Journal for STEM Education Research
https://doi.org/10.1007/s41979-023-00114-9

RESEARCH ARTICLE

Encouraging Young Women into STEM Careers: A Study Comparing Career Intention of Female STEM Students in China and Scotland

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Accepted: 8 November 2023

Abstract
Women are underrepresented in the science, technology, engineering, and mathematics (STEM) workforce. Whilst this is a worldwide phenomenon, there are differences in how this manifests in different countries. In order to understand this more deeply in a particular context, this study investigates the employment intentions of university STEM students in Scotland and China, analysing and comparing the intentions and the reasons behind them affecting young women in the two regions. The data represented 747 students from the University of Edinburgh, a large Scottish university, and Nankai University, a large Chinese university. The data showed that women are less likely to enter STEM careers than their male peers in both regions. In general we found that women in China had more hesitations about entering STEM careers than women in Scotland, but that Chinese women studying in Scotland had more similar responses to Chinese women studying in China than they did to other women studying in Scotland. Following an initial questionnaire, a semi-structured interview was designed to explore why the factors that affect women in different regions differed. Finally, combining the results of the quantitative and qualitative research, a number of recommendations are made that could encourage more young women into STEM careers.

Keywords Women in STEM · Career intentions · International comparison · China · UK

Introduction

Under-representation of women in STEM is a global problem, but there are significant differences between different cultures (UNESCO, 2019). Various factors contribute to

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Published online: 01 December 2023

this, such as the *leaky pipeline* theory, where women drop out of STEM careers at higher rates than men at all levels of seniority (Grogan, 2018, 11). This happens throughout all stages of education and employment. This study is particularly interested in exploring the leaky pipeline theory at a particular junction: women moving from STEM degrees into careers. We explore how attitudes to STEM careers vary for women in different cultures, and what the underlying factors that influence those aspirations may be.

Whilst the data is clear that there are significant differences in women's uptake of STEM careers based on country, there is not much existing research about the differences between women in STEM specifically in China and UK. However, cultural theory would suggest that cultural differences between countries is likely to lead to different aspirations and behaviour (Hofstede et al., 2010), and the cultural differences between China and the UK are significant.

Both societal influences and education policy vary widely, and it is plausible that this would factor into the feelings of young women around career options. For example, the influence of Confucian thought, with its emphasis on filial piety, is still influential in China (Yeh et al., 2013). Chinese students also have to make a decision in high school as to whether to be examined in Natural Sciences or Social Sciences, forcing students to choose whether to engage with STEM at an early age, whereas students in the various education systems in the UK have more flexibility and are able to make decisions later in their educational journey.

Chinese students who choose to study in the UK are an interesting subgroup: they will have received the same cultural influences growing up, but the motivations in their decision to study abroad may indicate differences, such as a more privileged upbringing and a stronger focus on careers (Cheng et al., 2017).

This study looks at this issue from a multi-national point of view, and specifically through a Chinese and UK lens. This is motivated by the desire to understand more deeply how cultural differences influence women's decisions to go into to STEM careers and by the significance of both China and the UK in the global STEM market. To this end, we have conducted research in two universities: the University of Edinburgh in Scotland and Nankai University in China - both large, highly-ranked universities of similar size and status.

The student population of the University of Edinburgh is highly international and includes a large number of Chinese students who are only in Scotland to study for their current degree; Nankai University is highly racially homogeneous and consists almost exclusively of students who are ethnically Chinese and raised in China. The leads to three distinct groups that we are comparing:

- Group CHI/CHI (260 women) - students attending Nankai University, who are overwhelmingly both ethnically and nationally Chinese.
- Group SCO/UK (198 women)- non-Asian students in the University of Edinburgh, made up of a variety of nationalities, but predominantly UK nationals.
- Group SCO/CHI (53 women) - Asian students who are attending the University of Edinburgh. Whilst there is some diversity in this group, the vast majority of the students in this group are ethnic Chinese students who are in Scotland only to study for their degree. Because of this dominance within the group, we refer to

this group as SCO/CHI, but readers should bear in mind that there will be some responses from non-Chinese Asian students within this group.

Based on the theoretical framework discussed above we therefore theorise that career aspirations towards STEM careers will differ in young women studying STEM in China and the UK, and between Chinese students studying in the UK and in China, and that the impact of gender may be different in these contexts. Our research questions are as follows:

- Is it the case that female STEM students are less likely to aspire to STEM careers than male STEM students in these different contexts?
- What are the attitudes towards STEM careers of female STEM students in our three groups, and how do these differ between the groups?
- What are the factors that influence these aspirations, and how do they differ between women in the three groups?

The study is conducted using a mixed methods approach, following an explanatory sequential design. The aim of the quantitative study is to understand trends around aspirations to STEM careers and factors that influence that across three populations. The aim of the qualitative study is to develop a richer understanding of factors that appeared from the quantitative study to be particularly interesting or significant, in order to develop a more complete understanding of how the data answers the research questions and how our work develops the theory in which the research is based. The combination of the two approaches allows us to generate integrated support for a theory on the different choices young STEM-focused women are making about their careers in the UK and in China.

Under-Representation of Women in STEM and Global Differences

The data from the UNESCO Institute for Statistics (UNESCO, 2019) shows very marked differences in the participation of women in science research and design around the world, with certain countries actually showing more women participating than men. There are some regional patterns with, for example, Eastern Europe, South-East Asia and South America showing good gender balance, but overall there is significant variation within most areas and few countries close to gender balanced. Whilst the UK is largely in line with surrounding Western European countries, the countries surrounding China are much more mixed, with many experiencing levels of science uptake in women that are similarly low to China, but Myanmar and Mongolia in particular having much high levels of participation. This data does not provide the full picture: it covers only science rather than the full spectrum of STEM, and focuses only on one aspect of participation in science. Nevertheless, it is helpful for understanding the huge variations we see across the world. There is far from a complete understanding of why this is, but doubtless cultural attitudes and pathways to STEM influence this significantly.

The majority of research in this area has focused on the US. Whilst Scotland is a different environment to the US, statistics around uptake of STEM degrees and STEM careers for women are similar - for example, 26.9% of the STEM workforce in the

UK are women[1], with 27% of the STEM workforce in the US [2], and the culture is to some extent shared - for example, through television and films - so we may expect insights in a US context to have some relevance to Scotland. One study in the US found that an important factor in the under-representation of women in STEM careers was the low number of female students in STEM fields during the school (K-12) years. This suggested that increasing the number of women who were doing STEM degrees could be effective in improving the lack of women in STEM careers (Sassler et al., 2017). Studies also suggest that STEM jobs could be difficult to balance with family life, an issue that is also identified as an issue for Chinese women (Yao, 2023). As women were promoted in STEM industries, this issue can become more pronounced (Glass et al., 2013). Family members also had an impact on women's work aspirations: women with brothers or fathers in STEM fields were conversely less likely to enter STEM careers than other women (Oguzoglu & Ozbeklik, 2016).

To the best of our knowledge, there has not been a study published directly comparing Chinese students to those from a UK-based international university. There is some existing work comparing STEM education in China with other countries. For example, Loyalka et al. (2021) describes how the outcomes of learning in universities differ significantly between China and the US, with students from both countries starting with similar skills in critical thinking, but students in US universities making considerable advances in these skills throughout university, whilst this improvement was not observed in the Chinese students. The research did not disambiguate on the basis of sex, nor did it include students in the UK or Scotland, so is not directly relevant to our work; however, the choices and intentions of female students in Chinese universities needs to be interpreted with the understanding that they are in very different educational environments.

Cultural Theories Around Career Aspirations

According to the Global Gender Gap Report 2020 published by the World Economic Forum, the UK is ranked 21st, while China is far behind the UK at 106th (World Economic Forum, 2020). The report measured the global gender gap through four lenses: economic participation and opportunity, educational attainment, health and survival, and political empowerment. In particular, economic participation and opportunity includes labour force participation rate, wage equality for similar work, educated earned income legislators, senior officials and managers and professional and technical workers, with professional and technical workers being highly correlated with STEM industries. In each of these areas of economic participation and opportunity, UK women were ranked significantly higher than Chinese women (World Economic Forum, 2020).

These wider country-based differences are likely to be influencing career choice in young people. Various of Hofstede's work-related cultural dimensions, such

[1] https://www.wisecampaign.org.uk/updated-workforce-statistics-june-2022/#:~:text=The%20latest%20government%20workforce%20data,December%202021%2C%20to%2026.9%25.

[2] https://www.forbes.com/sites/markkantrowitz/2022/04/07/women-achieve-gains-in-stem-fields/?sh=1bf365f75ac5)

as masculinity-femininity, individualism-collectivism and cultural values (Hofstede et al., 2010) are clearly relevant to young women's career choices. Whilst these were formulated some time ago and cultural differences betweem the UK and China are not static, more recent research indicates that this framework can still account for significant differences between Eastern and Western cultures (Wu, 2006; Chun et al., 2021).

The ways in which culture affects STEM engagement can be non-obvious and hard to understand. For example, the well-known Gender Equality Paradox in STEM (Stoet & Geary, 2018) illustrates the counter-intuitive fact that, in general, the more gender-equal a society, the less likely women are to be in STEM careers, with, for example, the Nordic countries as places where gender equality is very high, but female participation in STEM is amongst the lowest in the world. There is therefore much value in exploring data around STEM career aspirations in Chinese and UK women, and what the factors affecting these are.

Societal Influences and Educational Policy in the UK and China

It is well documented that women experience more sociocultural impediments and stereotype threat to pursue STEM careers, and since these are environmentally-related, it is plausible that this differs between women in different social contexts and cultures (McKinney et al., 2021). There are various theories that describe factors that influence women's career choices, such as the five-factor model (Costa & Paul, 1996), and Holland's theory of personality and vocational choice (Super, 1967), which focus on individual personality type and how that influences factors such as self-efficacy. Social Cognitive Career Theory (Lent et al., 2002), an extension of Bandura's Social Cognitive Theory (Bandura, 1986), highlights the importance of environmental factors as well as other factors such as self-efficacy, all of which can be influenced by cultural upbringing.

Research focusing primarily on China has already indicated lower parental expectations for girls' careers as opposed to boys', and highlight cultural gender stereotypes as factors in the low participation of women in STEM in China (Yang & Gao, 2021). Similar, though often less pronounced, patterns in women's employment and social status exist in the UK: in both environments, social influences discouraging women from seeing themselves as suitable for a STEM career influence career aspiration. However, although these patterns are similar at a high level, there remain significant cultural differences between the two countries, built on their different histories (see, for example, Talhelm and English 2020), which may lead to differences in the extent of these social impacts and the way they play out in women's lives and career choices.

Self-efficacy is an issue for women in both environments. Some studies have shown that women's self-efficacy improves as they study STEM, but is consistently lower than that of men, with MacPhee et al. (2013) illustrating this in the US and Chan (2022) in China. Whilst female students tend to perform in all subjects as well as their male counterparts, young women can still have highly gender-stereotypical self-efficacy beliefs, which further contributes to women being less interested in STEM fields than men (Tellhed et al., 2017). Additionally, the stereotypes of STEM fields reduce women's sense of belonging to STEM fields, and the lower the sense of belonging, the lower the interest of women in STEM (Cheryan & Plaut, 2010; Thoman et al., 2014).

Research highlights the impact of culture on women's choices within a European context (Caprile et al., 2012); given the greater cultural differences between a European country and China, it is plausible that this will be more extreme. For example, Buckley et al. (2023) showed that country has some impact on how male and female students perceive engineers and whether they are likely to picture them as male or female, which could plausibly factor into career choice and issues such as self-efficacy. Research within the US illustrates that lower uptake of STEM by minoritised young women is correlated with lower self-efficacy in maths (Butler-Barnes et al., 2021), another indication that environment is an important factor.

The importance of role models to women in STEM has been widely studied, but has mostly focused on a European context (see, for example, Microsoft 2018, Taylor-Smith et al. 2022), developing a comprehensive framework for delivering activites to support women in STEM, focusing on role models[3], but this has been much less explored in an Asian context (Chowdhury, 2023). The increasing numbers of women in STEM in China mean there is increasing potential for young women to find role models but there are fewer organised activities to facilitate this, and we will be exploring the impact of this in this study.

Methodology

Researchers and Participants

The researchers were based in the University of Edinburgh when the research was being undertaken. The second author was previously a student at Nankai University and is ethnically Chinese and a Chinese speaker. The first author is non-Chinese.

The participants were all students of either university. They were recruited by email and on social media channels related to their university, and asked to complete our questionnaire. Students that filled in the questionnaire were invited to leave an email address if they wished to participate in the interview phase. Interview candidates were chosen at random from the pool of those who did this and were available to attend the interview, were women studying STEM degrees and were either Chinese or British (the small number of respondents in the three categories who did not match the main ethnic/location profile were not included in the interviews). No participants received any incentives for participating in this research. The participants included undergraduate, taught postgraduate and research postgraduate students.

As explained above, the labels SCO/CHI and SCO/UK are intended to indicate the primary make-up of the groups and is not exclusive, as the SCO/CHI group contains a small number of non-Chinese Asians and the SCO/UK group contains a small number of non-Asian, non-UK students. Whilst this mix to some extent weakens the conclusions we are drawing about the two environments, we believe the dominance

[3] https://ada.scot/participant-centred-planning-framework/

of the referred to groups within the category means the our inferences are still valid. Candidates for interviews were chosen to match the group descriptions fully.

This research was approved by the ethics board of the School of Informatics at the University of Edinburgh, in which the research was primarily carried out.

Developing the Questionnaire and Interview Questions

Prior to the formal survey, eight volunteers participated in a pilot study: three students in the SCO/UK category and five in the CHI/CHI category, ensuring some feedback from speakers of both languages. The questionnaire was then refined on their feedback. The questionnaire was sent out with a covering email explaining its purpose and that we were only interested in STEM students. Additionally, students were asked to categorise their degree as STEM, non-STEM or unsure, after having read an explanation of what is meant by the term, within the questionnaire in case students erroneously filled it out. The data for students who categorised their degree as non-STEM or unsure was discarded.

We extracted from the literature factors that influence women's intentions to enter STEM careers, including stereotypes of STEM fields, ability stereotypes and perceived bias, role models and self-efficacy (Cheryan et al., 2017; Barker & Aspray, 2006; Saucerman & Vasquez, 2014), and used them to build a 53-item questionnaire[4]. This consisted of various questions:

- Demographic questions: gender identity, ethnic group, age, parents' educational backgrounds, whether they are in a long-term relationship and whether they have children. The last two were included because the literature highlights that concerns about family life were a factor in aspiring or not to a STEM degree (e.g., Yao 2023) so it is possible that students' current family set up could be an influence.
- Questions about their degrees: their degree programme, confirmation that they are in a STEM subject, their average grade band over the last year overall and their average grade band over the last year in mathematics.
- A movable slider allowing them to choose values between one and ten as to how much they want to work in a STEM field in the future.
- Three questions with multiple sub-questions focusing on:
  - their beliefs about stereotypes of the STEM field. Stereotypes of STEM fields are beliefs about the field that are shared culturally amongst the general public within a particular culture (Fiske, 2010). The more stereotypes of gender in STEM fields are evident, the less sense of belonging women have in STEM fields (Makarova et al., 2019), as these stereotypes tend to focus heavily on STEM practitioners being male (Master et al., 2016; Ceci & Williams, 2015; Picker & Berry, 2000). Sense of belonging is a key factor in how young women choose employment (Cheryan et al., 2015). Stereotypes of STEM fields include stereotypes around who goes into and works in STEM, value judgements, stereotypes of balance between work and family, and stereotypes of work

[4] The full questionnaire, together with the interview questions, can be found at https://osf.io/3qv6t/?view_only=7b40f625777942aabd0c2e3dfbedb6bb.

(Cheryan et al., 2017). Value judgements also have a significant impact on women's employment intentions, as students' judgements about whether the industry is valuable will influence their career choices (Gino et al., 2015). Additionally, some studies have shown that the balance between work and family and stereotypes of work are the other two reference conditions for women's career choices (Cheryan et al., 2017; Ceci et al., 2009). Stereotypes of work consist of three components: what is the scope for personal development within the career (Gino et al., 2015), whether only people with natural talent and outstanding abilities can enter STEM fields (Leslie et al., 2015) and whether the work environment is friendly (Diekman et al., 2010).

– the importance of role models to them. The number and gender of role models is one of the factors that appears to influence women's entry into STEM careers. Some studies have shown that female role models or mentors can increase women's interest and participation in the field (Cheryan et al., 2017). However, little research has explored what the degree of influence of male role models on women is.
– their self-belief in their own abilities and skills. Self-efficacy can have a significant impact on women's willingness to enter STEM fields. It is the degree to which individuals are confident in their ability to learn and complete tasks (Concannon & Barrow, 2009). Women's assessments of their own abilities may be more realistic, whereas men may overestimate their abilities (Bench et al., 2015). Since the proportion of men in STEM industries is greater than the proportion of women, it is possible that low female representation in the STEM industry is a result of lower self-efficacy. We used Farro's model and The What I Am Like (WIAL) scale to measure participants' self-efficacy (MacPhee et al., 2013). The WIAL scale is more comprehensive than other scales measuring self-efficacy because it measures participants' self-evaluation through four dimensions: academics, communication skills, creativity, and intelligence.

Each of these questions asked them the extent to which they agreed with a set of statements and used a seven-point Likert scale. The questions around each of these issues contained, respectively, seventeen, five and nine statements.

- A question about negative stereotypes they may have come across about women in STEM, asking them whether they had heard these statements never, rarely, sometimes, often or always.

The key factors the questionnaire explores, together with example questions for each element, are encapsulated in Table 1. The Cronbach's alpha values for each scale were above 0.70, indicating that this quantitative survey was reliable.

The Semi-Structured Interview

The semi-structured interview was designed after analysing the data from the questionnaire. The aim of this study was to focus on how negative factors influence women's willingness to enter STEM fields, whether there is an interplay between these factors, and what methods can help break down these constraints.

Table 1 The Influence Factors for Young Females on willingness to STEM careers

Variables	Sub-factors	Example
Stereotypes of STEM fields	Stereotypes of gender	Men are better at completing STEM tasks than women
	Value judgement	Working in STEM fields is more fulfilling than other fields
	Stereotypes of balance between work and family	Women with children have the same or better prospects for promotion in STEM fields than women without children
	Stereotypes of promotion	Promotion is easier in a STEM field than other fields
	Stereotypes of capabilities of people	Anyone can enter STEM fields
	Stereotypes of work environment	For women, the work environment in STEM fields is more friendly than in other fields
Ability stereotypes and perceived bias	The frequency of exposure to ability stereotypes and perceived bias	How often have you heard "Women's prospects in STEM fields are not as good as men's"
Role models	Importance of same-sex role models	If there are more same-sex role models in STEM fields, you will be more likely to enter STEM fields
	Number of well-known figures in STEM fields	How many celebrities[a] in STEM fields can you think of in 10 seconds from now
	The gender of role models in STEM fields	The gender of the first celebrity you just thought of is
Self-efficacy	Academics	I have the confidence to learn the curriculum well
	Communication skills	I am a good communicator
	Intelligence	I am as smart as anyone else

[a]We acknowledge that the use of the use of the term *celebrity* may not be ideal and that a more neutral term such as *well-known figure* may have been clearer

Table 2 Demographic characteristics of survey respondents

Characteristic	Total N=747	Scotland n_1=364	China n_2=383
Gender			
Male	31%	29%	32%
Female	69%	69%	68%
Ethnic group			
White	33%	69%	0%
Mixed/Multiple ethnic groups	4%	5%	0%
Asian, Asian Scottish or Asian British	63%	21%	100%
Black/African/Caribbean/Black British	1%	1%	0%
Other ethnic group	2%	2%	0%
Educational background			
Undergraduate degree	42%	44%	40%
Taught postgraduate degree	28%	27%	29%
Research postgraduate degree	30%	29%	31%

Of the 68 participants who left their contact details, 48 were female. Although the analysis of the female sample indicated that young women from different regions showed different levels of willingness for STEM careers, there were significant differences in the factors that influenced the preferences of SCO/UK women and SCO/CHI, with similar results between the SCO/CHI and CHI/CHI women. This may be due to the fact that the majority of SCO/CHI women are in Scotland only for their degree studies, having been educated in China prior to coming to Scotland for further study, hence sharing their cultural upbringing with CHI/CHI women[5]; we therefore combine these groups for the interview stage. For the interviews, we therefore focused on two groups: UK women, based in the Scottish university (women from the SCO/UK group, but with any non-UK women excluded), and Chinese women, based in either the Chinese and the Scottish university (a mix of the SCO/CHI and CHI/CHI group, excluding any non-Chinese Asian students).

Seven Chinese women and seven UK women were selected randomly for interview in this study to meet the sample representativeness requirement (Bechhofer & Paterson, 2012). The interviews were conducted over Teams and Tencent and data was recording using the tools' transcription functions.

Participants' Data

Table 2 reports the summary statistics of our survey data for the full sample. The final valid data was 364 from Scotland and 383 from China, with a total of 513 females and 227 males. Whilst the main focus of this research is on women and uses only female data, we also collected data from male students to help us answer our first research

[5] We believe this through informal interactions with interviewed students and with other students in the SCO/CHI group; it was not a question we asked formally in this research.

question. The female data of this questionnaire consisted of a sample of 513 young Chinese and Scottish females, representing 69% of the total sample size. It is worth noting that this does not indicate that females make up a majority of students in STEM fields. Because the study focused on extending an invitation to young women during the sample collection process, it is reasonable that women make up the majority of this data. Specifically, of the total female sample, 252 (49%) were in Scotland and 261 (51%) were in China. Table 3 illustrates the demographics of the female samples.

Results and Analysis

Impact of Gender of STEM Career Aspirations

We conducted multiple linear regression analysis on all data from all participants. However, the only result of interest to us for the full sample was the extent to which gender influenced intention to go into STEM; other questions were explored using only the female data.

Table 4 presents the results of the multiple linear regression analysis for the overall data.

The results show that the coefficient of determination, R^2, of the model is 0.450, meaning that the independent variables explain 45.0% of the dependent variable, indicating that the fit is statistically significant. The Durbin-Watson value is 2.078, which is approximately equal to 2. This value indicates that the auto-correlation of the independent variables in this model is not significant and the model was reasonably well designed. The model $p<0.001$ indicates that less than 0.1% of the variables in the sample could be associated by chance and lead to different results from the experiment. This indicates that the model is highly statistically significant.

Table 3 Demographic characteristics of female samples

Characteristic	Total N=513	Scotland n_1=252	China n_2=261
Ethnic group			
White	35%	70%	0%
Mixed/Multiple ethnic groups	2%	3%	0%
Asian, Asian Scottish or Asian British	62%	23%	100%
Black/African/Caribbean/Black British	1%	1%	0%
Other ethnic group	1%	3%	0%
Educational background			
Undergraduate degree	48%	46%	50%
Taught postgraduate degree	26%	27%	25%
Research postgraduate degree	26%	27%	25%

Table 4 Multiple regression results for full samples

	Full sample		
	Standardized Coefficient β	Significance p	VIF [b]
Control variables			
Region	-0.215	<0.001	3.047
Gender	-0.66	0.050	1.450
Ethnic group	-0.046	0.362	1.025
Educational qualifications	-0.877	0.876	1.911
Age	-0.037	0.381	2.047
Degree programme	-0.277	<0.001	1.268
Single status	0.027	0.869	1.139
Parenting situation	-0.021	0.505	1.149
Father's educational background	-0.058	0.214	2.554
Mother's educational background	0.020	0.668	2.693
Grade of all courses	0.015	0.702	1.765
Grade of mathematics courses	-0.065	0.096	1.780
Independent variables: Stereotypes of STEM fields			
Stereotypes of gender	0.098	0.009	1.657
Stereotypes of valuable fields	0.410	<0.001	1.375
Stereotypes of balance between work and family	0.085	0.016	1.470
Stereotypes of promotion	0.126	<0.001	1.327

Table 4 continued

	Full sample		
	Standardized Coefficient β	Significance p	VIF [b]
Stereotypes of capabilities of people	0.088	0.012	1.258
Stereotypes of work environment	-0.019	0.577	1.378
Independent variables: Ability stereotypes and perceived bias	0.085	0.022	1.601
Independent variables: Role models			
Number of role models personally known	0.105	0.001	1.592
The gender of role models	0.094	0.011	1.592
Number of well-known figures	0.026	0.516	1.958
Independent variables: Self-efficacy			
Academics	0.073	0.061	51.775
Communication skills	-0.064	0.060	1.835
Creativity	0.006	0.881	1.341
Intelligence	-0.004	0.923	1.897

[b] Variance inflation factor(VIF) detects correlation between predictors (i.e. independent variables) in a model. Values between 1 and 5, as we find in this table, indicate moderate correlation

Although we present the full results for the interest of the reader, and could do further comparison of different facets of overall responses compared to female responses in future work, our current concern is just with the impact that gender has on intention to study a STEM career. As illustrated in Table 2, gender was a significant factor in the willingness to go into STEM careers, with a standardized cooefficient β of -0.66 and a p-value of 0.05. This suggests that participating males are more willing to work in STEM fields than females. This validates multiple existing research on this phenomenom (for example, STEMWomen, 2020) and reminds us that the female brain drain in STEM fields will continue.

It is also worth noting from this data that the region was also significant: the β value of -0.215 indicating that students studying in Scotland were more likely to aspire to STEM careers than students studying in China. When we are considering more deeply the attitudes of female students in China as opposed to Scotland, we need to bear in mind that this is happening against a backdrop of differences in aspirations of students as a whole in the different regions.

Table 2 suggests many potential areas of interest - for example, β values for educational qualifications is very high, and degree programme is also high, indicating that conversion from STEM degree to STEM career is higher in some STEM subjects than others - perhaps indicating employment opportunities. However, our interest in this particular research is on how gender and region influence STEM career choices, and how known factors around that such as stereotypes are influencing women in different regions, so we leave this for further work.

Factors that Influence Female Aspirations in STEM

In the rest of the analysis, we consider only the data from our female respondents, illustrated in Table 5.

Interest in STEM

The survey asked what the students' interest in going into a STEM career was, and showed that there are concerns for women in all categories around their likelihood of dropping out of STEM, with interesting variations between the groups.

During the interviews, we discovered a bit more about the choices that students had made around their STEM studies. Both Scottish and Chinese interviewees felt that they were treated equally within their families and friends and that these close people respected their career choices. 93% of them were interested in working in STEM fields. Interestingly, almost all of the Scottish respondents identified their career goals at the age of 10-13, became interested in STEM subjects such as physics, maths or biology at a very young age and continued to work towards their dream career throughout their subsequent years of study. In contrast, five out of seven of Chinese interviewees did not have clear goals for their future career plans.

86% of Chinese interviewees said they chose the natural-science-oriented area because they were better at it when they were in high school, not because they were interested in a STEM subject from a young age. 71% of Chinese interviewees said

Table 5 Multiple regression results for women from different regions

	All women Standardized Coefficient β	SCO/UK β	SCO/CHI β	CHI/CHI β
Control variables				
Region	−0.187**	-	-	-
Ethnic group	-0.032	-	-	-
Educational qualifications	-0.042	0.020	0.474	-0.052
Age	-0.013	-0.001	-0.868	0.073
Degree programme	−0.281***	−0.372***	−0.215*	−0.181***
Single status	0.017	0.074	-0.023	-0.024
Parenting situation	-0.010	0.025	0.234	-0.002
Father's educational background	-0.040	-0.074	-0.499	-0.059
Mother's educational background	0.048	0.024	0.501	0.079
Grade of all courses	-0.016	0.009	-0.012	-0.017
Grade of mathematics courses	-0.053	-0.048	−0.176*	−0.139*
Independent variables: Stereotypes of STEM fields				
Stereotypes of gender	0.150***	0.072	0.406**	0.151**
Stereotypes of valuable fields	0.429**	0.312***	0.600**	0.571**
Stereotypes of balance between work and family	0.042	0.039	−0.551*	0.012
Stereotypes of promotion	0.085*	0.046	0.277*	0.123*

Table 5 continued

	All women Standardized Coefficient β	SCO/UK β	SCO/CHI β	CHI/CHI β
Stereotypes of capabilities of people	0.088	0.099	-0.168	0.085
Stereotypes of work environment	-0.064	-0.021	-0.264	−0.112*
Independent variables: Ability stereotypes and perceived bias	0.071	0.107	0.167	0.021
Independent variables: Role models				
Number of role models personally known	0.054	-0.066	0.047	0.132*
The gender of role models	0.128**	0.074	0.264*	0.171**
Number of well-known figures	0.049	0.125	0.187	0.014
Independent variables: Self-efficacy				
Academics	0.031	0.065	-0.050	-0.055
Communication skills	-0.011	-0.175	0.071	0.002
Creativity	0.038	0.040	0.016	0.033
Intelligence	-0.045	0.046	0.005	-0.063

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

they became interested in their current major after they entered it. This is significantly different from non-Chinese respondents in that all non-Chinese women interviewed had their career goals before the age of 14, whereas Chinese women only developed the idea of entering a STEM field recently, and some Chinese women studying STEM subjects are still wavering in their career choice.

Stereotypes of the STEM Field

For the independent variables related to stereotypes of STEM fields, stereotypes of gender, stereotypes of the value of the field and stereotypes of promotion all have a positive and significant effect on young women' intentions: that is, women with fewer gendered stereotypes about the STEM field are more likely to aspire to a STEM career. Stereotypes of gender did not appear to have a significant effect on SCO/UK women, yet remained a consideration for both CHI/CHI women and, especially, SCO/CHI women. The absolute value of β for SCO/CHI women was much greater than that of CHI/CHI women, implying that SCO/CHI women are more likely to be negatively influenced by the stereotypes of gender. Stereotypes of the value of the field was significant for all three groups, indicating that all women in the study placed a high value on STEM fields. Stereotypes of balance between work and family was an influential factor in SCO/CHI women's attitudes towards employment in STEM fields. Interestingly, β was -0.551, suggesting that the more SCO/CHI women felt that work in STEM fields could not be balanced with family life, the more likely they were to choose to work in STEM fields. Potential reasons for this are also discussed below.

In addition, both SCO/CHI and CHI/CHI women were significantly affected by stereotypes of promotion, and both are positively correlated, while SCO/UK women were not. This could suggest that personal development in STEM fields is more of a consideration for Chinese women, and that Chinese women who perceive better treatment and promotion in STEM fields are more likely to want to work in STEM fields. However, we cannot conclude from this that these things are not important to SCO/UK women: the fact that stereotypes around promotion do not put them off may indicate that these stereotypes are not negative rather than implying that they are not motivated by promotion. Furthermore, whether the work environment in STEM fields is friendly to women only had a significant and negative impact on CHI/CHI women: surprisingly, the more they perceive the STEM work environment to be unfriendly to women, the more they wanted to enter the STEM industry, which is explored below.

In the qualitative analysis, a key finding is that women talk less about their own stereotypes of STEM than those of their family and those around them. Non-Chinese parents tend to be more supportive towards their daughters' STEM ambitions. However, 2/7 UK interviewees said that their parents were very traditional and felt that staying at home and looking after the family was a better option for women. These UK women did not accept their parents' views and were adamant that choosing a career that they love was the better choice. There were more Chinese interviewees whose family members did not support their choice, with 4/7 Chinese respondents saying that their family members were not supportive of them going into STEM careers. Instead, their families still wanted them to choose a “stable" and “non-challenging" career. These family members felt that STEM as a highly male-dominated industry was too competitive and that women would not be able to compete with men for promotion. Two Chinese respondents said that their families believed that getting married and having children was the most important thing in life and that a woman's career was optional compared to the former. One Chinese interviewee said:

> *"My mother, who was an accomplished engineer before she got married, quit her job to become a stay-at-home mom after she got married. She respected my future career choice, but other family members always told me that taking care of the family was what a woman should do."*

These Chinese women who were discouraged by their families did not give up on their current career pursuits; they still chose to enter the STEM industry because they "liked it" (4/7 of interviewees), for "better personal development prospects" (3/7 of interviewees), and "wanting to make the industry better by entering it myself" (3/7 of interviewees). All of the interviewees said that they would stay in STEM if they could improve the gender bias of the industry and attract more women into STEM industry. This attitude may go some way to explaining the confounding findings that SCO/CHI women were more likely to enter the STEM workforce if they believed it was detrimental for family life, and that CHI/CHI women were more likely to aspire to STEM careers if they felt the work environment to be hostile to women. These women have had to show commitment and resilience to discouragement to persist in their STEM aspirations and are keen to improve the environment for the better; hence the worse they consider the environment to be, they more they may feel their contributions can bring about change, despite the personal cost to them. However, this remains an interesting finding that we would like to investigate further.

In addition to the impact of upbringing on women, many respondents were concerned about the current gender gap in STEM. 79% of respondents (both Chinese and UK) felt that women getting married and pregnant could affect their careers. They believed that because STEM fields are associated with cutting-edge technology, a characteristic that requires workers to be constantly learning, pregnancy and maternity could affect their learning efficiency and productivity. These concerns were more prevalent amongst Chinese students. In particular, 86% of Chinese respondents believe that leaders may be more likely to choose to promote men above similarly qualified women. Compared to non-Chinese women, women in Chinese societies are more likely to be given the responsibility of looking after the family, while men are indoctrinated to think that almost all they have to do is to earn money (Xiaolu, 2007). This outdated gender norm means that Chinese women are expected to give more of their time to raising children and taking care of household chores. Our interviewees were concerned that STEM companies would consider that women entering the workforce will not be able to devote themselves to their work due to their families, giving better development opportunities to their male colleagues. Some Chinese interviewees have even found STEM companies that put "men only" directly on their job postings when looking for internships. Although this is illegal in both Scotland and China, "men only" job postings occasionally appear in China as there are no serious penalties to stop this practice. One Chinese interviewee who was about to graduate said:

"Many years ago, most couples in China were only allowed to have one child. Women without children were often seen as a 'ticking time bomb' as maternity leave affected the efficiency of the sector.The company therefore breathes a sigh of relief when a female employee gives birth to a child. Since the implementation of the three-child policy in 2021, STEM companies may further squeeze women's space in the workplace, as the duration of the "time bomb" has been tripled."

Sense of belonging in a male-dominated environment is an issue for many women, with 86% of all respondents saying that the under-representation of women in STEM sectors left them with a lack of sense of belonging. All interviewees expressed concerns about STEM fields, "It can be difficult to fit in as a woman in a male-dominated industry"(11/14 of interviewees), "Workplace sexual harassment is more likely to occur in more male-dominated industries" (2/14 of interviewees), and "Male leaders will not understand the difficulties of women" (3/14 of interviewees). It has been shown that women often report feeling that they do not belong in STEM because of various threats to their social identity, including gender discrimination, stereotype threat, and concerns about inclusion (O'Brien et al., 2015). This qualitative study also validates this view. The desire for more female colleagues and leaders in STEM industries was consistent across all respondents; we did not see different patterns emerging from the three groups on this point.

Ability Stereotypes

Ability stereotypes do not appear to have a statistically significant impact on the likelihood of women to aspire to STEM careers. The most likely explanation for this is that these stereotypes - such as *Women's prospects in STEM fields are not as good as men's* - do not resonate with female students in any of the groups, who believe they have an equal chance with men, and hence they are not held back by them. Whilst this is a positive finding, we know that barriers do exist in the STEM field for women (Arredondo et al., 2022), and discovering this during their career could be one of the reasons for the leaky pipe phenomenon.

In the interviews, we discovered no shortage of opposition to women entering STEM careers in the educational environment in which they grew up. 4/7 of Chinese respondents said they had been told by relatives before they started university that women were not appropriate to STEM subjects. 2/7 of them said they had heard teachers say that "girls are worse at maths than boys" or that "girls don't think as well as boys in science". A similar phenomenon is prevalent globally, where some teachers tend to attribute the success of female students in mathematics to effort and their failure to ability. For male students, on the other hand, they attribute success to ability and failure to lack of effort (Fennema et al., 1990; Thacker et al., 2022). 3/7 of the Chinese respondents reported that they had female friends close to them who really thought they were not suited to learning STEM skills because of the gender-biased ideas spread by their teachers. One respondent said:

"I often heard the argument that girls aren't appropriate for STEM subjects, and my physics teacher said the same thing, but I was determined to show them that girls can do well in STEM subjects. After I got into computer science at

university, my close female friend said I had done things that she could not do. But she was just influenced by sexism and thought she really couldn't learn, even though she hadn't tried to study these subjects once."

Such views were much less reported by the UK interviewees, who experienced less direct experience of blatant bias in their education. However, 2/7 of the UK respondents had similar experiences of teachers giving higher marks to male students for the same answer in a test. This unconscious bias of teachers for male students created a great deal of frustration for these female students. Some studies have shown that at the higher education level, male students are more likely to get a response from STEM professors than emails from female students, and to do so more quickly (Milkman et al., 2015). This could have a significant impact on women's confidence in studying STEM subjects. This may explain why the results of the analysis in the quantitative part of this study showed that ability stereotypes and perceived bias are no longer influencing women's willingness into STEM fields: all our respondents had already chosen to study STEM degrees and had thus proved their ability to persevere in STEM despite this discouragement; perhaps students more vulnerable to such bias have already dropped out of STEM.

Although research shows that teachers in STEM being prejudiced towards boys is a global phenomenon (Fennema et al., 1990; Thacker et al., 2022), it is notable that such experiences were much less common in interviews with UK women. The cultural context is perhaps such that a teacher would not feel as free to express these sexist comments, which is surely a positive thing for their female students. However, they may still be exhibiting biased behaviour, whether conscious or unconscious, that could impact their students.

Role Models

Among the independent variables related to role models, the number of role models in STEM fields that participants were familiar with had a significant effect on CHI/CHI women only, with a positive correlation. The gender of role models had a significant effect on all Chinese female participants, and both CHI/CHI and SCO/CHI believed that female role models would be more encouraging to their STEM employment intentions compared to male role models. In contrast, SCO/UK women did not seem to be so impacted by the visibility or gender of role models.

Some studies suggest that an increase in the proportion of female faculty members in faculties does not attract more women to major in that field (Canes & Rosen, 1995; Price, 2010). The quantitative research in this study showed that same-sex role models had a significant impact on Chinese women's intention to be employed in STEM industries. Furthermore, 100% of the UK respondents mentioned in the interviews that female role models had a positive impact on their willingness. All respondents said that if there were more female role models in STEM industries, they would be more likely to enter STEM careers.

Chinese women and UK women have different visions of what a female role model should look like. 71% of Chinese women believed that they expected female role models in STEM fields to be able to balance a family career with a rich life of their own. These interviewees felt that if many role models in this field gave up other social identities for their careers, it would in turn them off the profession. UK respondents did not have similar requirements for images of female role models, perhaps indicating a better approach to work/life balance in Chinese students, or perhaps indicating that they took for granted that a decent work/life balance would be possible, and therefore weren't explicitly looking for it. This may be related to the needs of the Chinese community as discussed earlier. Compared to the more liberal social role choices of UK women, Chinese women have more of the shackles of outdated gender stereotypes and face a greater risk of leaving the workplace.

Additionally, 79% of all respondents suggested that if a STEM company had more female leaders it would make them more likely to work for the company.

The importance of seeing other girls interested in STEM and being able to access opportunities to engage with STEM was highlighted in the interviews. One Chinese female who had been studying in Scotland since high school said:

> *"I once attended a career guidance event in Scotland run by STEM Women. At first the class drew lots to choose who would go to the event and because the male student base was larger, it was all guys and not me. But the event organiser told our class leader to please let girls come to the event if there were any in the class, and that made me feel better about the STEM industry. The STEM industry would make me look forward to working there even more if they showed they were inclusive of women."*

Self-efficacy

From the group that we analysed here, there was no clear impact of self-efficacy with intention to enter STEM careers. The results we might expect from this is that low self-efficacy decreases their willingness to enter STEM careers, as they might worry they will not have the skills to succeed. We hypothesise that the fact that all students are studying at highly selective universities, and thus plausibly have high levels of self-efficacy, may be a reason for why we are not seeing such effects.

Because of the low correlations between self-efficacy and interest in STEM careers, we did not focus on this subject in interviews, and none of our interviewees highlighted factors around self-efficacy as a concern for them in deciding whether or not to enter STEM.

Suggestions for Change

As well as asking questions around the factors we considered in the questionnaire, we also asked interviewees for their ideas about how we could improve women's access to STEM careers.

Combining the quantitative and qualitative analyses from this study, we found that if a respondent wanted to enter a STEM industry out of interest, she was more likely to want to pursue STEM careers than other respondents for whom other reasons were more important. All of the UK interviewees became interested in STEM fields as children, either because they had family members who worked in STEM fields or because they were exposed to STEM subjects and found them enjoyable. Almost no Chinese respondents were exposed to STEM fields before high school, and almost all of them learned about STEM knowledge and the STEM industry after they entered their major field of study in college. 100% of the respondents agreed that their willingness to enter the industry would have been stronger if they had been exposed to STEM knowledge earlier.

A Google search for “Scotland STEM activities" showed 7,800,000 results. Baidu[6] (China’s largest search engine) produced four times as many results and over 1/3 of the first page was from other countries. There are currently 940 million internet users in China, 257 times more than Scottish internet users (statista.com, 2022), indicating that we would expect the number of Chinese hits to be significantly larger if there were equal opportunities. Additionally, none of the respondents based in China had received any promotional emails about activities to encourage women into STEM careers, while all of the respondents based in Scotland had received such emails, and many of them learnt a lot from the event.

The UK also has many websites to promote STEM women’s employment, for example, ‘STEM Women’[7], which provides a wealth of information on employment for students already in STEM fields, but there is no similar websites in China. All Chinese respondents said that if their country had a website like STEM Women, they would have a better chance of finding out about STEM companies and would be more willing to enter the STEM industries.

In summary, core ideas from our interviewees are introducing STEM to young people earlier, both in school and external events, and ensuring there is information, activities and role models around STEM careers aimed at young women.

Discussion

The key motivation for this research was to understand more deeply why women are so underrepresented in STEM careers by looking at the intentions of the next generation of potential female STEM workers and getting some understanding into the factors encouraging or discouraging them from entering STEM careers in different contexts. We know that the percentage of women in STEM industries varies across the globe (UNESCO, 2019), and that the cultural issues that impact such decisions differ across different cultures, and we hoped to gain more insight into similarities and differences by exploring this in two different locations and largely between two clear subgroups - Chinese and British women. These groups were chosen not just because that is where our personal experience lies, but because both China and the UK are significant players in STEM industries, with China producing more STEM graduates than any other country, and because there is little comparative work between the two countries.

The results are thought-provoking, with women in both location having profound concerns around the stereotypes of STEM careers held by themselves and those around

[6] Baidu is similar to Google in China as Chinese internet users cannot use Google due to the Chinese internet “wall".

[7] https://www.stemwomen.com/; multiple other websites with similar aims are available.

them. Note that when we refer to stereotypes, we mean simplified or generalised views of a field and do not mean to dismiss these views as incorrect or meaningless; often there is considerable truth in stereotypes. We did not find that the students we worked with agreed with the limited stereotypes around abilities in STEM - perhaps because they themselves had already proved them to be untrue - but many were surrounded by others, including family and teachers, who did buy into them. No doubt there were many girls with STEM potential who were dissuaded from pursuing STEM because of this. Role models were viewed as important, especially for Chinese students, whom the interview data suggested may have less access to role models. This correlates with our investigations in to opportunities to connect with role models in the two countries. Our research did not find any correlation between self-efficacy and likelihood of entering a STEM career, but we do not conjecture that this is therefore not an issue. Rather, this may be a factor of the highly academic women this research targeted. This is an important subgroup to study as the potential STEM leaders of the future are likely to fall into such a group, and it is good news that we have not found issues around this for women. However, if we are looking at women in STEM more broadly, we cannot dismiss this as a potential factor.

A finding that came up repeatedly in this research, both in the survey and in the interviews, is that both British and Chinese women have similar concerns around entering STEM, but that these tend to be more pronounced for Chinese women. Discussions in the interview suggested this is often caused by social attitudes in China which, whilst still existing in Britain, have become less prevalent, and also around practice in industry which is similar in both countries but where Britain has seen greater improvements than China has yet experienced. The UK students interviewed appeared to be less aware of and concerned by stereotyping around STEM. This is good news: there have been considerable efforts to improve STEM stereotypes in the UK which, as evidenced in the interviews, is much less common in China, so these appear to have had some impact. This suggests that similar changes are possible in all places, if the will to implement them is there.

With China appearing far lower than the UK in the World Economic Forum's Global Gender Gap Table (106 to 21), and the interviews with the female students highlighting the traditional expectations on women that are common in countries with lower gender equality, a natural assumption might be that this would lessen Chinese women's engagement with STEM. However, the gender-equality in STEM paradox (where percentage of female workforce is lower in STEM the more gender equal a country is) may lead us to suppose we would see more women entering STEM in China, which does not seem to be the case. Of course, the paradox illustrates approximate global trends and we would not expect to see close correlation for all countries, but this research helps us to look a bit deeper into this phenomenon by exploring contexts in which it does not appear to hold. Whilst this research in isolation can't tell us very much about the correlation between gender equality and women in STEM, it can highlight some interesting results and bases for further study.

Revisiting the research goals of this study, we come to the following conclusions.

- *Is it the case that female STEM students are less likely to aspire to STEM careers than male STEM students in these different contexts?* As expected, we found that

women were less likely than men to aspire to STEM careers. Interestingly, we found that Chinese students as a whole were less likely to aspire to a STEM career than UK students.
- *What are the attitudes towards STEM careers of female STEM students in our three groups, and how do these differ between the groups?* We found that whilst many of the women in our study had high aspirations for their STEM careers, there were many concerns about the reality of these careers and many environmental factors that are putting women off STEM careers, as discussed in detail above. We found that these views were broadly similar across all three groups, but that all factors tended to be more pronounced in Chinese students, whether studying in their home country or in Scotland. We did not explore reasons why Chinese students may chose to study abroad rather than at home and whether they represent demographical or other differences and we would like to explore this in more detail.
- *What are the factors that influence these aspirations, and how do they differ between women in the three groups?* For the students in our study, negative stereotypes around their own abilities and self-efficacy were not a factor even though many of them had been exposed to seriously negative views around the suitability of women for STEM careers, but stereotypes around STEM careers, and particularly how these affected life/work balance were. Role models were demonstrated to be important, as was early exposure to information about STEM subjects and careers, especially with a focus on how women can thrive in them.

This work contributes to the theory by providing additional evidence both for (i) the similarity of experiences of young women in STEM across the globe, as many of the views expressed both across the populations and in our richer qualitative data were similar for women in China and in the UK, but also for (ii) the impact of cultural differences in smaller but potentially impactful ways. In particular, the culture of a country and within the industry in a country, and the expectations families put on young women, differs in different environments and can contribute meaningfully to young women's aspirations. Our data suggests that women who travel abroad to study retain attitudes that are largely in line with those of their own country, and do not appear to differ in attitudes towards STEM careers to those who studies in their home country. However, we only explored populations of women from elite institutions in both environments, so cannot generalise these findings beyond that. Differences in education systems are one factor that could explain some of the differences we encountered; however, we do not have sufficient data to draw conclusions on that point. Our data also explored the importance of STEM role models to Chinese women, which has not been explored much in detail, and found these played an important role - even more so than for the UK women.

Limitations

Whilst we believe this provides important insights into the attitudes of young female STEM students to STEM careers, and in particular how this varies across two different locations, there are limitations to this work. Firstly, we only looked at one institution in each of the locations. To get a clearer idea of the differences, we would like to extend the research to more universities in these countries.

It is tempting to extrapolate general ideas about differences in attitudes of women to STEM careers in westernised countries versus Asian countries. Our qualitative research indicates that cultural believes are a key factor in these attitudes, and we might expect countries with similar cultural backgrounds to exhibit similar patterns. In order to get a clearer idea about this, we would need to conduct similar research in several different countries.

Due to the phrasing used in the questionnaire, there is also some ambiguity in our data around Asian vs Chinese students, and non-Asian vs UK students. Whilst we know that a significant majority of the Asian survey respondents in the Scottish university are Chinese, and the group is thus referred to as Scottish Chinese students, it is likely that there are some non-Chinese Asian students included in the numbers which could be slightly skewing the data. Likewise, we know that a significant majority of the non-Asian students are from the UK (predominantly Scotland, but with significant numbers of English, Welsh and Northern Irish students). In future we would ensure absolute clarity on this point. This is only a factor in the survey; the students in the interviews were all either Chinese or British.

In this study, we lumped together women at different stages in their academic journeys: undergraduate, taught postgraduate and research postgraduate. Given what is known about the leaky pipeline, it would be interesting to disaggregate the data to explore differences at different levels. Whilst we would be able to do this with our existing data, it would leave us fairly small numbers in each group, so we would like to collect more data to do this in a more robust way.

Finally, although the number of participants involved in the study is respectable, the results would be more robust with a broader range of subjects, both in the surveys and the interviews. However, we feel that the patterns emerging from the survey respondents are clear and the interviews appeared to be reaching saturation; that is, new interviewees were echoing sentiments already expressed by others rather than bringing in new views. We therefore think it unlikely that this would have a significant influence on the findings.

Conclusions

Stereotypes of the STEM field and gender bias not only make women waver in choosing a STEM career, but their development in the STEM workplace is also negatively affected (Eaton et al., 2020). Based on previous research on the under-representation of women in STEM, this study combined the findings from questionnaire data and interviews to help us understand career intentions and the factors influencing that in three groups of young women studying STEM degrees: Chinese women in a Chinese university, Chinese women in a Scottish university and UK women in a Scottish university, to help explore the influence of women's cultural contexts on their career choices. Women's upbringing in all environments are influenced by family expectations on the one hand and the prejudices of teachers in schools on the other, which often differ from the expectations on men. Young women nowadays are subjected to these frustrations while being motivated by positive images of ‘trailblazers’ and working towards their childhood dreams. Accordingly, this research suggests ways to increase women’s willingness to pursue STEM careers by introducing more female role models and developing more STEM activities. In addition, stricter penalties should be introduced to enforce confirming to legislation around gender equality, which some of our data suggests is happening more in the UK than in China. Achieving gender balance in STEM fields requires everyone’s recognition that women have the same level of STEM skills and talents as men.

Some of our key findings were as follows:

a.) Compared to Chinese women who did not learn about STEM fields until high school, British women had an earlier and stronger desire to enter STEM careers.
b.) Chinese women face greater discrimination in the work place and the home environment than British women, and perhaps because of this they are more likely to want more female role models to emerge to inspire them.
c.) Ability stereotypes and perceived bias did not have a significant impact on STEM women’s employment choices, and this may be because young women who are able to study STEM degrees at university are able to deal with the negative effects of prejudice. Those women who are significantly affected by ability stereotypes and bias may have been discouraged from STEM fields before university. Additionally, we may find changes in these views once women are in the workplace.
d.) The interviews revealed that some Chinese women have a high sense of social responsibility and believe that by joining the STEM industry they will be able to work towards making it more equal, and that this is a key reason why they are willing to enter the STEM industry.

Many years ago, women were excluded from university education and most STEM careers. Now, these male-dominated workplaces are opening their doors to women, but to work towards a better gender balance will take teachers, STEM companies and everyone else to put aside their prejudices and address this social challenge. The research in this paper highlights some ways in which this could be approached.

Funding Statement No funding was received for conducting this study.

Data Availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of Interest statement The authors have no relevant financial or non-financial interests to disclose.

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