM or STEM-related occupations. Table 6 shows the results of two logistic regressions that aim to forecast the association between majoring in STEM or STEM-related fields and continuing STEM or STEM-related employment, controlling for marital status (married with a spouse with a STEM or STEM-related

Table 5 Summary statistics of married women with STEM or STEM-related majors with spouses working in STEM or STEM-related occupations or non-STEM occupations.

	Spouses are in STEM or STEM-related occupations	Spouses are in non-STEM occupations
Variables (mean/percentage)		
Employed in STEM or STEM-related occupations	56.63%	47.01%
Spouse has a STEM or STEM-related major	84.36%	40.80%
Age	39.73 years	40.53 years
Spouse is male	99.15%	98.76%
Education above bachelor's degree	53.40%	46.82%
In metropolitan region	96.55%	94.05%
Employed	76.39%	81.90%
Has children	72.78%	73.68%
Number of children at or above age 5 years	0.968	1.051
Number of children under age 5 years	0.398	0.390
Usual hours worked per week	30.21 h	32.63 h
Wage and salary income (Unit: $10,000)	6.65	6.41
Total personal income (Unit: $10,000)	7.07	6.86
Spouse's education above bachelor's degree	58.23%	43.26%
Spouse's usual hours worked per week	44.34 h	45.23 h
Spouse's wage and salary income (Unit: $10,000)	13.78	10.93
Spouse's total personal income (Unit: $10,000)	14.71	12.08
Total family income (Unit: $10,000)	22.09	19.32
Number of observations	60,144	87,323

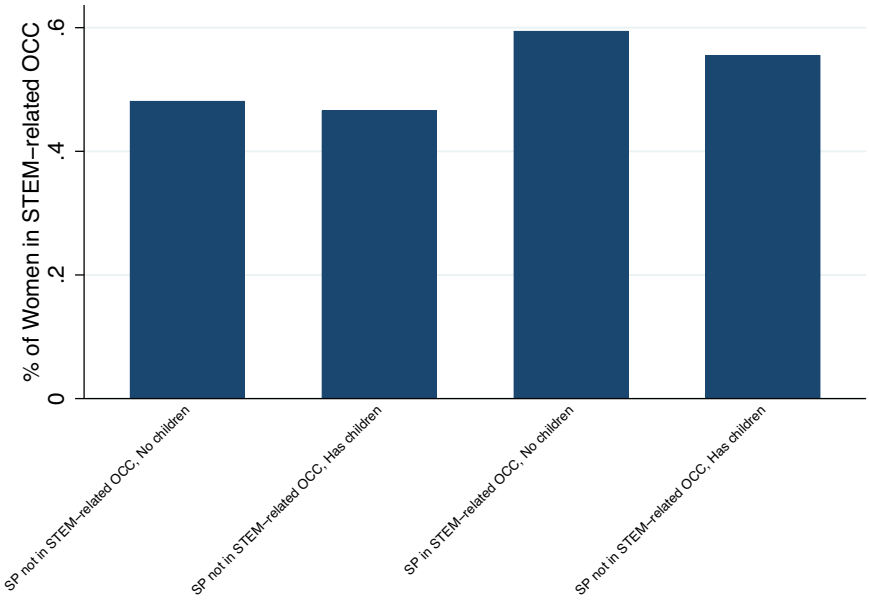

Fig. 1 Percent of married women who stay in STEM or STEM-related occupations: those with a spouse in STEM or STEM-related occupations (yes/no) and children (yes/no).

occupation/degree field, married with a spouse without a STEM or STEM-related occupation/degree field, separated, divorced or widowed, never married). The regression results in Table 6 suggest the following interpretation: holding all other control variables constant, the odds of a woman with a STEM or STEM-related major staying in a STEM occupation are multiplied by 1.24 when she is married to a spouse with a STEM or STEM-related occupation (relative to a woman who has never been married). In this regard, being married to a spouse with a STEM or STEM-related occupation, unlike being married to a spouse who only majored in a STEM or STEM-related field, is positively related to a woman's retention in a STEM or STEM-related occupation.

Spouse's STEM or STEM-related occupation/degree field and women's retention in a STEM occupation. Table 7 shows the results of four logistic regressions that predict women's retention in STEM or STEM-related occupations based on their spouses' STEM or STEM-related occupations/degree fields. The regression results in Table 7 have the following interpretation: holding all the other independent variables constant, the odds of married women's retention in STEM or STEM-related fields are multiplied by 1.591/1.180 (the slash distinguishes the odds for Models 3 and 4, respectively), when a woman's spouse has a STEM or STEM-related occupation/degree compared to when a woman's spouse does not have a STEM or STEM-related occupation/degree. Controlling for the effects of the spouse's income and the

usual number of hours worked per week, the corresponding odds are multiplied by 1.603 and 1.195. In addition, the greater the spouse's wage and salary income are, and the higher the usual number of hours worked per week is, the lower the odds are that married women will remain in STEM or STEM-related occupations. In this respect, a spouse's STEM or STEM-related occupation is positively associated with whether a married woman with a STEM or STEM-related major stays in a STEM or STEM-related occupation. This positive association is similar to but stronger than the association between a woman's retention in a STEM or STEM-related occupation and her spouse's STEM or STEM-related degree field. When controlling for the spouse's income and usual hours worked per week, the relationships are found to be slightly stronger.

Spouse's STEM or STEM-related occupation/degree field and women's employment status. However, regarding the effects on married women's employment and occupational retention, the spouse's STEM or STEM-related occupation and degree field play different roles. While a spouse's STEM or STEM-related occupation is negatively associated with her employment, the relationship between her spouse's STEM or STEM-related degree field and her employment is not statistically significant. The findings in Table 8 are interpreted as follows: holding all other predictor variables constant, the odds of remaining employed when majoring in STEM are lower (by 0.890) for women with spouses who are in a STEM or STEM-related occupation than for women with spouses who are not in a STEM or STEM-related occupation. When controlling for the effects of the spouse's income and the usual number of hours worked per week, a woman's employment odds remain lower (multiplied by 0.950) but less so. There is a negative relationship between the employment of a woman and two measures of her spouse's employment, namely, income and the usual number of hours worked. When controlling for these factors, the negative relationship between women's employment and her spouse's STEM or STEM-related occupation is weakened.

According to the results shown in Tables 7 and 8, although a spouse's STEM or STEM-related occupation is negatively correlated with a married woman's employment, the relationship of this variable with a woman's employment in a STEM or STEM-related occupation is always positive and statistically significant. In contrast, a spouse's STEM or STEM-related degree field does not have a statistically significant relationship with a married woman's employment. Moreover, the positive association between a spouse's degree field and a woman remaining in a STEM or STEM-related occupation is smaller and less statistically significant than the positive effect of her spouse's STEM or STEM-related occupation. On the other hand, spouse's income and hours worked per week have a statistically significant negative association with whether a married woman remains in a STEM or STEM-related occupation. When controlling for these factors, the associations between a spouse's STEM or STEM-related occupation and degree field and whether the woman stays in a STEM or STEM-related occupation are slightly strengthened.

These results are consistent with the hypothesis of a positive relationship existing between having a spouse with a STEM or STEM-related occupation/major and women's retention in STEM or STEM-related occupations. These findings may reveal the

Table 6 The effect of marital status on the odds ratio for women's retention in STEM or STEM-related occupations.

Variables	Model 1	Model 2
Martial situation		
Married with a spouse with a STEM or STEM-related occupation	1.240***	
Married with a spouse with a STEM or STEM-related degree field		1.012
Married with a spouse without a STEM or STEM-related occupation	0.787***	
Married with a spouse without a STEM or STEM-related degree field		0.866***
Separated, divorced, or widowed	1.009	1.022
Important control variables		
Age (years old)	0.985***	0.984***
Born in the U.S.	1.232***	1.213***
Education above bachelor's degree	1.669***	1.683***
Number of children at or above age 5 years	0.890***	0.889***
Number of children under age 5 years	0.984	0.984
Observations	159,251	159,251
R-squared value	0.1049	0.0990

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 7 The effect of the spouse's STEM or STEM-related occupation/degree field on the odds ratio for women's retention in STEM or STEM-related occupations.

Variables	Model 3	Model 4	Model 5	Model 6
Spouse's occupation/degree				
Spouse's STEM or STEM-related occupation	1.591***		1.603***	
Spouse's STEM or STEM-related degree field		1.180*		1.195**
Spouse's employment				
Spouse's wage and salary income (Unit: $10,000)			0.994***	0.996***
Spouse's usual hours worked per week			0.992***	0.991***
Other important control variables				
Age (years old)	0.993***	0.993***	0.995**	0.994***
Spouse's age (years old)	0.992***	0.991***	0.991***	0.991***
Born in the U.S.	1.173***	1.164***	1.189***	1.179***
Spouse was born in the U.S.	1.092***	1.094***	1.103***	1.104***
Education above bachelor's degree	1.663***	1.664***	1.668***	1.668***
Spouse's education above bachelor's degree	0.963**	0.988	0.994	1.016
Number of children at or above age 5 years	0.888***	0.887***	0.895***	0.892***
Number of children under age 5 years	0.982	0.981*	0.988	0.986
Observations	147,429	147,429	147,429	147,429
R-squared value	0.1077	0.1017	0.1097	0.1036

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 8 The effect of the spouse's STEM or STEM-related occupation/degree field on the odds ratio for women's employment.

Variables	Model 7	Model 8	Model 9	Model 10
Spouse's Occupation/Degree				
Spouse's STEM or STEM-related occupation	0.890***		0.925***	
Spouse's STEM or STEM-related degree field		1.012		1.063
Spouse's employment				
Spouse's wage and salary income (Unit: $10,000)			0.973***	0.973***
Spouse's usual hours worked per week			0.988***	0.988***
Other important control variables				
Age (years old)	1.009***	1.009***	1.016***	1.016***
Spouse's age (years old)	0.991***	0.991***	0.991***	0.991***
Born in the U.S.	1.546***	1.547***	1.632***	1.634***
Spouse was born in the U.S.	1.304***	1.303***	1.351***	1.351***
Education above bachelor's degree	2.050***	2.046***	2.131***	2.129***
Spouse's education above bachelor's degree	0.720***	0.716***	0.807***	0.804***
Number of children at or above age 5 years	0.796***	0.797***	0.816***	0.817***
Number of children under age 5 years	0.632***	0.632***	0.643***	0.643***
Observations	147,416	147,416	147,416	147,416
R-squared value	0.0819	0.0815	0.1006	0.1005

*p <0.05; **p <0.01; ***p <0.001.

impact of the two mechanisms mentioned in the introduction. Since both the spouse's salary and working hours have a negative relationship with whether a woman stays in a STEM or STEM-related occupation, a spouse's pay and working hours are negatively linked to efforts to retain married women in STEM or STEM-related occupations. It is possible that under these circumstances, the wife needs/wants to spend more of her time and energy on the family. A spouse's high income and long working hours increase the odds that a married woman will leave a STEM or STEM-related job. Nonetheless, after adjusting for spouse income and usual hours worked per week, the odds of a woman remaining in STEM or STEM-related occupations increases only slightly. Therefore, even if a spouse's high pay and long working hours resulting from a STEM or STEM-related occupation may decrease the odds that a married woman will stay in her STEM or STEM-related occupation, these factors are not dominant. College-educated spouses in STEM or healthcare worked about one hour less and earned on average $28,500 more than college-educated spouses working outside STEM or healthcare fields (see Table 5). These average differences in work hours and salary did not substantially alter the positive impact of spousal career alignment on women's retention in STEM and healthcare occupations.

Therefore, it is likely that the notion that support comes from a spouse who is in the same occupation or has a similar degree of support does make sense. Moreover, perhaps it is easier for women who choose STEM or STEM-related occupations to meet men with a STEM or STEM-related occupation or degree field; there may be an increased probability that these women will marry men in STEM or STEM-related occupations. Furthermore, it is likely that more STEM-specific support exists between couples who are both in STEM or STEM-related occupations and that a woman's STEM or STEM-related occupation can contribute to her spouse's choice to work in a STEM or STEM-related occupation if their occupations are relevant in some way.

STEM and STEM-related (healthcare) subsamples. In this section, the main sample is divided into STEM and healthcare subsamples. Table 9 contains the results of four logistic regressions showing the association between spouses' STEM or healthcare occupations or degree fields and whether women who majored in STEM or healthcare fields continue working in these STEM or healthcare fields. In both the STEM and healthcare subsamples, a positive effect on a woman's continued employment in her degree field was found if the spouse's occupation was of the same classification. Moreover, a positive association between spouses' degree field and the same classification was found only in the healthcare subsample. However, the spouse's occupation and degree field of the other (dissimilar) classification are not positively associated with the woman's retention in the field in which she majored. The regression results in Table 9 suggest the following interpretation: holding all other independent variables constant, the odds of a woman's retention in STEM or healthcare when majoring in STEM or healthcare are multiplied by 1.921 or 1.990 (the odds ratios for Models 11 and 13, respectively) when a woman's spouse is employed in a STEM or healthcare occupation compared to when a woman's spouse is employed outside STEM or healthcare; the odds of in a STEM retention occupation for women whose spouse is employed in a healthcare occupation are 0.523 times the odds of a similarly educated woman whose spouse is employed outside STEM and healthcare; and the odds of retention in a healthcare occupation for women with a healthcare major who also has a spouse with a healthcare degree are 2.525 times the odds of those women whose spouses have degrees that are neither in STEM nor in healthcare.

When comparing the results for the main sample (Table 7) and the two subsamples (Table 9), the relationship between the spouse's occupation of the same classification and the woman's retention in the field in which she majored is stronger when using the two subsamples instead of the main sample. Moreover, it should be noted that in the healthcare subsample, the association between a spouse's degree fields of the same classification and her continued employment in the field is much stronger, especially when compared to other similar associations shown in those results.

Spouse's STEM or STEM-related occupation/degree field, children's presence, and women's retention in STEM or STEM-related occupations. Table 10 shows the regression results when the presence of children is considered and an interaction term is added. The presence of children is shown to be a moderator variable in the relationship between women's continued employment in STEM or STEM-related occupations and their spouses' STEM or STEM-related occupations. Having children is negatively associated with women's continued employment in STEM or STEM-related occupations, and the negative relationship is

Table 9 The effects of spouse's STEM occupation/degree field and healthcare occupation/degree field on the odds ratio for women's retention in STEM/healthcare occupations.

Variables	Model 11 (STEM subsample)	Model 12 (STEM subsample)	Model 13 (Healthcare subsample)	Model 14 (Healthcare subsample)
Spouse's occupation/degree				
Spouse's STEM occupation	1.921***		1.013	
Spouse's STEM degree field		1.185		1.258
Spouse's healthcare occupation	0.523***		1.990***	
Spouse's healthcare degree field		1.358		2.525**
Spouse's employment				
Spouse's wage and salary income (Unit: $10,000)	0.995***	0.993***	0.983***	0.987***
Spouse's usual hours worked per week	0.992***	0.989***	0.991***	0.991***
Other important control variables				
Age (years old)	1.002	1.002	0.990***	0.987***
Spouse's age (years old)	0.990***	0.989***	0.998	1.000
Born in the U.S.	0.924**	0.908**	1.360***	1.356***
Spouse was born in the U.S.	0.982	0.964	1.096**	1.094**
Education above bachelor's degree	1.086***	1.079***	1.197***	1.192***
Spouse's education above bachelor's degree	1.082***	1.036	0.901***	0.948**
Number of children at or above age 5 years	0.834***	0.829***	0.910***	0.910***
Number of children under age 5 years	0.893***	0.885***	1.008	1.012
Observations	92,470	92,470	56,812	56,812
R-squared value	0.1262	0.1104	0.0418	0.0364

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table 10 The effects of a spouse's STEM or STEM-related occupation/degree field and the presence of children on the odds ratio for women's retention in STEM or STEM-related occupations.

Variables	Model 15	Model 16	Model 17	Model 18
Spouse's occupation/degree				
Spouse's STEM or STEM-related occupation	1.689***		1.707***	
Spouse's STEM or STEM-related degree field		1.186*		1.204**
Presence of children and interaction terms				
Presence of children	0.915***	0.885***	0.929***	0.895***
Spouse's STEM or STEM-related occupation* Presence of children	0.922***		0.920**	
Spouse's STEM or STEM-related degree field*Presence of children		0.993		0.992
Spouse's employment				
Spouse's wage and salary income (Unit: $10,000)			0.994***	0.996***
Spouse's usual hours worked per week			0.991***	0.991***
Other important control variables				
Age (years old)	0.990***	0.989***	0.992***	0.991***
Spouse's age (years old)	0.991***	0.991***	0.991***	0.990***
Born in the U.S.	1.167***	1.159***	1.184***	1.175***
Spouse was born in the U.S.	1.091***	1.093***	1.103***	1.104***
Education above bachelor's degree	1.677***	1.679***	1.682***	1.682***
Spouse's education above bachelor's degree	0.959**	0.984	0.992	1.015
Observations	147,429	147,429	147,429	147,429
R-squared value	0.1060	0.0999	0.1082	0.1020

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

stronger for those whose spouses had STEM or STEM-related occupations than for those whose spouses did not. Controlling for the spouse's income and hours worked per week does not reduce the positive association between a woman's retention in a STEM or STEM-related occupation and her spouse having a STEM or STEM-related occupation or major. However, after controlling for not only for the negative effects of the spouse's working hours and income but also for the interaction effects from the presence of children, there is a slight increase in the positive effect of the spouse's STEM or healthcare employment status on women's retention in STEM and STEM-related occupations. Since the effects are not significant when considering the interaction terms for children's presence, the main finding is the stability of the positive relationship between a woman's retention in STEM or STEM-related occupations and her spouse having an occupation or major that is either in a STEM or STEM-related field.

Discussion

The current study examines the association between spouses' occupations/majors and married women's retention in STEM or STEM-related occupations. The results show a positive relationship between married women's retention in STEM or STEM-related fields and their spouse's occupation/major of the same classification, especially when controlling for their spouse's usual hours worked per week, wage and salary income, and presence of children. Overlaps in career and professional interests may contribute to spouses in STEM or STEM-related fields choosing each other and remaining married.

The results shown herein confirm the findings of related studies. The positive association between spouses' similar professional pursuits and women's continued employment in STEM and healthcare fields is consistent with the emphasis on spousal homogamy (Arum et al., 2008; Blossfeld, 2009; Case, 2013; Wallace and Jovanovic, 2011), as well as the positive relationship between women's retention in STEM and their spouse's STEM employment, which are shown in previous studies (Glass et al., 2013).

This study has certain limitations. First, a woman's salary and working hours are potential factors related to her occupational choices. However, these two variables are not incorporated into this analysis. As the correlation between a woman's salary or working hours and her spouse's STEM or STEM-related occupation or major is unknown, the direction of the possible bias that this omission might have created is uncertain. Second, most demographic characteristics of the children are not factored into the analysis, which, in turn, might have caused the underestimation of the positive effects of a spouse's STEM or STEM-related occupation/major on women's STEM and healthcare retention. Moreover, the analysis does not determine the specific reasons for the positive relationship between a spouse's occupation/major and a married woman's decision to remain in a STEM or STEM-related occupation, thereby providing only some speculation. In particular, it was not possible to examine spousal support in the current study, which is a potential reason for the examined relationship. Exploring the forms and levels of spousal support between couples in STEM or STEM-related fields is a possible focus of future research. With respect to why the effect of a spouse's STEM or STEM-related degree is not as large as that of the spouse's STEM or STEM-related occupation, high levels of STEM-specific informational support and spousal homogamy are suggested as possible causes of this phenomenon. However, this study did not determine which one (if either) is dominant. Conducting further, in-depth qualitative studies might answer this question. Finally, this research is limited to the impact of spouse's occupation and field of study on women's decision to remain in an occupation with respect to STEM or STEM-related degree fields, which is not generalizable. Future studies could focus on the effect of spousal occupational similarity in other fields and make comparisons across them.

This study may contribute to research on women's career development, especially in STEM or STEM-related fields, as well as spousal homogamy and the effect of shared occupational interests among couples. It may also provide useful information to women with STEM or STEM-related majors and their families.

Conclusion

In many societies, spouses can affect married women's career development. This study concludes that for married women who major in STEM or STEM-related fields, the positive effects of similar professional pursuits among spouses may appear to be greater than the potential negative effects of the spouse's STEM or STEM-related occupations, such as work–family conflicts. A positive impact of having a spouse with an occupation of the same classification is also shown in both the STEM and healthcare subsamples of married women. Moreover, it is found that when children are present, the positive relationship between spouses' STEM or STEM-related occupations and married women's retention in STEM or STEM-related occupations is not reduced and may in fact be marginally strengthened.

Data availability

This research did not involve the collection of new data. The secondary data that support the findings of this study are openly available from IPUMS USA at the following: https://doi.org/10.18128/D010.V12.0.

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Author contributions

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Competing interests

The author declares no competing interest.

Ethical approval

Ethical approval was not required, as the study did not involve human participants.

Informed consent

Informed consent was not required because the study did not involve human participants.

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