

## Determinants of career development in cardiology – results from a Swiss national survey

Wild Mirjam G.<sup>a</sup>, Dettmer Susanne<sup>b</sup>, Haeblerlin Andreas<sup>c a</sup>, Regitz-Zagrosek Vera<sup>e d</sup>, Tanner Hildegard<sup>a</sup>

<sup>a</sup> Department of Cardiology, Inselspital, University Hospital Bern, Switzerland

<sup>b</sup> Charité – Universitätsmedizin Berlin, Institute of Medical Sociology and Rehabilitation Science, Germany

<sup>c</sup> Sitem Centre for Translational Medicine and Biomedical Entrepreneurship, University of Bern, Switzerland

<sup>d</sup> Charité – Universitätsmedizin Berlin, Department Gender in Medicine, Germany

<sup>e</sup> Faculty of Medicine, University Hospital Zurich, Switzerland

### Summary

**BACKGROUND:** Despite the rising proportion of female medical students and specialised female doctors in Switzerland, the field of cardiology remains one of the most male-dominated.

**OBJECTIVES:** The goal of this study was to identify determinants of and obstacles to career development for cardiologists with special regard to an academic and interventional career.

**METHODS:** Under the direction of the Swiss working group Women in Cardiology (IG-WIC), an online survey was conducted among Swiss cardiologists and cardiologists in training.

**RESULTS:** 140 participants (43.6% female, 56.4% male; median age 45.0) were included. Women were more often single (27.9% vs 10.1%,  $p = 0.013$ ) and less likely to have children (52.5% vs 70.9%,  $p = 0.034$ ). If they had children, they were more likely to provide childcare themselves (37.5% vs 10.7%,  $p = 0.006$ ) or to have interrupted their work in favour of parenting (40.6% vs 8.9%,  $p < 0.001$ ). A majority of women indicated a negative impact of their gender on their career development (78.7%), and 36.3% reported sexual harassment at their workplace. Women felt less supported in their professional training, especially concerning research activities. As a hindrance for pursuit of a career in academic medicine, both sexes stated lack of compatibility of work and family (44.6%) and the competitive work environment (55.4%) being most important. Women also identified gender-specific disadvantages as one of the main reasons for not choosing an academic or interventional career.

**CONCLUSIONS:** The overall satisfaction among Swiss cardiologists is high regarding training in health care and the working atmosphere. However, women and men plead for better compatibility of work and family and better structured training curricula. Several gender-specific aspects hindering women from advancing in cardiology training should be addressed.

### Introduction

Despite a growing proportion of female medical students, as well as female doctors, there still is a significant underrepresentation of women in cardiology. In Switzerland, in the time period from 2012 to 2019, the percentage of female medical students rose from 56.6% to 60.4%, and the proportion of female practicing medical doctors from 37.5% to 43.2% [1, 2]. Yet cardiology remains one of the specialties with the lowest proportion of women: from 47 possible specialty trainings in Switzerland, cardiology is eight-to-last, and even second-to-last among specialties in internal medicine, with a proportion of 21% women holding the specialty title (working in a medical practice: 17.6% [76/432] and in a hospital 24.1% [95/394],  $p = 0.03$ ). Further, the portion of new specialty titles allocated to women is relatively low at only 34.2% in 2019, so a shift in sex proportions seems not be coming soon [2]. This phenomenon is not unique to Switzerland and has been reported similarly for several countries [3, 4].

Within the sub-specialties of cardiology, the gender disparity becomes even more apparent in interventional specialisations such as electrophysiology, and coronary and structural interventions. Worldwide, women account for 3–5% of interventional cardiologists and most of them are the single female operator at their centre [5–7].

Similar disparities can be found at the academic level, where women make up only 16.5% of cardiology faculty members with a 37% lower likelihood of a full professorship at US medical schools [8]. Compared with the other internal medicine specialties, cardiology was one of only two subspecialties (the other one being infectious diseases) where these lower odds of professorship could be identified [8]. Besides their underrepresentation in academic positions, women are less likely to receive or renew a scientific grant [9].

Over recent years, efforts have been made to analyse and understand the underlying causes for these gender disparities. This is crucial to remove impediments to career development and to better support and promote women in cardiology. This work aimed at supporting this process, with

### Correspondence:

Mirjam Gauri Wild, MD,  
Department of Cardiology,  
University Hospital Bern,  
Freiburgstrasse 18,  
CH-3010 Bern, mir-  
jam.wild[at]insel.ch

special regard to academic and interventional career development.

## Materials and methods

To investigate determinants of career development for cardiologists in Switzerland, an online survey was conducted. The questionnaire was developed in cooperation with the Charité University Hospital of Berlin (Germany) and the survey was carried out under the direction of the Swiss working group Women in Cardiology (IG-WIC) among all members of the Swiss Society of Cardiology (SSC) (730 members) and IG-WIC (108 members), including cardiologists in training who were members of Swiss Cardiologists of Tomorrow (SCOT) (250 members). The invitation was distributed by e-mail. The survey was offered in German and English. Data were collected anonymously during December 2019 and January 2020, and was stored and processed according to the current data regulations. The questionnaire included 49 items covering demographic information such as sex, age, country of birth, citizenship, marital status and children (see online-appendix for full questionnaire). Professional information included current position, working time, income class, academic level, specialisation, workplace environmental aspects, and future career pursuits. Questions using an ordinal Likert scale assessed, fulfilment of expectations of education and current job, opportunities to pursue research activities or aim for a leadership position and reasons for choosing or not choosing an academic or interventional career.

## Statistical analysis

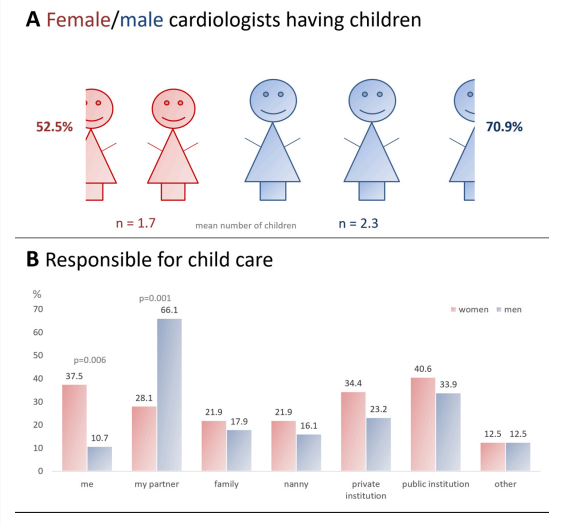
Only fully completed surveys were included in the analysis. Categorical variables are expressed as counts or proportions (%). Continuous variables are shown as mean with standard deviation or median and interquartile range (IQR), after the data distribution was assessed (using Q-Q-plots and Shapiro Wilk's test). Comparisons between women and men were made using Wilcoxon's rank sum test. Proportions were compared using the Pearson  $\chi^2$  test or Fisher's exact test as appropriate. Uni- and multivariate ordinal logistic regression models were fitted to quantify the influence of sex, age, position in hospital and working time on income class. The latter three variables were selected *a priori* based on their use for income class allocation. The full multivariate model includes all variables from the univariate models, no backward-elimination was performed. A two-sided p-value of  $<0.05$  was considered to indicate statistical significance. R version 3.6.1 for Windows (R Foundation, Vienna, Austria) and SPSS Statistics Version 25 for windows (IBM, New York, United States) were used for analysis.

## Results

### Demographics

Of the 179 subjects participating, 140 completed the survey and were included in the analysis (completion rate 78.2%). Of the participants included, 43.6% (n = 61) were women and 56.4% (n = 79) were men. Men were older (median age women 40.0 years [IQR 36.0–52.0], men 47.0 years [IQR 38.5–56.0], p = 0.019), more likely to be of Swiss nationality (24 women [39.3%], 52 men [65.8%], p

**Figure 1:** (A) Proportion of female (red) and male (blue) cardiologists with children and mean number of children. (B) Responsibility for childcare, multiple answers possible. Values are given as proportions of the full female/male sample. Multiple choices possible.



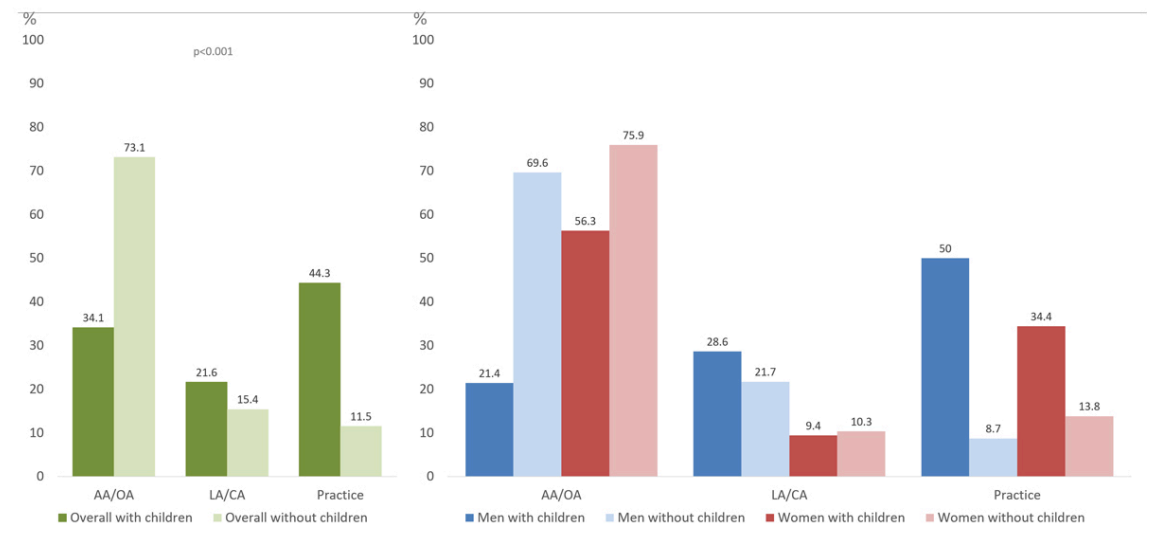
= 0.002) and in a different working position (p = 0.006). Among study participants, 25.7% were in their residency or fellowship (*Assistenzarzt/-ärztin*), 22.9% worked as attending physician (*Oberarzt/-ärztin*), 14.3% as senior attending physician (*Leitender Arzt/Ärztin*), 4.3% as chief of department (*Chefarzt/-ärztin*), and 32.9% in a medical practice (employed or self-owned). There was a trend for men to more often hold a position as senior attending physician (19.0% v. 8.2%, p = 0.089), whereas women were more likely to hold a position as attending physician (34.4% vs 13.9%, p = 0.008) and less likely to work in a medical practice (24.6% vs 39.2%, p = 0.07). Complete baseline data are provided in table 1.

### Personal life and family

Among the survey participants, women were more often single (27.9% vs 10.1%, p = 0.013) and showed a trend to be less likely to be married (55.7% vs 72.2%, p = 0.066) or to have children (52.5% vs 70.9%, p = 0.034). If they had children, they had significantly fewer than their male peers (mean 1.7 vs 2.3, p = 0.002). Participants with children were asked about who was providing child care: 37.5% of women and 10.7% of men indicated that they took care of the children themselves (p = 0.006), whereas 28.1% of women and 66.1% of men stated their partner was taking care of them (p = 0.001). Comparable statements were made by both sexes regarding other sources of childcare (fig. 1).

Almost all women and also a majority of men had a working partner (95.5% vs 82.9%, p = 0.046), but working partners of women had a higher working time than partners of men (45.6 vs 36.4 hours per week, p = 0.017). Partners of men had significantly more often interrupted their work temporarily (48.2% vs 21.9%, p = 0.015) or permanently (19.6% vs 0%, p = 0.007) in favour of childcare, whereas only 8.9% of men themselves had temporarily interrupted their work (vs 40.6% of women, p  $<0.001$ ). Men and women with children more often worked in a medical practice rather than in a hospital environment (p  $<0.001$ ). How-

**Figure 2:** Hierarchical position according to family status (with/without children) overall (green) and for men (blue) and women (red). AA = Assistenzarzt/-ärztin (resident), OA = Oberarzt/-ärztin (attending), LA = Leitender Arzt/Ärztin (senior attending), CA = Chefarzt/-ärztin (chief of department). Values are given as proportions of the full female/male sample.



ever, there was no statistically significant difference in the hierarchical position of men and women with or without children (fig. 2).

#### Income and career development

In the univariate analysis, the monthly income of women was significantly lower than that of men ( $p < 0.001$ ). However, after adjusting for age, position and contractually agreed working time, there was no income difference for physicians working in hospitals. For private practitioners, female sex remained an independent predictor for a lower income class (table 2).

Women reported having less authority to issue instructions to other employees ( $p = 0.035$ ) and there remained a statistical trend after adjusting for position and age ( $p = 0.071$ ). Asked about how their own expectations on their current job have been fulfilled, women were overall less satisfied (table 3). Especially the possibility for career development (53.7% vs 86.6%,  $p < 0.001$ ), the promotion of professional training (66.7% vs 87.3%,  $p = 0.009$ ) as well as opportunities for research activity (55.3% vs 80.0%,  $p = 0.014$ ) were stated by women to be less fulfilled. However, women and men agreed on the expectation on the job which is least fulfilled, namely a family-friendly working environment (52.2% and 57.7%, respectively).

**Table 1:**  
Baseline, family and work characteristics.

	Overall (n = 140)	Women (n = 61)	Men (n = 79)	p-value
<b>Age</b>	45.0 (36.8–53.0)	40.0 (36.0–52.0)	47.0 (38.5–56.0)	0.019
<b>Nationality</b>				0.001
Swiss	76 (54.3%)	24 (39.3%)	52 (65.8%)	
German	34 (24.3%)	18 (29.5%)	16 (20.3%)	
Italian	7 (5.0%)	5 (8.2%)	2 (2.5%)	
Austrian	6 (4.3%)	1 (1.6%)	5 (6.3%)	
Other	17 (12.1%)	13 (21.3%)	4 (5.1%)	
<b>Marital status</b>				0.024
Married	91 (65%)	34 (55.7%)	57 (72.2%)	
Partnership	24 (17.1%)	10 (16.4%)	14 (17.7%)	
Single	25 (17.9%)	17 (27.9%)	8 (10.1%)	
<b>Children</b>	88 (62.9%)	32 (52.5%)	56 (70.9%)	0.034
<b>Number of children, overall</b>		1.0 (0–2.0)	2.0 (0–3.0)	<0.001
<b>Number of children, without childless</b>	2.0 (1.5–3.0)	2.0 (1.0–2.0)	2.0 (2.0–3.0)	0.002
<b>Current position</b>				0.006
Resident (Assistenzarzt/-ärztin)	36 (25.7%)	19 (31.1%)	17 (21.5%)	
Attending (Oberarzt/-ärztin)	32 (22.9%)	21 (34.4%)	11 (13.9%)	
Senior attending (Leitender Arzt/Ärztin)	20 (14.3%)	5 (8.2%)	15 (19.0%)	
Chief of department (Chefarzt/-ärztin)	6 (4.3%)	1 (1.6%)	5 (6.3%)	
Medical practice	46 (32.9%)	15 (24.6%)	31 (39.2%)	

Values are given as median with interquartile range (IQR) or as counts with proportions.

### Discrimination

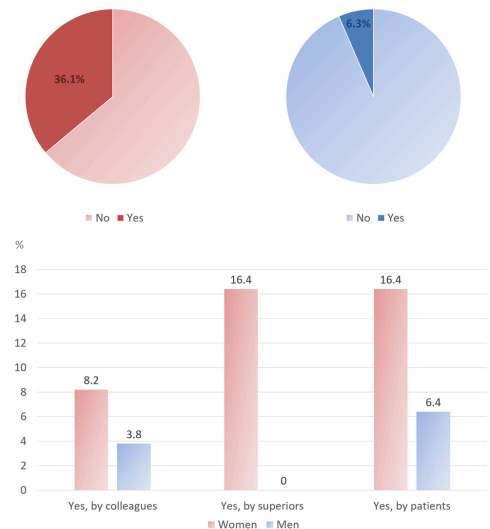
One third of women reported having experienced sexual harassment at their workplace (36.1% vs 6.3% of men,  $p < 0.001$ ), mainly from superiors (16.4%) or patients (16.4%) (fig. 3). The majority of women (78.7%) believed that their gender has had a negative impact on their previous professional career development. If men indicated an influence of gender (27.8%) on their career development, it was almost always stated to be positive, mainly based on better support from superiors received as a man in a male-dominated work environment.

### Academic medicine

Concerning an academic career, men and women equally often held a degree as medical doctor (*Dr. med.*) (93.7% vs 90.2%,  $p = 0.533$ ) and had already completed or were planning to complete a *habilitation* (25.3% vs 13.6%,  $p = 0.138$ , and 12.7% vs 18.6%  $p = 0.466$ , respectively). As reason for not pursuing a *habilitation*, men more often stated that it was too much effort for the result (48.8% vs 12.9%,  $p = 0.003$ ), whereas women more often stated lack of support or protected research time being the main reason for not pursuing a further academic career (32.3% vs 9.8%,  $p = 0.037$ ) (table 4). Also, women indicated that they were less satisfied with the opportunity for research activity ( $p = 0.014$ ) and their involvement in ongoing research projects at their institution ( $p = 0.034$ ). When asked about their designated field of work in the future, 40.7% stated this to

be in a university hospital (men 40.0%, women 44.3%), 32.9% in a non-university hospital (men 34.2%, women 31.1%), 42.1% in a medical practice (men 48.1%, women 34.4%), 8.6% in research (men 8.9%, women 8.2%), 1.4%

**Figure 3:** Experience of sexual harassment at the work place by women (red) and (men) and if so, by whom. Values are given as proportions of the full female/male sample. Multiple choices possible.



**Table 2:**

Predictors of a higher income class for physicians working in hospital and in free practice (uni- and multivariate ordinal logistic regression models).

	Univariate analysis		Multivariate analysis	
	OR (95% CI)	p-value	OR (95% CI)	p-value
<b>Physicians working in hospitals</b>				
Male sex	4.55 (2.40–8.64)	<0.001	1.19 (0.47–3.02)	0.706
Higher hierarchical position	20.45 (8.73–47.91)	<0.001	13.45 (4.17–43.41)	<0.001
Working time	1.07 (1.04–1.11)	<0.001	1.11 (1.05–1.17)	<0.001
Age	1.13 (1.09–1.17)	<0.001	1.10 (0.99–1.22)	0.091
<b>Practitioners</b>				
Male sex	4.55 (2.40–8.64)	<0.001	2.47 (1.23–4.98)	0.011
Working time	1.07 (1.04–1.11)	<0.001	1.08 (1.04–1.11)	<0.001
Age	1.13 (1.09–1.17)	<0.001	1.13 (1.09–1.17)	<0.001

CI = confidence interval; OR = odds ratio

**Table 3:**

Extent of which main expectations in the current working position have been fulfilled totally/mainly.

	Overall	Women	Men	p-value
Qualified training in health care	121 (93.1%)	50 (87.7%)	71 (97.3%)	0.042
Opportunity for research activity	70 (68.6%)	26 (55.3%)	44 (80.0%)	0.014
Structured training / adherence to training times	94 (80.3%)	37 (72.5%)	57 (86.4%)	0.103
Possibility for career development / promotion prospects	87 (71.9%)	29 (53.7%)	58 (86.6%)	<0.001
Promotion of professional training	100 (78.1%)	38 (66.7%)	62 (87.3%)	0.009
Good income	101 (72.1%)	38 (70.4%)	63 (84.0%)	0.102
Enjoying work	124 (88.6%)	53 (91.4%)	71 (91.0%)	1.0
Good working atmosphere	124 (88.6%)	51 (86.4%)	73 (93.6%)	0.263
Family-friendly conditions	65 (46.4%)	24 (52.2%)	41 (57.7%)	0.688
Creative leeway	94 (67.1%)	35 (63.6%)	59 (77.6%)	0.119
Well-planned working hours and planning security	85 (60.7%)	37 (66.0%)	51 (67.1%)	1.0

Values are given as count with proportion

as a doctor outside of healthcare in the public sector (e.g., cantonal medical service, Federal Office of Public Health (BAG), non-university research) (men 0%, women 3.3%), and none outside of healthcare in the free economy. Main reasons indicated for not wanting to work in a university hospital for both sexes were the competitive work environment (55.4%) and the lack of compatibility of work and family (44.6%). Women further stated gender-specific disadvantages to be a hindrance to work in a university hospital (50.0% vs 2.0%,  $p < 0.001$ ) (table 4).

Among possible offers and measures to increase the attractiveness of leadership positions in university medicine, the most frequent answers in men and women were to increase the compatibility of work and family (men 74.7% and women 93.4%,  $p = 0.003$ ), measures for flexible working time (e.g., working time accounts) (men 70.9% and women 86.9%,  $p = n.s.$ ) and offers for the sharing of management tasks ("Top Sharing") (men 68.4% and women 86.9%,  $p = 0.002$ ). A majority of women also stated more gender balance in leading positions to be an important measure (men 68.4% vs women 86.9%,  $p < 0.001$ ) (fig. 4).

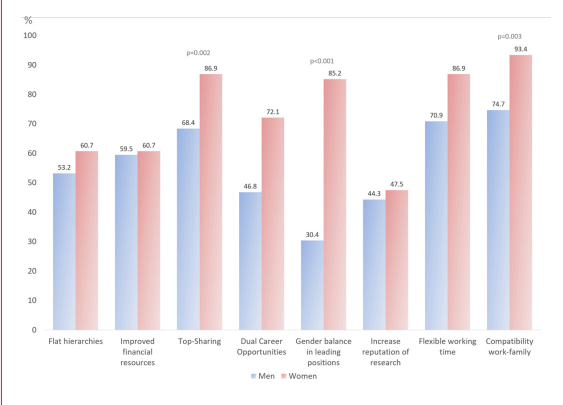
### Interventional career

Among the 140 study participants, 33 (23.6%) stated that they were working in interventional cardiology (coronary, structural or electrophysiology), of whom 10 were female (16.3% of all women) and 23 were male (29.1% of all men,  $p = n.s.$ ). Additionally, seven women (11.5%) and eight men (10.1%) were currently in interventional training or planned to be. Women who were not pursuing an interventional career ( $n = 44$ ) were asked about the reasons why. The most frequent reasons given were gender-specific disadvantages (40.9%), a too competitive work environment (31.8%), the lack of opportunity (31.8%) and other fields of interest (31.8%). The least stated reasons were too high responsibility (2.3%), radiation exposure (22.7%), family/private reasons (childcare, partner) (25.0%) and a

too high workload (on-call duties, long working hours) (25.0%) (fig. 5). On the other hand, men were asked why they thought women are not choosing an interventional career. The most often assumed reasons were family/private reasons (childcare, partner) (73.4%), a too high workload (50.6%) and radiation exposure (44.3%).

In conclusion, study participants were given the possibility of an open feedback on what their wishes for a better career advancement in cardiology are and what would have to be improved. Half of the participants made use of this opportunity ( $n = 75$ ). Among both sexes, the most frequent answers given were directed towards better mentoring systems, advanced compatibility of work and family, more flexible working time models and part-time offers, more transparent and better structured training curricula as well as support of research interests.

**Figure 4:** Measures for improving attractiveness of leadership positions in academic medicine by women (red) and men (blue). Values are given as proportions of the full female/male sample.



**Table 4:**  
Academic career.

	Overall	Women	Men	p-value
<b>Doctorate (Dissertation)</b>	129 (92.1%)	55 (90.2%)	74 (93.7%)	0.533
<b>Habilitation</b>				0.282
Yes	28 (20.3%)	8 (13.6%)	20 (25.3%)	0.138
Planned	21 (15.2%)	11 (18.6%)	10 (12.7%)	0.466
Undecided	17 (12.3%)	9 (15.3%)	8 (10.1%)	0.519
No	72 (52.2%)	31 (52.5%)	41 (51.9%)	1.0
<b>Reason/s not to habilitate</b>				
Too much for effort for the result	24 (33.3%)	4 (12.9%)	20 (48.8%)	0.003
Not relevant for my plans	33 (45.8%)	10 (32.3%)	23 (56.1%)	0.077
No exemption or support	14 (19.4%)	10 (32.3%)	4 (9.8%)	0.037
No interest	21 (29.2%)	12 (38.7%)	9 (22.0%)	0.198
<b>Reason/s not to pursue a career at a university hospital</b>				
High workload	24 (28.9%)	9 (26.5%)	15 (30.6%)	0.870
Insecure career development	22 (26.5%)	11 (32.4%)	11 (22.4%)	0.452
Gender-specific disadvantages	18 (21.7%)	17 (50.0%)	1 (2.0%)	<0.001
Too competitive work environment	46 (55.4%)	20 (58.8%)	26 (53.1%)	0.768
Low income compared to effort	12 (14.5%)	5 (14.7%)	7 (14.3%)	1.0
No interest in research/teaching	15 (18.1%)	6 (17.6%)	9 (18.4%)	1.0
High burden of administration	25 (30.1%)	8 (23.5%)	17 (34.7%)	0.397
No compatibility work-family	37 (44.6%)	18 (52.9%)	19 (38.8%)	0.293

Multiple choices possible. Values are given as counts with proportions.

## Discussion

With the steadily increasing burden of cardiovascular disease, the training of young professionals in the field of cardiology becomes more and more important, and one has to ask whether a healthcare system can afford to lose a considerable proportion of skilled doctors along the way, in the so-called “leaky pipeline”. The good news is that, in comparison to other countries where the number of female cardiologists has even decreased over past years, the proportion of women holding a specialty title in cardiology in Switzerland rose from 14.1% to 21.0% in the time period of 2012 to 2019 [2]. Nevertheless, the results of the nationwide study reported here show that there are still considerable disparities between men and women working in cardiology.

### Personal life and family

Female cardiologists are less likely to be married or have children than their male peers. If having children, they more often provide childcare themselves and are less likely to have spouses providing childcare or taking a leave from work to take over childcare temporarily or permanently. These results correspond to previously reported results from a similar survey among US-American cardiologists in 2008 [10]. A survey study among the subgroup of young high-achieving physician-researchers showed that, even after adjustment for working time, women spend significantly more time (8.5 more hours per week) on parenting and domestic activities [11], which emphasises the balancing act women have to manage when pursuing a career in academic medicine without giving up family planning. Furthermore, according to our results, the lack of compatibility of work and family seems to be an issue for both sexes, hindering them from pursuing a career at a university hospital, and the most important factor that would have to be improved to increase the attractiveness of leadership positions in academic medicine.

### Income and career development

Another well-known and previously described phenomenon is partially reflected in our results, the so-called gender pay gap. After adjusting for age, position and contractually agreed working time, we found a significant wage

difference for men and women working in medical practice. However, we could not find this statistically significant difference for cardiologists employed in a hospital. Public hospitals have guideline-based wage determination, so there might not be any sex-based income differences. Additionally, bonus payments can make a substantial contribution to the yearly income and might have sex-based differences, but they were neither asked nor specifically excluded in the survey. The limited sample size might be a further reason why we could not find a significant wage difference between sexes. A recent report from the Swiss Federal Office for Statistics showed a wage difference in Switzerland for men and women across the public and private sector of 11.5% overall, increasing to 18.6% in higher positions with management responsibility [12]. An analysis among US-American cardiologists revealed similar results with a sex-based difference in income around 17% [13].

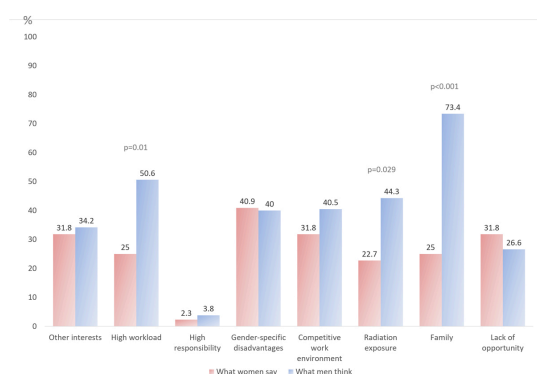
### Discrimination

Besides financial compensation, gender-based discrimination has many faces, as our survey results show. Women felt significantly less promoted in their professional training, career development and research interests. A majority of women believed that their gender has had a negative impact on their professional career development, for example as a result of less support from male superiors who prefer male colleagues at the same level of training. This impression was shared by a number of men, who stated their gender to have had a positive impact on their career development. This kind of discrimination due to gender remains high among women and has barely changed over the last 20 years [10]. Another aspect is the relatively high number of women (36.1%) who reported having experienced sexual harassment at their working place. Although no further details were assessed in our survey and the definition of sexual harassment might be up to individual interpretation (as it can be understood in different aspects such as unwanted sexual attention, sexual assault or duress or gender harassment), these results align with several reports indicating a high incidence of sexual harassment throughout the medical profession, starting in medical school and residency [14, 15]. It has been shown that sexual harassment in the workplace correlates with burn-out, which can have negative implications both for physicians and for patient outcome [16, 17]. Since reporting of sexual harassment, especially by superiors as stated by 17% of our study participants, can be associated with fear of consequences on personal career development as a form of covert retaliation, there is an imperative necessity for neutral points of contact and support systems.

### Academic medicine

We found that both sexes equally hold a degree as medical doctor and have completed a *habilitation*, and that there is a high proportion of women aiming at further academic development. The main reason for women not to pursue a *habilitation* is a perceived lack of support and, additionally, feeling that they are less included in ongoing research activities at their institution. The positive impact of mentoring in academic medicine has been reported repeatedly [18, 19], and university programmes where young female physician-researchers find a structured mentoring system

**Figure 5:** Reasons for women not to choose an interventional career (red) and assumption of men why women do not choose an interventional career (blue). Values are given as proportion of the sample of women not pursuing an interventional career and the full male sample, respectively.



might help to overcome some of the hindrances [20–22]. For both sexes, mentoring systems were stated to be an important measure to improve career advancement in cardiology, whereas for women, the aspect of female role models and more gender balance in leading positions was also underlined (fig. 4).

### Interventional career

In interventional cardiology, gender disparities worldwide are still immense [4, 6, 7, 23], but were not reflected in our study. The large number of women working in an interventional field among our study participants might be due to a selection bias by distribution of the questionnaire via the network “Women in Cardiology / IG-WIC”, which has a relatively high proportion of women in an academic and/or interventional working environment. Noteworthy is the discrepancy in stated reasons for not choosing an interventional career by the women on one side, and the reasons presumed by men on the other side. The most stated reasons assumed by men were the reasons least stated by women, namely family/private matters, the high workload and radiation exposure. The aspect of radiation exposure might be important during pregnancy and can certainly be challenging owing to the overlap of interventional training and childbearing age, but does not seem to be a main hindrance for women [24]. Regarding the high workload, a study in the US revealed that despite only 3% of all coronary procedures are performed by the 4% female operators in interventional cardiology, women treated more patients with ST-segment elevation myocardial infarction (STEMI) and cardiogenic shock, and the clinical outcome was not different from that of men in terms of in-hospital mortality [5]. Position papers of the European and US-American women’s committees address and advise women on this and other female-specific aspects of an interventional career [25, 26]. As reported previously in other studies, the main obstacles keeping women from an interventional career are gender bias and discrimination, the competitive male-dominated work environment, and lack of opportunity and support. But especially with regards to the reported underdiagnosis and under-treatment of female patients presenting with cardiovascular disease such as acute coronary syndromes [27, 28] or atrial fibrillation [29], an increase in female operators could potentially lead to better patient care [30]. Additionally, a higher proportion of women in academic cardiology could be one possible way to raise awareness and address the significant underrepresentation of female patients in cardiovascular clinical trials [31, 32].

### Similarities and differences to German results

The German survey [33] was conducted similarly to ours, but only addressed medical doctors aged 25 to 45, so there are considerable differences in the sociodemographic baseline characteristics, and comparison of results may be limited. One major finding of the German survey is the difference in monthly gross income between men and women in the position of assistant doctor ( $p = 0.03$ ) or consultant ( $p = 0.004$ ), which we did not observe for our study participants. However, their analysis was not adjusted for age. With regard to hindrances to an academic career and possible measures to improve job attractiveness in academic medicine, the results of the two studies are well aligned. Furthermore, the proportion of women reporting to have

experienced sexual harassment in the workplace is comparable (32.1%).

### Limitations

Although of national scope, the study has its limitations. The relatively low number of study participants (16% of registered cardiologists in Switzerland) may not be representative enough, and, therefore, interpretation of results is limited (sampling bias). Certain sub-analyses may lack statistical power. Moreover, inherent limitations of a voluntary survey, such as a non-response bias, are present. The low participation rate of young physicians in cardiology was an unfortunate limitation, especially since the survey addressed career development, which mainly affects the young generation. Why the opportunity for expression of opinion and participation is used so little, as can also be observed in the annual feedback of the Swiss Medical Association (FMH), remains unclear. Other limitations are the self-reported character of the data, possible confounders not included in the analysis, and the selection bias from not offering the survey in French or Italian, which might have hindered participation of cardiologists from the Italian- and French-speaking parts of Switzerland.

### Conclusion

Our study showed that there is high overall satisfaction among Swiss cardiologists and cardiologists in training with high-quality training in health care, a good working atmosphere and the experience of joy in work. However, the compatibility of work and family, as well as training structure including mentoring systems and curricula, could be improved. Moreover, several gender-specific aspects, such as discrimination and lack of support due to gender, deserve to be addressed to eventually reach a higher gender balance in the field of cardiology.

### Disclosure statement

Prof. Dr Tanner has received educational grants from Biosense Webster, as well as a travel grant from Abbott, outside the submitted work. PD Dr. Haerberlin has received travel grants from Medtronic and research funding from Novartis, outside the submitted work. He was a consultant for Cairdac, co-founder and head of Act-Inno. The other authors have no potential conflict of interest to declare.

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