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ORIGINAL ARTICLE
Miscellaneous

Moving toward gender equity in the cardiology and cardiovascular research workforce in Germany: a report from the German Cardiac Society

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Aims

Although the share of women in cardiology in Germany is growing steadily, this does not translate into leadership positions. Medical societies play a crucial role in shaping the national and international medical and scientific environment. The German Cardiac Society (DGK) aims to serve the public discourse on gender-equity by systematic analysis of data on gender representation within the society and in Germany.

Methods and results

We present gender disaggregated data collection of members, official organs, working groups, scientific meetings, as well as awards of the DGK based on anonymized exports from the DGK office as well as on data gathered from the DGK web page. From 2000 to 2020, the overall number of DGK members as well as the share of women increased (12.5% to 25.3%). In 2021, the share of women ranged from 40% to 50% in earlier career stages but was substantially lower at senior levels (23.9% of consulting/attending physicians, 7.1% of physicians-in-chief, 3.4% of directors). The share of women serving in DGK working groups had gained overall proportionality, but nuclei and speaker positions were largely held by men. Boards and project groups were predominantly represented by men as well. At the DGK-led scientific meetings, women contributed more often in junior relative to (invited) senior roles.

Conclusion

Increasing numbers of women in cardiology and in the DGK over the past 20 years did not translate into the respective increase in representation of women in leadership positions. There is an urgent need to identify and, more importantly,

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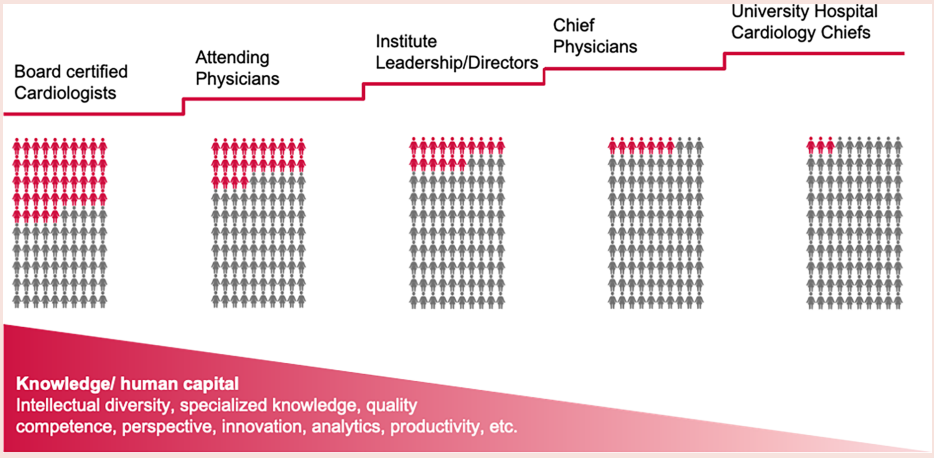
to overcome barriers towards gender equity. Transparent presentation of society-related data is the first step for future targeted actions in this regard.

Graphical Abstract



'Leaky Pipeline' phenomenon for women members of the German Cardiac Society. With every career stage, as well as positions of influence in the society (depicted as steps above, red line), the share of women reduces (depicted as percent). Measures to move towards gender equity are necessary to avoid a knowledge and competence drain in the field of cardiology and cardiovascular research of women presented with barriers to move forward in their career.

Keywords Academic medicine • Cardiology workforce • Equity • Gender

Introduction

Gender equity has been acknowledged as one of the most important factors for health and economic development of societies.[1] Further, the decrease in fertility and a rapidly ageing population in European and North American countries highlight the need to fully mobilize the human capital of half the population.[2]

Gender equity in science and medicine has the potential to contribute to major health, social, and economic improvements. There is evidence that gender-diverse workplaces have higher productivity, innovation, and employee satisfaction and retention.[3,4] For example, diverse teams publish relatively more articles and receive a higher number of citations, also justified by high-quality science.[5–7] Gender-diverse teams benefit from intellectual diversity, a wide range of analytical skills and different perspectives.[8] Gender diversity in medicine might also translate into improved outcomes, even affecting mortality.[9] Meeting a patient's preference for a doctor of a specific gender might be essential for equity in access to care in certain situations.[10] Also, a greater number of women in research teams contributes to a higher number of female study participants in clinical cardiovascular research, which is particularly important for the optimal treatment of female patients.[11]

However, although awareness for the benefits of gender equity is on the rise and progress has been made, women only hold a small part of leadership positions and a significant gender gap remains.[1] Structural, organizational, institutional, cultural, and societal barriers to equity and participation are considered to have an important impact on the chronic underrepresentation of women in science and medicine.[12,13] Thus, a major responsibility of effecting change in science and medicine lies in the hands of leaders, influencers, and policy makers and there is an important role for scientific and medical societies to demonstrate leadership in advocating for gender equity.[12,13] Professional societies play a crucial role in the education and training of doctors and researchers.[13] Furthermore, they offer opportunities to network and increase national and international visibility, e.g. by presenting current research results and expert lectures during conferences. The German Cardiac Society (DGK) aims to create an environment that enables its members to strive, and to sustain and promote the skills and expertise of clinicians and scientists in cardiovascular medicine irrespective of gender. Therefore, a project group was implemented to support gender equity and to create equal opportunities within the DGK. The main goals are to uphold an evidence-based dialogue to identify causes for gender inequity in clinical cardiology and cardiovascular research in Germany, to develop measures to counteract them, to evaluate the success of these measures, respectively, and to set the course for sustainable gender equity.

The present manuscript is considered a first step towards these goals by presenting the current status of gender representation in the DGK that will pave the way for future initiatives as well as of the successes or failures of measures.

Methods

We analyzed anonymized data exports collected from DGK members and DGK-led scientific meetings provided by the DGK office as well as data gathered from the DGK website and websites of respective departments of the members and associated members of the Association of University Hospitals in Germany for indicated time ranges. Further data were extracted from official sources.[14,15] We report descriptive data, which was plotted, and graphs were generated using SPSS Statistics 26 (IBM) and Graph Pad Prism Version 9. Data are presented as *n* (%), mean (SD), or median (Q1; Q3), as indicated. Approval from an Ethical Committee or Institutional Review Board was not required as no human or animal subjects were involved in research and outcomes, data were obtained anonymized. No patients were involved in conducting the current analyses.

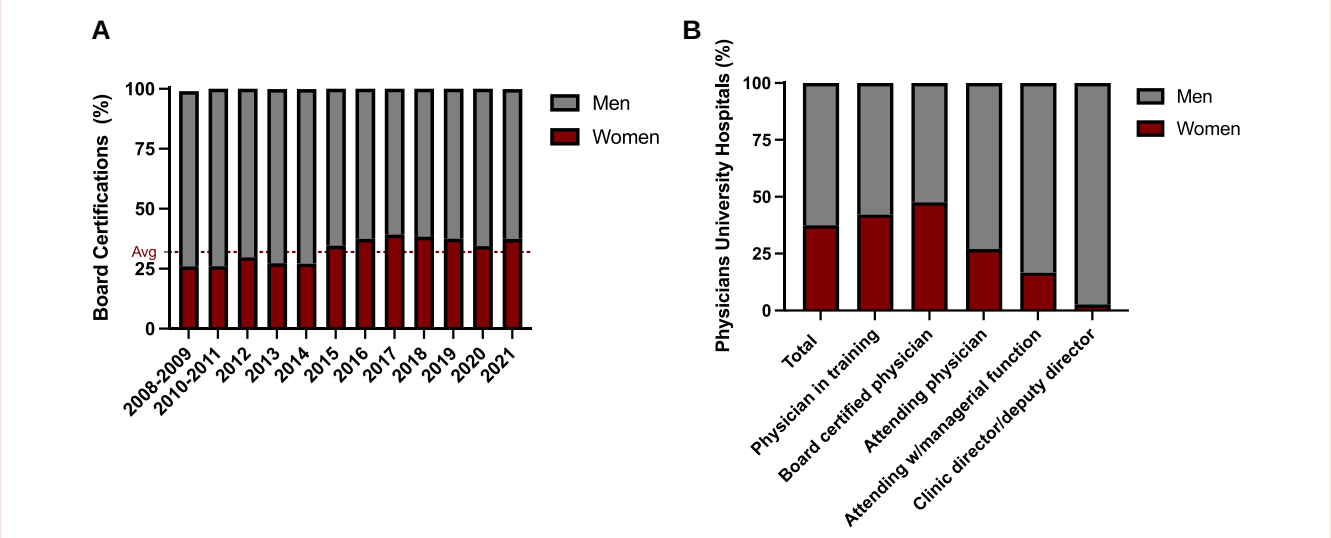


Figure 1 Specialization in internal medicine and cardiology and employed physicians in cardiology departments of university hospitals in Germany. (*A*) Board certification for internal medicine and cardiology in Germany 2008–2021 according to the federal statistics of medical boards by gender. Dotted red line represents average share of women. (*B*) Gender distribution (women and men) of university hospital physician staff in Germany analyzed based on websites of respective departments of the members and associated members of the Association of University Hospitals in Germany, analysis of available data May/October 2021.

Results

Women in cardiology and cardiovascular research in Germany

On average, women earned 32% of all German board certifications for *internal medicine and cardiology* over the last 14 years (*Figure 1A*).[14] At German university hospitals, 2.6% of leadership positions (department chairs and vice/deputy directors) are held by women (*Figure 1B*), and currently none of the university hospital departments of cardiology ($n = 38$) is chaired by a woman. In non-university internal medicine hospitals with a focus on cardiology, eight out of 281 physicians-in chief are women (3.5%).[15]

Women in the national society

The total number of DGK members increased from 4235 to 11 283 (+62.5%) between 2000 and 2020. The proportion of women increased from 12.5% to 25.3% during that time (*Figure 2A*). According to DGK membership data, the share of women in 2021 was relatively high among students (38.4%), physicians in training (38.7%), and board-certified physicians (45.1%), as well as staff members/employees (47.4%) and scientific employees (45.8%) (*Table 1*, *Figure 2B*) but lower in attending/consulting physicians (23.9%), physicians-in-chief (7.1%), and clinic directors (including vice directors/deputy directors; 3.4%). A total of 15.8% of institute director positions are currently filled by women and 17.2% are practicing in a practice (practitioners) (*Table 1*, *Figure 2B*). We did not find a relevant age difference between men and women DGK members neither according to their career stages nor in the age distribution over time (see Supplementary material online, *Tables S1* and *S2*). In summary, we found a lower proportion of women in higher career stages.[16]

The DGK is headed by an executive board consisting of the current president, past president, and president-elect. In addition to the three presidential positions, the broader board includes the treasurer, the speakers for the commission for clinical cardiovascular medicine and experimental cardiovascular medicine, respectively, the scientific meeting program chair, as well as representatives for members working at university/academic hospitals, basic science institutions, non-academic hospitals, and practitioners. Members of the board are elected by the General Assembly upon nomination through a separate dedicated committee. As of 2022, no woman has been elected member of the executive board (*Figure 3A*). However, an increase in the proportion of women as members of the board has been recorded in recent years (*Figure 3B*), whereas the share of women on the nomination committee still stagnates (*Figure 3C*). An inert increase up to a proportionate share of women in the program committee could be observed in recent years (*Figure 3D*). Whereas the Commission for Clinical Cardiovascular Medicine is predominantly represented by men, the proportion of women in the Commission for Experimental Cardiovascular Medicine is currently higher (*Figure 3E, F*).

The DGK leadership further appoints committees to represent the interests of cardiovascular medicine in cooperation with health policy institutions, e.g. committee for quality control or committee for health services research. Aside from a relatively recently founded committee for *eCardiology*, these committees are exclusively staffed with men.

In addition, project groups appointed by and directly reporting to the Board focus on specific and important topics regarding the present and future of the society. Currently, there are five project groups: prevention, public relations, history of cardiology, ethics in cardiology, and women and family in cardiology. Except for the latter, the project groups are predominantly represented by men.

The society also runs 34 working groups dedicated to specific topics in cardiology that are further clustered into three groups (Acute and Intensive Care, Imaging, Basic Sciences). Every member of the society can become a member of these working groups. Nuclei and chairs of the groups are nominated and elected by their respective members. The share of women members in the working groups varies largely: for example, the working group for interventional cardiology comprises 15% women, whereas the working group for gender medicine in cardiology consists of more than 80% women

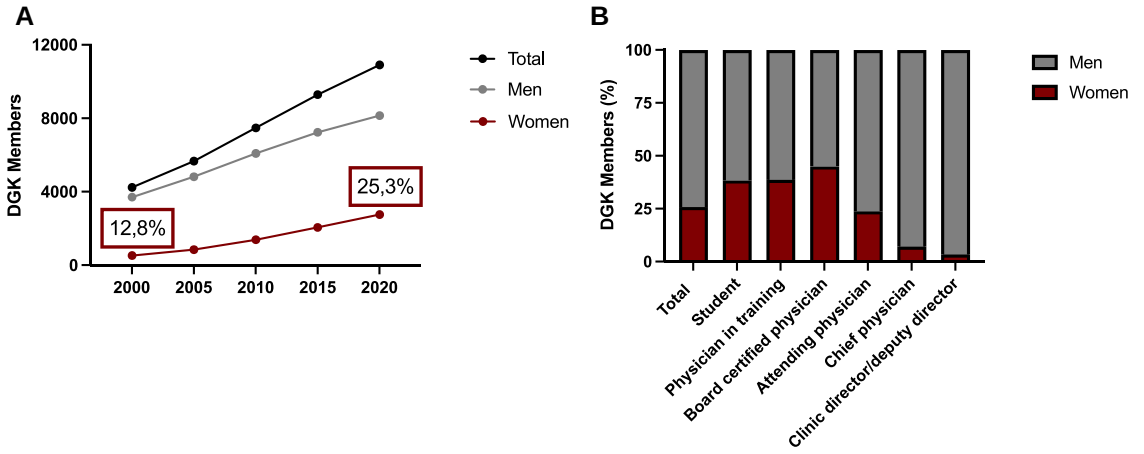


Figure 2 Members of the German Cardiac Society (DGK). (*A*) Members of the DGK between 2000 and 2020, total and by share of men and women. (*B*) Gender (men and women) distribution of DGK members by career stage in 2020, source: DGK office.

Table 1 Members of the German Cardiac Society (DGK)

DGK members	Total ($n = 11\,283$)	Men ($n = 8376$)	Women ($n = 2907$)
Age	49.6	51.4	44.3
Student (%)	1.1	61.6	38.4
Staff/employee (%)	7.0	52.6	47.4
Medical scientist (%)	2.9	54.2	45.8
Physician in training (%)	15.8	61.2	38.7
Board-certified physician (%)	6.2	54.9	45.1
Attending/consulting physician (%)	26.7	76.1	23.9
Department leader (%)	2.0	83.7	16.3
Chief physician (%)	6.3	92.9	7.1
Clinic director (%)	1.6	96.6	3.4
Institute director (%)	0.7	84.1	15.9
Practicioner (%)	17.9	82.8	17.2
Retiree (%)	10.4	89.8	10.2
Other (not catagorized) (%)	1.3	77.2	22.8

Members of the DGK by employment and career status in 2021, in % men and women, source: DGK office.

(*Figure 4A*). Working group nuclei usually consist of 3–10 members that are primarily involved in the working group activities, as well as a chair and a co-chair (speakers), who represent the working group and are heading the nucleus. The average share of women in nuclei is 21% over all 34 groups, with eight nuclei exclusively consisting of men (*Figure 4B*). The average share of women speakers is 29% (*Figure 4C*), however, 21 (62%) working groups are chaired exclusively by men, 10 are chaired by mixed leadership pairs (29%), and three are chaired by women only (9%).

There are three sections in the DGK: (i) serving to nursing and assistant staff, (ii) the *Young DGK* dedicated to cardiologists and cardiovascular researchers in training, and (iii) the German Chapter of the American College of Cardiology (ACC). In the section for nursing and assistant staff 78% are women, the share of women in the Young DGK is 34% and the share of women in the German Chapter of the ACC is 7%.

For the years 2019–2022, we aggregated meeting attendance and different roles of attendees by gender in greater detail (*Figure 5*). While 2019 was an in-person meeting, in 2020, the originally as an in-person meeting planned sessions were converted into an online conference, and in 2021, the meeting was held as a full online conference. In 2022, the meeting was carried out in a hybrid model. The overall proportion of women as attendees in 2019–2022 ranged from 34% to 37%. Among invited speakers for the main program, 17.5% were women (on average) (*Figure 5A*), while for invited industry-sponsored symposia, the share of women was on average 10% (*Figure 5B*). The share of women invited for oral presentation during special sessions curated by the respective chair of the conference varied, with an almost 50% share in 2021 (when a woman chaired the conference) (*Figure 5C*). A steady increase of the share of women can be reported for session chairs and moderators overall. Whereas 13% of session chairs/moderators were women in 2018 and 2019 (+3% since 2014),[17] this number increased to 17% in 2021 and 23% in 2022. In 2020, when the conference had to be converted into a smaller online format, only 11% of chairs/moderators were women.

Oral abstract presentations remained stable compared to previous years, with an average share of women as presenters of 26% (*Figure 5E*), while the share of women presenting abstracts in a poster format declined by 3% compared to the years prior (in 2020 there were no poster sessions held) (*Figure 5F*).[17]

Forty-seven research prizes were awarded at the DGK Annual Conference 2021. For 10 awards requiring an application, 74 (76%) men and 23 (24%) women applied, the award winners were 8 (80%) men and 2 (20%) women. Of the 25 scientific awards endowed with <3000€ without application, 11 (44%) were given to women, while of the 12 awards endowed with >3000€ and requiring a nomination, only one (8%) was given to a woman (*Figure 6*).

Discussion

For over two decades, more than 50% of medical students in Germany are women and the share of women in cardiology is growing steadily.[18] Also, women earned on average 32% of the German board

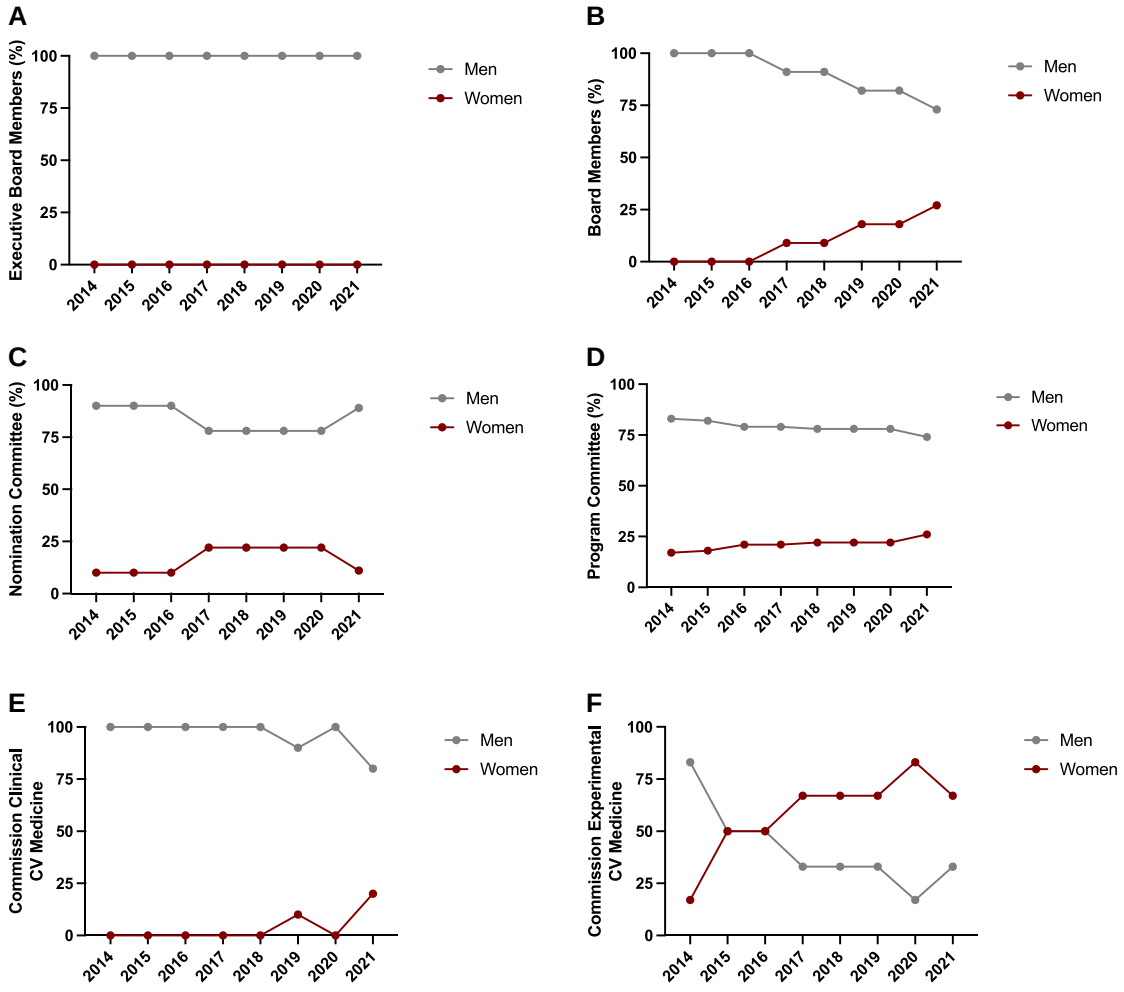


Figure 3 Leadership of the German Cardiac Society (DGK) 2014–2021. (*A*) Executive board members, (*B*) board members, (*C*) nomination committee, (*D*) program committee, (*E*) commission for clinical cardiovascular (CV) medicine, (*F*) commission for experimental CV medicine; in % men and women, source: DGK office.

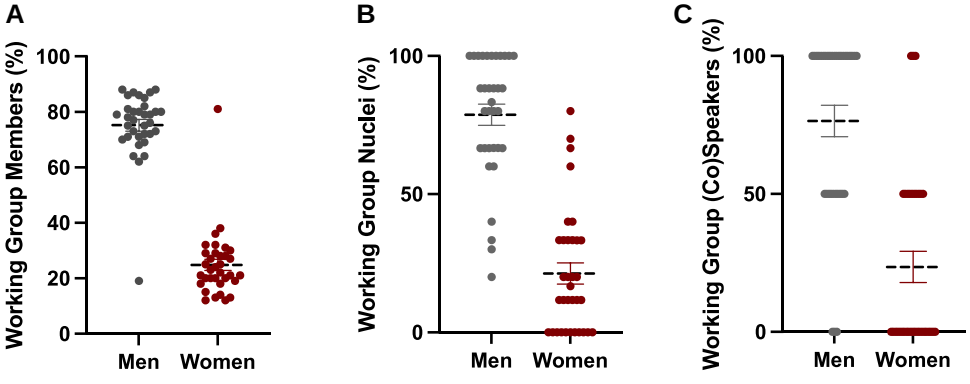


Figure 4 Gender distribution within working groups of the German Cardiac Society (DGK). (*A*) Share of women and men in each of the 34 working groups (in %), (*B*) share of women and men in the 34 working group nuclei (in %), and (*C*) share of women and men as speakers of the working groups (each group has two speakers, in %) (dotted lines = 25th/75th quartile, dashed lines = median, (*B*) and (*C*) truncated).

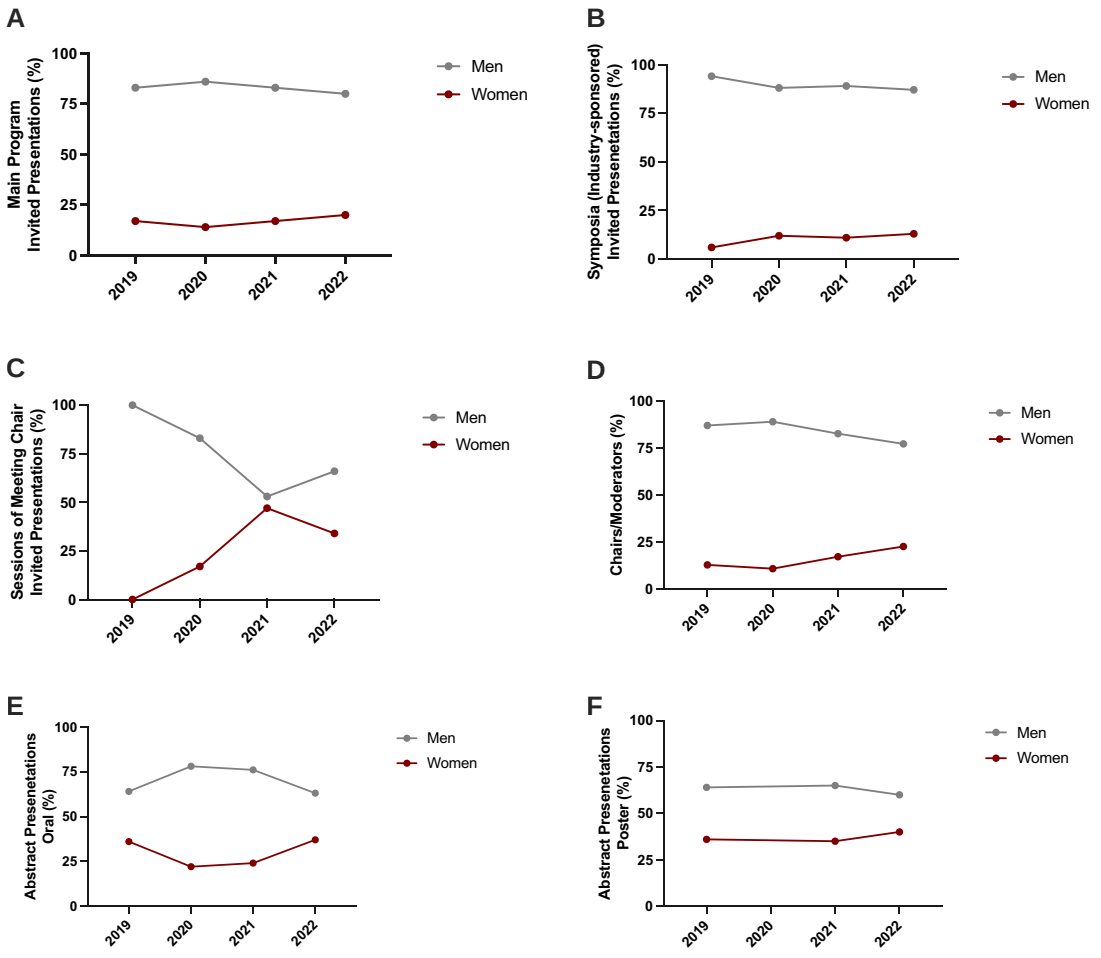


Figure 5 Gender distribution for roles at the annual meeting (conference) of the German Cardiac Society (DGK). Share of women and men (in %) (*A*) among invited speakers for the main program, (*B*) among invited speakers for industry-sponsored symposia, (*C*) among invited speakers of sessions curated by the respective year's meeting chair/president, (*D*) as session moderators/chairs, (*E*) among oral abstract presenters, and (*F*) among poster presenters. *no poster presentations were held in 2020.

certifications for *internal medicine and cardiology* over the last 14 years. However, even though women are much more present in medicine and cardiology, women remain underrepresented in leadership positions.[17] The overall share of women in cardiology leadership positions throughout Europe is already relatively low, but Germany is even at the bottom end.[19]

Nationally and internationally, awareness of gender inequity and the need to install measures that ensure equity and inclusion rose. Data reported from other cardiovascular societies and thorough analyses of trends support changes in leadership composition.[13,20] With this report, we offer insight into gender distribution among members of a large Cardiac Society in Europe as an important step towards gender equity in the cardiology and cardiovascular research workforce in Germany. Programs to retain women in academic medicine and to increase the share of women in leadership positions are well underway in Germany on many levels (i.e. government funding to support specific programs, adjusted regulations by funding agencies, quotas in university search committees, funding dedicated to women applicants, mentoring/coaching programs, etc.). However, the transition into leadership positions remains relatively slow for women, particularly in the field of cardiology and cardiovascular research, as also confirmed by our data. While an age-effect, meaning that transitions would 'naturally' occur cannot be ruled out completely, our data and previous research offer no strong indication that the gender gap was neither closed adequately until now nor that it will be closed in the near future. For example, previous studies have shown that women are substantially less likely than men to be full professors, even after accounting for age (as well as experience, specialty, and measures of productivity),[21] or that women become principal investigators at a 20% lower rate than men with a significant amount of that gap stemming from women receiving less credit for their work.[16] Also, research into the gender publication gap using last authorships as a proxy for leadership positions shows that the senior author gender gap remains large and stable for the last three decades in cardiovascular research (accounting for the changing opportunities for authorship given the increase of women participating), even though women have become overall more likely to earn first authorships.[22]

Reasons are manifold and must be considered fully when measures to promote equity are prioritized. For example, substantial conscious or subconscious gender-dependent perceptions remain a major factor,[23,24] women scientists receive less monetary institutional funding than men,[25] are less likely to be in relevant author

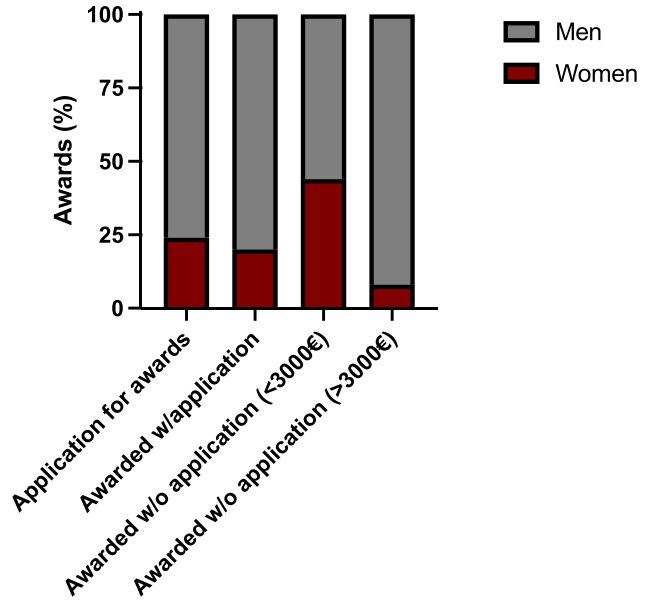


Figure 6 Gender distribution of winners of awards granted at the annual meeting of the German Cardiac Society (DGK) 2021.

positions on publications,[22] and women are less likely to be involved in scientific collaborations.[23] A gender bias has also been demonstrated in the review process for publication of research and for funding applications, which is reinforced by the underrepresentation of women as editors and reviewers.[23,26]

The gender pay gap, meaning that women earn less for the same work, reinforces gender inequity.[27,28] Interestingly, in Germany, where pay in the public health sector is based on standardized wage agreements, there is still a salary gap as large as 30% between men and women physicians.[29] In a cross-sectional study conducted through the DGK, income differences between men and women were also reported among members of the society.[30]

Our analyses revealed the classic picture of the so-called leaky pipeline, referring to the decreasing proportion of women in medicine and science with higher career stages. A promotion to attending/consulting physician often falls into the time of starting a family and for women in particular, roadblocks become overt during that time. Even though maternity leave and parental leave policies are much more generous than in other countries, unnecessary occupational bans during pregnancy can cause a delay of training and/or promotions, which can be further aggravated by lack of supporting structures for pregnancy and breast-feeding. Also, being present and available at all times often cannot be reconciled with family and domestic obligations.[31] Short-term contracts and non-transparent institutional training curricula further counter part-time working models. These uncertainties are likely to influence early and later-in-life career choices, especially for women. Childcare and household chores are still predominantly taken over by women, this is especially true for couples where both partners work in academic/medical professions.[32] Studies investigating academic productivity during parental leave show that men can increase their productivity, a phenomenon that cannot be observed in women.[33] This implies that reduced institutional obligations during parental leave give men more freedom for research. However, normalization of taking on responsibilities for the family while still aspiring to excel in their career will ultimately benefit both men and women. In a survey carried out through the DGK in 2019, both men and women demanded measures to improve work-life balance and more flexible working time models.[30]

Another problem mainly affecting women is the high incidence of sexual harassment at the workplace.[30,34] Among DGK members, significantly more women than men reported sexual harassment at work.[30] Overt gender-based discrimination is even more common,[34,35] and institutional factors such as a strict hierarchy, fixed-term contracts, and lack of mentors/role models may contribute to such cases not being properly addressed.

Moving toward gender equity

As described above, gender inequities in research and medicine have been extensively documented.[24,28,30,32,34–42] It now seems important to use this information to create a more diverse, equitable and integrative clinical and research environment. Professional medical societies are of particular importance not only for providing educational platforms, but also to increase visibility of its members by providing opportunities to present clinical and research efforts and to network at national meetings.[13,17] Within the DGK, the proportion of women as members of the national society increased from 12% to ~25% over the past 20 years, a very encouraging development which, in view of ~40% female board-certified cardiologists in Germany, however, still leaves room for improvement and the society strives for a share of at least 25% (or that of the overall membership distribution) in committees. Especially among DGK members in leadership positions at their respective institutions or within the society, the share of women remains low and essentially stagnates.

Following the first report of gender demographics of the DGK annual conferences,[17] a committee focusing on gender equity and inclusion in the society has been implemented. Our data suggest that women in key leadership roles (e.g. as annual meeting president/chair, as head of the program committee, as speakers of commissions, etc.) might have supported the retainment of women, accelerated the increase of women in relevant positions in the society, and increased their

representation in more senior roles at the annual meeting. However, there is much room for improvement.

Structures within professional medical societies are more flexible when compared to hospital structures, hence the DGK might lead the way, serve as a role model and set standards for changes in the profession. Given that the representation of women in the society declines with advanced career stages, it seems possible that flexible funding programs aimed at easing the challenges during respective transitioning times would benefit women the most and deliver an incentive to continue their career track. For example, financial support for personnel (i.e. scientific assistance, nursing staff, administrative support, household help) could fill gaps during leaves, or under certain circumstances such as the pandemic.[42,43] In addition, funding measures could aim to cover travel costs for accompanying children and caretakers to conferences/meetings.

Another pillar will be to establish educational programs specifically designed by and tailored to female members of the society. In areas where women are particularly underrepresented, such as interventional cardiology, such events could serve to not only educate but also to build important networks for women cardiologists in training and provide important support. Dedicated scientific sessions that specifically include gender-related aspects, e.g. radiation safety, in particular for those during childbearing years, suggest to be of important added value for female clinicians in training. Further, it needs to be ensured that actual barriers within societies/institutions that slow down/exclude women's success or advancement are addressed at the same time.

One of the most crucial pillars is commitment and responsibility by the society's leadership. Professional societies in particular, through their central position, have the opportunity to shape norms, values and culture in their respective field.[13,44] Many initiatives to promote women in medicine/science, as well as research on historical and current disproportions, are carried out by the group most affected.[44] This potentially leads to a downward spiral in which women, already disadvantaged by the above-mentioned factors, spend further time and possibly financial resources on research and representation of the interest group, which is ultimately not conducive to their own careers. Therefore, it is essential that the national society and institutional leadership bear the responsibility to implement the necessary strategies to remedy gender-based inequities. To promote women in cardiology and to ensure the best possible use of all perspectives and expertise, equal opportunities and diversity should become a central task, especially in the decision-making and trend-setting commissions.[3,8]

This includes leadership training for current and future leaders, to provide a comprehensive, evidence-based, and up-to-date overview of relevant topics, including background information on gender-based bias and the basics of an anti-bias approach. Crucial is also the implementation of parental leave and part-time working opportunities for men, which will support equal opportunities overall.

Our report gives extensive insights into the structure of the DGK and the representation of women in the different organs of the society. We not only confirm the previously reported shortage of women in leadership position in German academic cardiolgy,[45] but further reveal a leadership gap within the Cardiac Society and non-academic hospitals, respectively. Disaggregation by career stage allows to paint the full picture of a leaky pipeline. We here report data from one single Cardiac Society, which, of course, are substantially influenced by the conditions in Germany and, hence, are not completely generalizable to other countries. Nevertheless, our findings concordantly extend current knowledge in the field of gender equity and might encourage other societies to critical introspection.

In summary, this report aims at transparently describing the status and current efforts for moving toward gender equity in the cardiology and cardiovascular research workforce in Germany, while also discussing the most crucial next steps. Recent measures seem to indicate a successful foundation for retaining women and promoting women into leadership positions in cardiology and cardiovascular research.

Data availability

Data used in this descriptive study is available on request from the authors.

Supplementary material

Supplementary material is available at *European Heart Journal Open* online.

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