International Journal of Gender, Science and Technology
http://genderandset.open.ac.uk

Selected papers presented at the 7th Network Gender & STEM Conference, 18-20 July 2024 in Heidelberg, Germany

In association with
NETWORK GENDER & STEM educational and occupational pathways and participation

Gender Roles and Career Paths: A Study of Ambitions and Work Preferences in Computer Science Undergraduates

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ABSTRACT
According to Abele's (2002) model, gender roles shape goals and expectations, which can also be influenced by environmental factors such as work conditions. Based on this framework, the present study examined gender-specific career ambitions among 197 computer science undergraduates (36.5% women) at a German university (2014/2015). The survey assessed gender role attitudes, career plans, preferences for part-time work, and leadership aspirations. Results showed that women endorsed significantly more egalitarian gender roles than men. Women were more likely to express a preference for part-time work, regardless of their gender role attitudes. Leadership aspirations displayed a nuanced pattern: more women than men rated leadership as moderately important, whereas men with traditional gender role attitudes were more represented among those rating leadership as very important. Differences between egalitarian and traditional attitudes within gender groups were generally not significant. These findings suggest that gender role attitudes are associated with career preferences in the male-dominated STEM context. Supporting flexible career pathways remains important to allow students to pursue careers aligned with their individual goals.

KEYWORDS: Women in computer science, gender role attitudes, part-time work conditions, career ambitions, professional goals

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INTRODUCTION

The proportion of women in computer science in European countries including Germany is still low (Bitkom, 2024). According to the study by Bitkom (2022), the industry association of the German information and telecommunications sector, representing companies in the digital economy and regularly conducting surveys on labor market developments, there is currently a shortage of 96,000 IT professionals in Germany. In 2023 the proportion of women in computer science was only 18% (Statistisches Bundesamt, 2024). Accordingly, the proportion of women in leadership positions in this area is also very low (Heinevetter, 2012; Hoppensted Branchenmonitor, 2012; Statista, 2019; Will-Zocholl & Kämpf, 2014). In 2019, only three out of 100 technical leadership positions were held by women (Cataldo & Bott, 2019). A survey by Bitkom (2022) found that around 50% of IT companies do not have a single woman in their executive ranks. It is striking that the shortage of skilled professionals in the IT sector is still increasing and more pronounced compared with other STEM subjects, such as the natural sciences.

In areas such as mathematics, chemistry, and physics, women are more likely to pursue teaching careers, as these fields are perceived to allow better reconciliation of family and career obligations. For example, in Baden-Württemberg, around 65% of new mathematics teachers and 50% of chemistry teachers in teacher-training programs are women (MINT-Bilanzbericht Baden-Württemberg, 2022). International studies also suggest that women often choose teaching roles in STEM because these positions offer greater work-life flexibility compared to more intensive technical professions such as IT (Ceci et al, 2014; OECD, 2025).

In STEM professions that are in strongly male-dominated technical fields, such as computer science, many women are often concerned that it is difficult to reconcile work and family life (Beyer, 2014; Ripke & Siegeris, 2012). Previous research indicates that women in STEM fields, including computer science, tend to value employer initiatives that enhance work-life balance, such as flexible working hours and family-supportive policies (Quesenberry & Trauth, 2012). Because of gender stereotypical attributions of ability, computer science is also a domain where men are initially more likely to be attributed with higher professional aptitude than women (e.g., Jaglo, 2013; Kessels, 2012). As a result, many women feel disadvantaged when it comes to promotions because of a lower recognition of women's work and skills (Fisher et al., 2013).

Women in the computer science workforce have a more difficult time finding role models and mentors to motivate and support their careers (Trauth et al., 2003), as there is a lack of female role models to which women can orient themselves and become aware of their talents. Traditional role models and attitudes– referring to conventional societal expectations that men are breadwinners and women are primary caregivers– can deter women from following their interests (Microsoft, 2017; Müller, 2010). Empirical findings from prior research show that this is the case especially in male dominated occupations such as computer science: women seem to perceive fewer career prospects due to both their own and others

traditional gender role attitude (e.g., Abele, 2003; Abele, 2013; Dicke et al., 2019; Koch et al., 2015; Trübswetter et al., 2014; Williams & Best, 1990).

A multitude of reasons for gender differences in STEM participation have been examined, including gender role beliefs (e.g., Bryant, 2003; Ceci et al., 2014; Cheryan et al., 2017; Lauermann et al., 2015; Wolter et al., 2015) which have been measured in a variety of ways and often showed cross-cultural differences. Gender role beliefs include beliefs about responsibilities and behaviours that are considered appropriate for each of men and women (Abele, 2013; Athenstaedt & Alfermann, 2011; Hannover, 2006). The present study focuses on gender role beliefs primarily within heterosexual relationship contexts, as much of the existing research and theoretical work on the division of paid and unpaid labour is based on heterosexual couples. However, it is important to acknowledge that relationship structures are more diverse. Research shows that labour division patterns and the meaning of gender differ substantially in same-sex couples, who often negotiate roles more flexibly and less gender-normatively (Goldberg, 2013). Furthermore, not all individuals aspire to long-term partnerships (Ruckdeschel, 2015), and thus partnership-based expectations regarding labour division do not apply universally. These broader considerations highlight that gender role beliefs—regardless of partnership status—can shape career-related aspirations. For example, women with more traditional role attitudes often prefer social or humanitarian occupational fields (Cheryan et al., 2017; Lauermann et al., 2015), whereas men tend to choose highly technical professions.

Generally, individuals holding a traditional gender role belief see men as the family breadwinners and women as responsible for childcare and supporting family matters (e.g., Brand, 2018; Dicke et al. 2019; Förtsch et al. 2018; Jabsen & Blossfeld, 2008; Krüger, 2001). From a theoretical perspective, these attitudes towards the role of women in family and child-rearing may also influence male students' career preferences, including their desire for leadership positions or full-time work. For example, in line with traditional gender roles, men tend to report being more career oriented and ambitious to earn a higher income (Abele, 2013; Eccles, 1987). Men who endorse traditional gender roles may anticipate fulfilling the breadwinner role and thus prioritise career advancement and salary, while egalitarian men may be more open to part-time work and shared household responsibilities. This rationale provides an empirical and theoretical justification for examining how male students' gender role attitudes relate to their professional aspirations.

Empirical research has shown that at the beginning of a marriage or partnership, egalitarian conceptualisations of gender role beliefs are typical (e.g., Albert et al., 2019; Levy & Ernst, 2002; Schulz & Blossfeld, 2006) and both women and men work full-time. Working full-time increases both partners' autonomy, offers opportunities for recognition and contribution to society, and can foster appreciation of each other's profession (Abele & Volmer, 2011). The egalitarian division of housework tends to be practised by such couples up to the time of having the first child, after which division of labour become more traditional and often women leave their careers and work part-time to take on family responsibilities (e.g., Huinink & Reichart, 2008; Leuze & Strauß, 2016; Levy & Ernst, 2002; Schulz & Blossfeld, 2006). Even if women have higher incomes than men, they are likely to do a larger

share of housework and childcare (Kühhirt, 2012). In contrast, the professional advancement of most fathers is usually not reduced once they have children, and employers support their careers (Schulz & Blossfeld, 2006).

In a longitudinal study, Corrigal and Konrad (2007) showed that egalitarian gender role attitudes have a positive subsequent effect on the length of women's working lives. The ideal of an egalitarian task arrangement implies that a mother returns to work relatively soon, as women should share in financial support of the family, and men should participate in childcare and household labour. In a multinational study, Stickney and Konrad (2007) found that egalitarian gender role attitudes have a positive effect on women's income, especially for women who work longer hours. Women with egalitarian attitudes also have higher career ambitions than women who endorse a traditional gender-role attitude. It is important to note that both studies focus on women's own gender-role attitudes and their perceptions of societal expectations, rather than on the attitudes of partners or broader social groups.

In Germany, the gender role beliefs of computer science students regarding their career plans and professional goals have not yet been sufficiently examined. This is important to consider given the current gender disparity within computer science and the demand for computer science professionals. The current study Bamberg Alumnae Tracking provides a unique database for analysing gender disparities in computer science. This article aims to shed light on the extent to which gender role attitudes impact the career plans of potential future women and men computer scientists during their studies.

Theoretical Framework

Gender role beliefs are shaped by a variety of social actors, beginning in childhood by the parental and family views and the home. These beliefs are also informed by early experiences at school and by peers. The acquisition of stereotypical knowledge of what a boy or girl should be like influences the development of gender role beliefs from early in childhood and continues throughout the lifespan. In this process, the stereotyping of a person based on gender does not occur consciously, but emerges as an automated process (Hannover, 2006). According to Eccles et al.'s (1983, 1993) expectancy-value theory, gender role beliefs are related to internalised social and cultural values. In their situated expectancy-value theory (SEVT; Eccles & Wigfield, 2020), aspects of the cultural milieu shape both family processes and adolescents' motivational beliefs, performance, and decisions.

In Germany, since the 1980s, a slow change in gender role attitudes can be observed due to the expansion of education and the increasing educational equality between men and women (see also Athenstaedt & Alfermann, 2011; Ruckdeschel, 2015; Stein, 2012). In the 21st century, individuals are more egalitarian than in the 1980s (Chen et al. 2023; Knight & Brinton, 2017); nevertheless, women still do not have the same career opportunities, especially in male-dominated fields such as computer science (Abele, 2013).

The present study is grounded in the model of life planning in professional and private life according to Abele (2002). Abele's model is an extension of Lent's social cognitive career theory (Lent et al., 1994). The model differentiates personal factors (characteristics, abilities/skills, self-concept, motives, interests/attitudes)

from enabling and disabling environmental conditions, which not only directly influence professional outcomes but indirectly influence expectations, goals and actions that influence professional development. This structural process model highlights that the factors involved can change over time. According to Abele, gender-specific aspects are related to career goals and expectations: she argues that gender role attitudes influence individuals' expectations and goals. These shape behaviours which, in turn, influence professional and personal success, satisfaction, health and wellbeing (Abele, 2002).

This study focuses on the gender role attitudes of computer science students at Otto-Friedrich-Universität Bamberg and examines how these attitudes affect their career plans. Specifically, it investigates how gender roles shape students' expectations and goals, and whether male and female future computer scientists already form differentiated career and life plans during their undergraduate studies. Importantly, these expectations refer to anticipated future family roles (Eagly & Wood, 2012). Current familial obligations of the students could not be taken into account, as corresponding information on parenthood was not collected. Gender role attitudes are known to shape how young adults imagine their future division of labour, which in turn informs early career preferences. Although the study does not include empirical data on male students' family obligations, prior research suggests that gender role attitudes also influence men's career preferences. Traditional gender role beliefs include expectations that men prioritise career advancement and full-time employment, whereas egalitarian beliefs allow for more flexible approaches to work and family. Accordingly, men with egalitarian attitudes may be more open to part-time work or to de-emphasising leadership roles (e.g., Abele, 2003; Eagly & Wood, 2012).

Hypotheses

Building on the theoretical framework outlined above, the present study examines how gender role beliefs relate to career aspirations among computer science students.

RQ1: Do men and women computer science students differ in their gender role attitudes?

H1: Based on prior research (Athenstaedt, 2000; Dicke et al., 2019; Frieze et al., 2003), men are expected to hold more traditional gender role attitudes than women. These differences are linked to long-standing societal norms, expectations regarding the division of labour in families, and early socialisation processes.

RQ2: Do men and women computer science students differ in their desire for part-time work conditions and how do gender role attitudes influence these preferences?

H2a: Women are expected to be more likely to prefer part-time work compared to men, as previous studies have shown that traditional gender expectations shape women's work preferences and concern for work-life balance (Eccles, 1987; Williams & Best, 1990).

H2b: Women who hold more traditional gender role attitudes are expected to show a stronger preference for part-time work options than (i) women with more egalitarian attitudes and (ii) men. This expectation reflects gendered assumptions about future work–family arrangements rather than current family obligations.

Conversely, men with egalitarian gender role attitudes are expected to show a stronger preference for part-time work options than men with more traditional attitudes.

RQ3: Do men and women computer science students differ in their goal to get a leadership position and how do gender role attitudes influence this goal?

H3a: Men are expected to consider leadership positions as more important than women, consistent with previous evidence that traditional gender roles encourage men to prioritise career advancement (Abele, 2002, 2003, 2013).

H3b: Men who do not consider a leadership position important will be more likely to hold egalitarian gender role attitudes than (i) other men and (ii) women. Conversely, women who do not consider a leadership position important will be more likely to hold traditional gender role attitudes than other women.

H3c: Women who consider a leadership position important will be more likely to hold egalitarian gender role attitudes than (i) other women and (ii) men. Conversely, men who consider a leadership position important will be more likely to hold traditional gender role attitudes than other men.

METHODS

Design and Participants

The study used the unique German dataset from the Bamberg Alumnae Tracking Study, which aimed to identify factors influencing the study and career goals of men and women in computer science. Data were collected from undergraduates and alumni of the Otto-Friedrich-Universität Bamberg between 2012 and 2015. All alumni who graduated from 2000 to 2014 were contacted (N = 1000; men = 86.3%, women = 13.7%). Students who were enrolled in the summer semesters of 2014 and 2015 were invited via online portals, the Virtual Campus, and introductory computer science courses. Approximately 500 students participated across all data collection periods (men = 77.1%, women = 22.9%). The survey could be completed either online or on paper.

The current analysis, is focused on the cross-sectional first-year student subsample collected in 2014 and 2015. Of 736 enrolled first-year computer science students, 197 participated in the survey (≈27% of the first-year cohort). Participants were primarily first semester students across various computer science Bachelor's and Master's programs. This subsample was selected because it included all constructs directly relevant to the research questions, such as gender role attitudes, part-time work preferences, and leadership aspirations. Earlier waves (2012–2013) did not capture the full set of measures and were therefore unsuitable.

The broader project comprised two complementary components: a student survey assessing current study experiences, gender role attitudes, and short-term career intentions; and an alumni survey focusing on retrospective evaluations of study conditions and long-term professional outcomes. Given these differing objectives, only the 2014–2015 dataset provides a complete and internally consistent set of variables necessary to address the research questions.

The analytical sample comprised 197 students (men = 63.5%, women = 36.5%; mean age = 23 years). Table 1 summarises their characteristics. Information on

ethnic background, sexual orientation, or non-binary gender identities was not collected, as such variables were not standard in German higher-education surveys at the time of data collection. Participants indicated their gender as "male" or "female," in accordance with the administrative categories used by the university at that time, noting that today, non-binary gender categories are now included in typical administrative procedures. Information on participants' socioeconomic status was not collected and could therefore not be considered in the analysis.

Table 1. Core characteristics of the subsample

	N	%
Total	197	100.00
Gender:		
Men	125	63.45
Women	72	36.55
Gender role attitudes:		
Egalitarian	103	52.28
Traditional	94	47.72
Desired offer of part-time work:		
Yes	28	14.21
No	169	85.79
To take up a leadership position:		
Not important/not that important	47	23.86
Moderately important	70	35.53
Important/very important	80	40.61
Age:		

Min	Max	Mean
18	33	23.19

Author's Positionality

In the interest of methodological transparency, I reflect on my positionality as an empirical educational researcher and as a woman with experience supervising multiple projects in computer science for research purposes, particularly related to gender issues. I acknowledge that my background and perspective may shape the interpretation of gender role attitudes among computer science students. I have aimed to minimize bias by strictly adhering to standardised survey procedures and transparently reporting methods and results. Reflecting on my positionality helps ensure that interpretations are guided by the theoretical framework and the data, rather than by personal assumptions.

Ethical Procedures

The study was reviewed and approved by the Legal Department of Otto-Friedrich-Universität Bamberg. All participants provided informed consent prior to participation. Participation was voluntary, and participants were informed that they could withdraw from the study at any time without any consequences. Data collection and storage were conducted according to university guidelines to ensure confidentiality and participant privacy.

Measures

Gender role beliefs. Traditional versus egalitarian gender role beliefs were assessed using items from the Bamberg Alumnae Tracking Study survey, which has been validated (Braun, 1999), and translated into English (Wasmer, 2014)[1]. Attitudes towards the role of women in the family and child rearing were measured with six items on a 4-point scale (1 = completely disagree, 4 = completely agree). Item responses were recoded so that higher scores indicated more traditional gender role beliefs. A composite score was calculated: mean values < 2.5 indicated egalitarian beliefs, while values ≥ 2.5 indicated traditional beliefs (α = .80). A dichotomised variable (0 = egalitarian, 1 = traditional) was created for use in analyses addressing RQs 2 and 3 because of the bimodal distribution of this measure. This is also consistent with established typologies in the literature (Braun, 1999; Eagly & Wood, 2012). Table 2 presents the classification of each item as indicating traditional or egalitarian beliefs. The focus on women's roles in family and child-rearing was chosen because these anticipated family responsibilities are most directly linked to early-career preferences for part-time work and leadership aspirations, which are the main outcomes of interest in this study. Attitudes toward men or toward women in professional contexts were not included, as they are less directly relevant to the present research questions.

Desire for part-time work conditions. Students indicated their preferred working models for future employment with a single item (Yes/No). Students were asked about their future work preferences without specifying exact timing.

Professional leadership goals. Leadership aspirations were measured using a single item asking students about the importance of taking a leadership position in their professional life (1 = not important, 5 = very important). Responses were collapsed into three categories: "not important/not that important," "moderately important," and "important/very important." This was done to avoid sparse cells and ensure stable estimation in multinomial logistic regression models (described below).

[1] More information about measure validation and translation can be found here and here, respectively.

Table 2. Classification of the items to traditional or egalitarian gender role beliefs

Items on 4-point-scale 1. Completely disagree 2. Tend to disagree 3. Tend to agree 4. Completely agree		
Conception of the distribution of roles between men and women	**Agreement**	**Disagreement**
A) A working mother can establish just as loving and secure a relationship with her children as a mother who doesn't work	egalitarian	traditional
B) It's more important for a wife to help her husband with his career than to pursue her own career.	traditional	egalitarian
C) A small child is bound to suffer if his or her mother goes out to work.	traditional	egalitarian
D) It is much better for everyone concerned if the man goes out to work and the woman stays at home and looks after the house and children.	traditional	egalitarian
E) A child actually benefits if his or her mother has a job rather than just concentrating on the home.	egalitarian	traditional
F) A married woman should not work if there are not enough jobs to go round and her husband is also in a position to support the family.	traditional	egalitarian

Data Analysis

All analyses were conducted in Stata 15 using the 2014–2015 undergraduate subsample (N = 197). Prior to analysis, variables were examined for missing data, outliers, and distributional properties. Cases with more than 20% missing values on key study variables were excluded (<2% of the subsample). Composite scores were created for gender role attitudes based on the full item battery collected.

Normality of continuous and ordinal variables was assessed using Shapiro–Wilk tests and visual inspection (histograms, Q–Q plots). Gender role attitudes and leadership aspirations showed significant deviations from normality, so non-parametric tests were applied at the item level. Item-level differences between men and women were assessed using Mann–Whitney U tests with Holm adjustment for multiple comparisons. In addition, an omnibus Wilcoxon rank-sum test was conducted using the composite gender role attitude score to examine construct-level gender differences.

Logistic regression examined gender differences in the desire for part-time work, controlling for gender role beliefs, age, course of study, degree program (bachelor's/master's), and current semester. An interaction term between gender and gender role beliefs was included to test moderation effects. Multinomial logistic regression was used to assess gender differences, controlling for gender role beliefs, age, course of study, degree program, current semester, and desire for part-time work. The interaction between gender and gender role beliefs was included to examine the moderating role of attitudes. Model fit was evaluated via likelihood ratio tests, pseudo-R^2 (McFadden), AIC/BIC, and examination of classification accuracy. Effects with $p < .10$ are reported as marginally significant. Reporting marginal significance is particularly relevant for detecting interaction effects in small subgroups, as it preserves sensitivity while providing insight into emerging trends in gendered preferences for part-time work and leadership roles. All regression results are reported in terms of average marginal effects (AME) and predictive margins (PM), which can be interpreted as average probabilities for the outcome at the mean values of the covariates. Average marginal effects represent percentage-point differences between predictive margins and identify statistically significant differences (Mood, 2010)[2].

Although a mediation model could in principle test whether gender role attitudes explain gender differences in part-time preferences and leadership aspirations, this approach was not appropriate for the present dataset because cross-sectional data are poorly suited to tests of mediation. Additionally, the outcome variables were not normally distributed continuous measures but categorical, and leadership aspirations had sparse extreme categories. Logistic and multinomial logistic regression were therefore the most appropriate models, providing interpretable effect sizes in terms of predicted probabilities.

RESULTS

> **RQ1:** Do Men and Women Computer Science Students Differ in their Gender Role Attitudes?

[2] For simplicity, the estimates for control variables are not presented, but are available on request from the author.

The first step of this study analysed whether male and female undergraduates differed in their gender role beliefs. The results of the Mann-Whitney-U-Test are reported in Table 3. Table 3 highlights egalitarian gender roles in blue and traditional in grey. All items showed significant gender differences ($p < .05$), even after Holm's adjustment for multiple testing.

On the dichotomised summary score calculated from the six component items, statistically significant differences between men and women were shown by the Mann Whitney U-Test = 3.57 ($p < .001$): $M_{men} = 2.05$ ($SD = .42$), $M_{women} = 1.84$ ($SD = .35$). Figure 1 shows the percentages within gender groups that endorse traditional versus egalitarian gender role attitudes: 55% of men and 35% of women held traditional role attitudes; conversely, 65% of women and 45% of men held egalitarian beliefs. These results indicate that men are more likely to endorse traditional gender roles, whereas women are more likely to endorse egalitarian gender roles.

Figure 1. Gender differences in gender role attitudes.

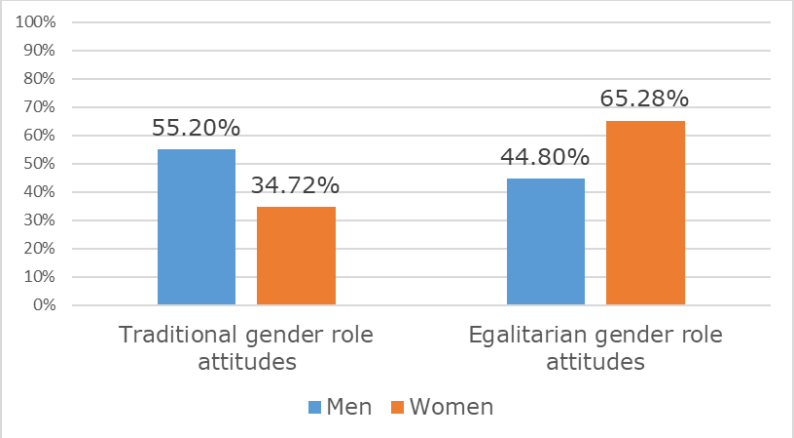


Table 3. Traditional and egalitarian gender role attitudes (Mann-Whitney U-Test)

Conception of the distribution of roles between men and women: 1= Completely disagree 2= Tend to disagree 3= Tend to agree 4= Completely agree	Men *n* = 125 *M (SD)*	Women *n* = 72 *M (SD)*	*U*-Test	*p*-value	Holm's adjustment
A) A working mother can establish just as loving and secure a relationship with her children as a mother who doesn't work	2.99 (.79)	3.65 (.51)	-5.958	.000	.000
B) It's more important for a wife to help her husband with his career than to pursue her own career.	1.57 (.66)	1.31 (.64)	3.284	.001	.003
C) A small child is bound to suffer if his or her mother goes out to work.	2.42 (.87)	2.06 (.88)	2.712	.007	.007
D) It is much better for everyone concerned if the man goes out to work and the woman stays at home and looks after the house and children.	1.69 (.81)	1.35 (.63)	3.088	.002	.004
E) A child actually benefits if his or her mother has a job rather than just concentrating on the home.	2.46 (.84)	3.17 (.75)	-5.519	.000	.000
F) A married woman should not work if there are not enough jobs to go round and her husband is also in a position to support the family.	1.78 (.84)	1.36 (.61)	3.578	.000	.001

Note: Grey indicates traditional and blue egalitarian gender role attitudes.

RQ2: Do Men and Women Computer Science Students Differ in their Desire for Part-Time Work Conditions and how do Gender Role Attitudes Influence this Desire?

The estimates of model 1 in Table 4 indicate significant differences in the desirability of future part-time work for men and women. Almost a quarter of women but fewer than 10% of men wanted part-time work conditions. This difference of 14% points was statistically significant according to logistic regression analysis. In addition, almost 20% more individuals with a traditional gender role attitude were interested in part-time conditions from their employer compared to only 10% with an egalitarian gender role. The difference of 10 percentage points between traditional and egalitarian gender role attitudes was marginally significant ($p < .10$). Overall, women were significantly more interested in part-time jobs than men, independent of their gender role attitude.

Table 4. Gender differences on the desired offer of part-time work (logistic regression)

Model (1)	AME	PM	*SD*
Gender:			
Men	–	9.58	.03
Women	14.35*	23.93	.05
Gender role attitudes:			
Egalitarian	–	10.14	.03
Traditional	9.68†	19.92	.04
N	197		
Log likelihood	–74.14		
Pseudo R^2	.28		

Note: †$p < .10$; *$p < .05$; model controls for age and course of study, bachelor/master programme, current semester. AME = average marginal effects; PM = predictive margins

To examine whether gender-role beliefs influenced the desire for part-time work, an interaction term between students' gender and their gender role attitudes was included in the model. The corresponding results are presented in Figure 2 and Table 5. Model 2 shows the average marginal effects of gender and gender role attitudes on the probability of preferring part-time work.

Among students with an egalitarian gender role attitude, women had a higher predicted probability of preferring part-time work than men, with an average marginal effect of 11.15 percentage points ($p < .10$). Among students with a traditional gender role attitude, women also showed a higher predicted probability than men, with an average marginal effect of 17.74 percentage points ($p < .10$). Within-gender comparisons indicate that men with a traditional gender role attitude had a 7.31 percentage-point higher predicted probability of preferring part-time

work compared to men with an egalitarian role attitude; this difference was not statistically significant. For women, those with a traditional gender role attitude had a 13.9 percentage-point higher predicted probability compared to women with an egalitarian role attitude; this difference was also not statistically significant.

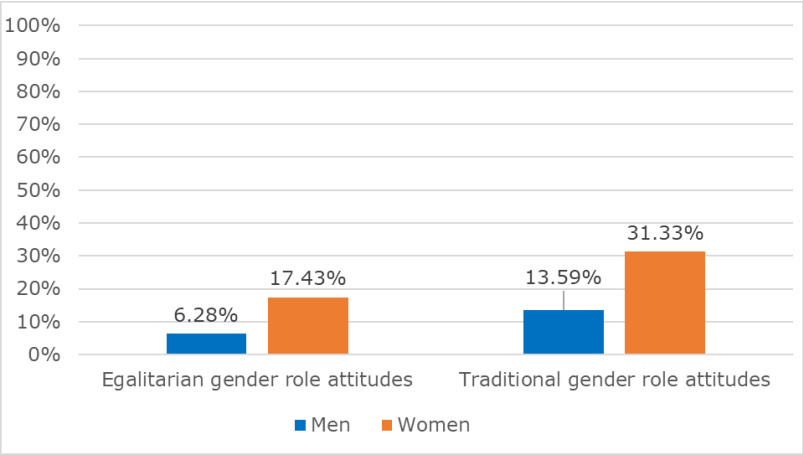
Table 5. Percentage points difference of the average in interaction between respondents' gender and gender role beliefs of the desire for part-time work (logistic regression).

Model (2)	AME	SD
Egalitarian gender role attitude		
Men	–	
Women	11.15†	.06
Traditional gender role attitude		
Men	–	
Women	17.74†	.10
Men		
Egalitarian gender role attitude	–	
Traditional gender role attitude	7.31	.05
Women		
Egalitarian gender role attitude	–	
Traditional gender role attitude	13.9	.01
N	197	
Log likelihood	–74.14	
Mc-Fadden Pseudo R^2	.29	

Note: †$p < .10$; model controls for age, course of study, bachelor/master programme and current semester. AME = average marginal effects; PM = predictive margins

These results highlight that women consistently show a higher likelihood of preferring part-time work than men, and that traditional gender role beliefs tend to increase this likelihood within each gender group, although not all within-gender differences reached statistical significance.

Figure 2. Gender specific effects of gender role beliefs on the desirability of part-time work.

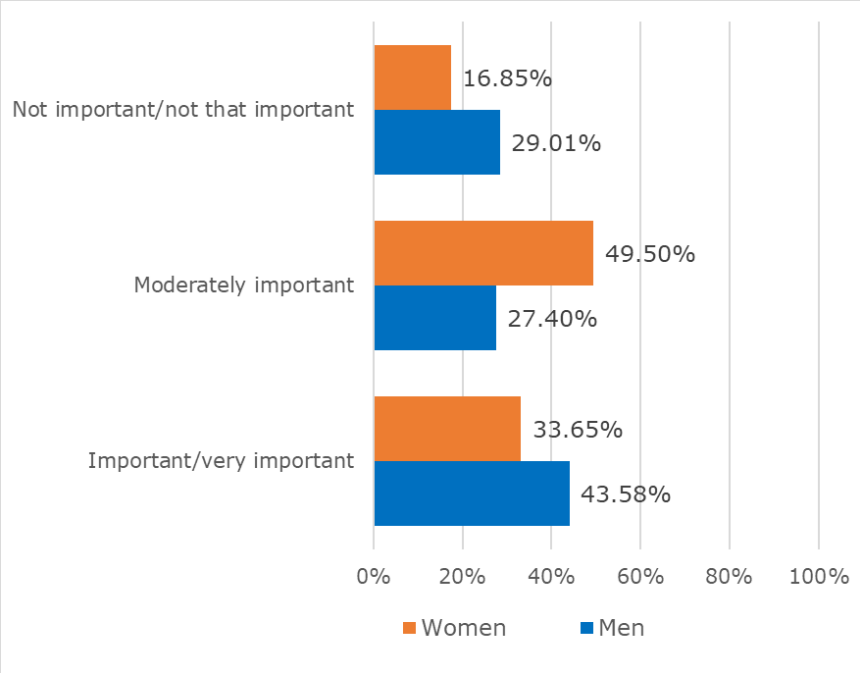


Note: Predictive margins (expressed as%) derived from a logistic regression model that also controlled for respondents' age, course of study, bachelor/master programme and current semester.

RQ3: Do Men and Women Computer Science Students Differ in their Goal to get a Leadership Position and how do Gender Role Attitudes Influence this Goal?

Proportions of men and women who aspired to a leadership role significantly differed (Figure 3 and Table 6). Higher proportions of men than women considered a leadership role "not important / not that important" (29% of men vs 17% of women), and this difference was statistically significant. Conversely, higher proportions of women than men considered a leadership role "moderately important": less than a third of men vs almost half of the women students, and this difference also was statistically significant. However, the difference was not significant among those who considered a leadership position "important/very important": 44% of men vs a third of women.

Figure 3. Gender difference in the profession goal to take on a leadership position.



Note: Predictive margins (expressed as %) derived from a multinomial regression model that also controls for respondents' age, desire for part-time work; course of study, bachelor/master programme and current semester.

Table 6. Percentage points difference in the average of the professional goal to take on a leadership position by gender (multinomial regression).

Model (3)	AME	SD
Not important/not that important		
Men	–	
Women	−12.16*	.06
Moderately important		
Men	–	
Women	22.10**	.08
Important/very important		
Men	–	
Women	−09.93	.07
N	197	
Log likelihood	−192.99	
Mc-Fadden Pseudo R^2	.39	

Note: †$p < .10$; *$p < .05$; **$p < .01$; model controls for age and course of study, desire for part-time work; bachelor/master programme, current semester. AME = average marginal effects; PM = predictive margins

It was of interest to explore whether gender role attitudes would be implicated in the relations between gender and leadership goals. Similarly to RQ2, the interaction effect of egalitarian versus traditional gender role attitudes and gender was introduced to the model (Figure 4 and Table 7).

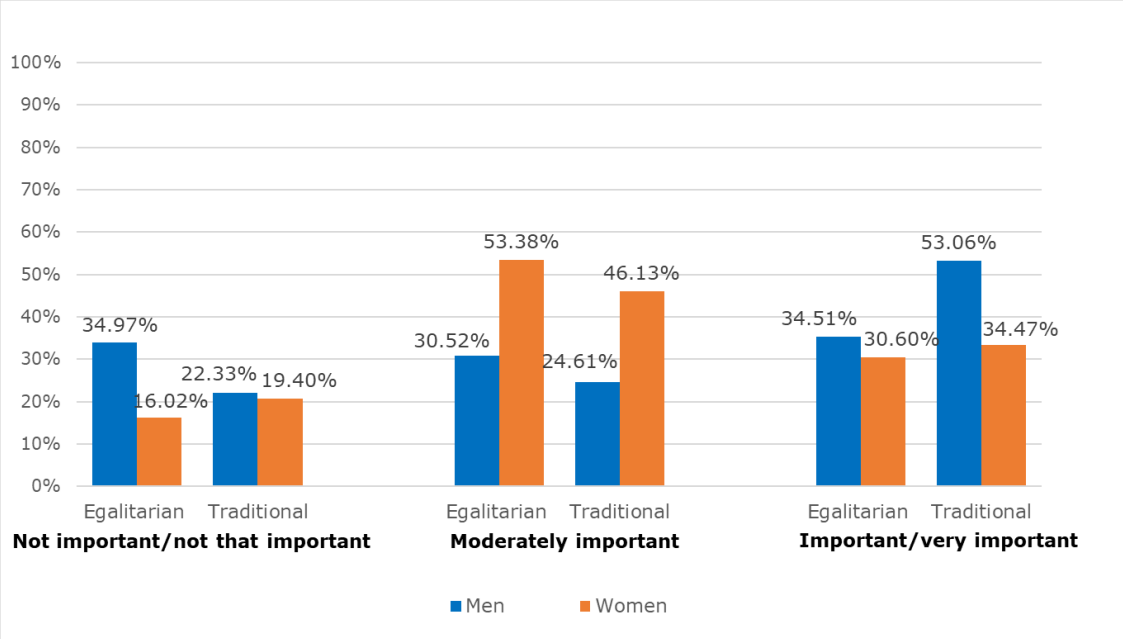
Table 7. Percentage points difference of the average in interaction between respondents' gender and gender role beliefs on the professional goal to take on a leadership position (multinomial regression).

Model (4)	AME	SD
Not important/not that important		
Egalitarian gender role attitude		
Men	–	
Women	−18.95*	.08
Traditional gender role attitude		
Men	–	
Women	−2.93	.09
Men		
Egalitarian gender role attitude	–	
Traditional gender role attitude	−12.64	.08
Women		
Egalitarian gender role attitude	–	
Traditional gender role attitude	3.38	.09
Moderately important		
Egalitarian gender role attitude		
Men	–	
Women	22.86*	.10
Traditional gender role attitude		
Men	–	
Women	21.52†	.12
Men		
Egalitarian gender role attitude	–	
Traditional gender role attitude	−5.91	.08
Women		
Egalitarian gender role attitude	–	
Traditional gender role attitude	−7.25	.12
Important/very important		
Egalitarian gender role attitude		
Men	–	
Women	−3.91	.09

Traditional gender role attitude		
Men	–	
Women	−18.59†	.12
Men		
Egalitarian gender role attitude	–	
Traditional gender role attitude	18.55*	.09
Women		
Egalitarian gender role attitude		
Traditional gender role attitude	3.87	.12
N	197	
Log likelihood	−192.84	
Mc-Fadden Pseudo R^2	.39	

Note: †$p < .10$; *$p < .05$; model controls for age and course of study, desire for part-time work; bachelor/master programme, current semester.

Figure 4. Gender specific effects of gender role beliefs regarding how important it is to take over a leadership position.



Note: Predictive margins (expressed as%) derived from a multinomial regression model that also controls for respondents' age, desire for part-time work; course of study, bachelor/master programme and current semester.

For students with low leadership aspirations ("not important/not that important"), egalitarian gender role attitudes were more prevalent among men than women (approximately a third of men vs. 16% of women; $p < .05$). Among students who

held traditional gender role attitudes, no gender difference emerged. Within the women's subgroup, the proportions of egalitarian versus traditional attitudes were very similar (16% vs. 19%), indicating no meaningful distinction. A comparable pattern appeared among men, although the gap between egalitarian and traditional attitudes (about 35% vs. 22%) was somewhat larger; however, this difference did not reach statistical significance.

Among students who rated leadership as "moderately important," egalitarian attitudes were significantly more common among women than men (over half of women vs. about one-third of men). A similar gender difference was observed among students who endorsed traditional attitudes (46% of women vs. roughly one-third of men). Yet, within each gender group, no significant differences emerged between egalitarian and traditional attitudes at this moderate level of leadership aspiration.

Among students who considered leadership "important/very important," traditional attitudes were more prevalent among men than women (53% vs. 34%), which represents a statistically significant gender difference. No such gender difference appeared for egalitarian attitudes. Within the women's group, egalitarian and traditional attitudes did not differ significantly in this category. In contrast, for men with high leadership aspirations, traditional attitudes were significantly more common than egalitarian ones (53% vs. 35%).

DISCUSSION AND CONCLUSIONS

The participation of women in STEM fields such as computer science remains comparatively low (Bitkom, 2022, 2024; Eccles, 2007; Statistisches Bundesamt, 2024), and women continue to be underrepresented in leadership positions in this male-dominated domain (Bitkom, 2022; Heinevetter, 2012; Statista, 2019; Will-Zocholl & Kämpf, 2014). The present study examined gender differences in gender role attitudes, preferences for part-time work, and leadership aspirations among university computer science students to better understand early career motivations.

Consistent with earlier research (Athenstaedt, 2000; Dicke et al., 2019; Frieze et al., 2003), men reported significantly more traditional gender role attitudes than women, confirming H1. This aligns with well-established findings that gendered socialisation and normative expectations continue to influence attitudes toward work and family roles.

The results regarding preferences for part-time work partially support theoretical expectations. Women indicated a greater desire for part-time work than men, confirming H2a and aligning with prior research showing that traditional gender expectations can influence women's work preferences and concerns about work–life balance (Eccles, 1987; Williams & Best, 1990). Regarding H2b, which predicted that traditional gender role attitudes would increase the likelihood of wanting part-time work among women– and that egalitarian attitudes would increase this preference among men– the findings provide partial support. Women with traditional attitudes were indeed more likely to prefer part-time work than egalitarian women. The pattern among men was also in the expected direction, with egalitarian men more likely to express a preference for part-time work than men endorsing traditional gender attitudes, but the results did not reach statistical significance.

It is important to note that the observed preference for part-time work among students may reflect multiple motivations beyond anticipated family responsibilities, such as opportunities for entrepreneurship, travel, continued education, or general work–life balance (Bailyn, 2006; Kossek & Lautsch, 2012). While traditional gender role beliefs may shape career planning, the data do not allow definitive conclusions about the specific reasons why women or men prefer part-time work. The findings should therefore be interpreted as consistent with multiple possible explanations, indicating the need for further research.

Leadership aspirations revealed a more nuanced pattern than initially assumed. Contrary to H3a, there was no significant gender difference in the proportion of students who considered leadership "very important," suggesting that men and women are broadly similar at the highest level of leadership ambition. More fine-grained hypotheses (H3b, H3c), focusing on interactions between gender role attitudes and leadership importance, received partial support. Among students with low leadership aspirations, men were more likely to hold egalitarian attitudes than women, although the interaction was not statistically significant. Among students rating leadership as moderately important, women (both those with egalitarian and traditional gender attitudes) were represented at higher rates than men, and these gender differences were statistically significant. Differences between egalitarian and traditional gender attitudes within gender groups were not significant. For students who regarded leadership as important or very important, women with egalitarian gender attitudes were not significantly more represented than women with traditional gender attitudes, and egalitarian men did not differ significantly from egalitarian women. Men with traditional gender role attitudes were more strongly represented in this category, and the difference between men with traditional vs egalitarian gender attitudes reached significance. However, this pattern does not translate into a general gender difference in high leadership importance, limiting support for H3c.

Limitations

It is important to acknowledge several limitations. First, gender alone does not provide a sufficient explanation for differences in leadership aspirations. Importantly, interpretations regarding motivations related to future parenthood or family planning are speculative and were not directly measured in this study; such statements should therefore be treated cautiously.

Second, it is possible that students who have already chosen a degree in computer science differ in their prior gender-role attitudes from students in other fields, which may partly shape the observed patterns. Future research could examine how self-selection into STEM interacts with gender role beliefs and career motivations.

Third, the present investigation is cross-sectional and relied on self-report. Future work may consider longitudinal designs that examine the career paths that students follow and the reasons for doing so. Similarly, work may consider alternative data collection methods, such as qualitative designs or diary studies.

Finally, the present investigation focused on first year students. Future work may compare whether gendered attitudes at the start of university differ from those endorsed in later stages. It may be that experiences at university inform gender attitudes in ways that change or further entrench these beliefs.

Outlook and Practical Implications

Although the present study empirically examines the associations between gender role attitudes, part-time work preferences, and leadership aspirations among computer science students, it does not allow for definitive conclusions about specific motivations or individual career decisions. Nonetheless, several cautious implications can be drawn. First, I argue that further qualitative research is needed. Certain patterns, such as egalitarian men's interest in part-time work or egalitarian women's leadership aspirations, could be further explored through qualitative interviews. This would provide a deeper understanding of underlying motivations, decision-making processes, and contextual factors. Second, researchers may consider the utility of career coaching and support programs. The findings highlight the potential relevance of individualized coaching for students. Initiatives such as the Coaching Network (CoachNet), which focuses on career planning, self-reflection, and networking during both studies and early professional life, may help students recognize and pursue their personal career goals (Förtsch, 2020, 2018; Förtsch & Gärtig-Daugs, 2019; Förtsch et al., 2018). Third, it may be important to ensure students are aware of flexible career paths. The differentiated patterns suggest that leadership ambitions and part-time preferences are not strictly gendered. Universities and career guidance services could therefore promote awareness of flexible career paths, challenging traditional gender-role stereotypes and supporting the alignment of professional and personal life plan.

CONCLUSION

Overall, these results highlight a complex interplay of gender, gender role attitudes, and occupational preferences, suggesting that leadership ambition in computer science is shaped not only by individual orientations but also by structural and professional considerations. Women endorsed more egalitarian gender role attitudes than men and were more likely to prefer part-time work, regardless of their attitudes. Leadership aspirations showed a nuanced pattern, with more women rating leadership as moderately important, while men with traditional gender role attitudes were overrepresented among those rating leadership as very important. These findings suggest that gender role attitudes may be linked to career preferences in the male-dominated STEM context and highlight the importance of supporting flexible career pathways that enable students to align professional trajectories with their individual goals. Future research could examine how gender role attitudes and career experiences interact over time to shape long-term leadership aspirations.

ENDNOTES

Funding statement: This research was supported by the Bamberg Alumnae Tracking Study, which is funded by the European Social Fund (ESF) and the Bavarian State Ministry for Labour and Social Affairs, Family and Women (Bavarian State Ministry for Labour, Social Order, Family and Women), under Funding Activity 11, aimed at increasing the proportion of women in leadership positions and future-oriented professions. The project is additionally supported by the Technologie Allianz Oberfranken.

Conflict of interest: The author declares no conflict of interest.

Acknowledgements: I thank Prof. Dr. Ute Schmid, who oversaw the Alumnae Tracking project, for her support, and Dr. Anja Gärtig-Daugs for her valuable advice and for reviewing earlier drafts of this manuscript. I also thank the randomly selected students of Otto-Friedrich University Bamberg for participating in the survey.

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