

Parenting and caregiving duties as career challenges among clinical microbiologists: a cross-sectional survey

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Aim: To estimate the burden of parenting and caregiving duties among clinical microbiologists in Germany and to identify workplace-related support systems and barriers to engaging in career-relevant activities. **Methods:** A cross-sectional web-based survey was conducted. Participants were asked to answer 37 questions, of which 24 specifically addressed parenting and caregiving duties. **Results:** Only few workplace-related support systems are currently available, and experiences of job-related disadvantages were frequently reported (27 of 47; 57.4%). Main barriers were a lack of flexible working hours and reliable childcare. Sociocultural norms and a lack of role models were perceived as detrimental. **Conclusion:** More support systems and a credible culture of family friendliness are needed to prevent jeopardizing the academic potential of young parents.

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Keywords: caregiving duties • clinical microbiology • family–career balance • gender gap • parenthood • parenting

Background

Leading positions within academic medicine, including clinical microbiology, are disproportionately held by men [1–3]. Internationally, women in infectious diseases are also underrepresented as researchers and senior clinicians [4] as well as in the scientific publishing process, including authorship, h-index and editorial positions [5,6]. This phenomenon is generally termed the ‘leaky pipeline’, indicating that women leave academia before reaching high-ranking positions [7–9]. Among the reasons for this representation gap are parenting and caregiving duties [10], which are still disproportionately carried out by women and are most prevalent at early career stages [7]. Furthermore, early publication success is decisive for progression to a successful career pathway in academic medicine [11,12]. This leads to a challenging situation for parents, and especially young women trainees and scientists early in their career, if they aim to combine both parenting and academic ambitions [13–15]. Of note, this parenting and caregiving burden may of course be relevant for parents of all genders and may also be pertinent at later career stages. The risk of a ‘productivity gap’ in publication activity among female parents in academia is especially pertinent in the years following parenthood and is caused by time-consuming caregiving and parenting duties [16], parent-unfriendly work environments, discriminating gender stereotypes and the burden of household labor [17]. This phenomenon is also termed ‘parenthood penalty’ for female parents [16].

Men in high-ranking academic positions are significantly more likely to have children compared with women in the same positions [14], whereas women pursuing a high position in academic medicine tend to avoid or delay parenthood more often than male colleagues [18]. Among young clinical microbiology and infectious disease trainees and physicians in Europe, the prevalence of parenthood, parental leave options and satisfaction differed significantly

across countries in a survey from 2017; however, men reported an overall higher satisfaction with parental policies and granted flexibility at the workplace for parents [19]. A 2020 survey of US residents demonstrated that a lack of support systems for parents, such as available and affordable childcare options, were among the key challenges perceived by respondents. One-quarter of respondents felt that trainees with children were a burden to those without children [20]. A 2019 survey of cardiology residents reported deleterious effects associated with becoming a parent during residency, such as forced alterations of training schedule, hurdles in fulfilling research obligations, 'perceived stigma' of pregnancy and significantly earlier cessation of lactation [21].

Positive spillover effects of parenthood and family ('work–family enrichment') on the work–life balance of women in leadership positions are reported in a qualitative interview study from Austria [22]. Mentoring, networking and coaching were identified as important support mechanisms for career advancement and increased satisfaction. Most recently, the COVID-19 pandemic has led to an increase in studies on (gendered) parenthood and scientific productivity due to aggravated imbalances in parenting and caregiving duties in light of school closures and lack of available institutional childcare [23].

Research gaps

The representation gap of women in leading positions in academic medicine has not been analyzed specifically for clinical microbiology and infectious diseases. Furthermore, thus far in the field of clinical microbiology, no in-depth study has been carried out to specifically and thoroughly analyze parenting and caregiving duties as early career challenges based on quantitative and qualitative survey data. Clinical microbiology is generally perceived as a 'family-friendly' specialty within academic medicine; however, the caregiving burden, accessibility of and need for workplace-related support systems and barriers to family–career compatibility within this discipline have not been scrutinized systematically.

Methods

Study aims

In this cross-sectional web-based survey, the authors aimed to assess the overall burden of parenting and caregiving duties among clinical microbiologists in Germany to determine attitudes toward the topic of family–career compatibility (comparing parents and non-parents), to picture the current infrastructure of workplace-related support systems and to identify specific hurdles for parents and caregivers in the everyday work setting and in career-relevant activities such as research and scientific conferences.

Study setting

This cross-sectional, web-based survey was conducted using the online platform LimeSurvey (LimeSurvey GmbH, Hamburg, Germany) between October and December 2019. Eligibility of participants was irrespective of specialist training status, hierarchy level and training background (medical or biological). Participants worked as clinical microbiologists in Germany at the time of answering the questionnaire.

Survey design

Participants were asked to answer 37 questions in German (Supplementary Material). Apart from 13 questions concerning basic demographic data and workplace setting (age, gender, federal state of employer, work environment, hierarchy level), questions were grouped into three domains: attitude and awareness, workplace infrastructure and workplace culture/day-to-day reality. The survey items were developed by the authors and included a final review to verify relevance, context suitability, topic coverage and internal validity. Additionally, the survey was tested in a pilot phase prior to dissemination. During this pilot phase, respondents unassociated with survey development tested the functionality of the survey platform, general feasibility of the survey and clarity of the survey items.

Measurement

Questions regarding basic demographic data and workplace setting consisted of nine multiple choice questions and four questions in the form of numeric open-ended response items. The survey items covering the remaining three domains consisted of five yes/no questions, seven 5-point Likert scale questions, seven open-ended response items and five multiple choice questions. The Likert scale ranged from 1 (strongly disagree) to 5 (strongly agree). Answers to the open-ended response items were screened regarding the themes they covered and ranked according to the number of times a certain theme was mentioned by survey participants.

Table 1. Demographics of survey participants.

Parameters	All	With children	Without children	p-value
Age, mean (SD) (n = 92)	37.3 (6.6)	39.2 (6.3)	34.4 (6.3)	0.0007
Female, n (%) (n = 92)	67 (72.0)	42 (72.4)	25 (73.5)	0.91
Participants with children, n (%) (n = 92)	58 (63)	–	–	–
Number of children, median (IQR)	1 (0–2)	2 (1–2)	–	–
Participants with caregiving duties for relatives, n (%) (n = 93)	5 (5.4)	4 (6.9)	1 (2.9)	0.65
Participants who took leave for caregiving/parenting, n (%) (n = 92)	53 (57.6)	51 (86.4)	2 (5.88)	<0.0001
Trainees in CM, n (%) (n = 89)	13 (14.6)	9 (16.4)	4 (12.1)	0.76
Specialists in CM, n (%) (n = 89)	18 (20.2)	12 (21.8)	6 (18.2)	0.79
Consultants, n (%) (n = 89)	8 (9.0)	7 (12.7)	1 (3.0)	0.25
Heads, n (%) (n = 89)	2 (2.3)	1 (1.8)	1 (3.0)	0.99
Biologists without specialization, n (%) (n = 89)	27 (30.3)	12 (21.8)	15 (45.5)	0.03
Biologists with specialization, n (%) (n = 89)	8 (9.0)	7 (12.7)	1 (3.0)	0.25
Working at an academic setting, n (%) (n = 95)	75 (78.9)	49 (81.7)	26 (74.3)	0.44
Working on fixed-term contracts, n (%) (n = 89)	49 (55.1)	29 (51.8)	20 (60.6)	0.51
Actual work hours, mean (SD) (n = 84)	43.7 (8.2)	40.6 (7.3)	48.8 (7.2)	<0.0001
Contractual work hours, mean (SD) (n = 85)	37.7 (5.3)	36.9 (5.7)	39.1 (4.5)	0.0679

Significant p-values are indicated in bold.
CM: Clinical microbiology; IQR: Interquartile range; SD: Standard deviation.

Survey administration

The invitation to the survey was disseminated on behalf of and via the official newsletters of the German Society for Hygiene and Microbiology and the Young German Society for Hygiene and Microbiology. A professional newsletter dissemination tool was used to track the opening rate of the email. The invitation to the survey was disseminated to 1206 individuals, of whom 413 (34.3%) opened the email and 105 (25.4%) participated in the survey.

Statistical analysis

Answers were analyzed using the analysis tools provided by LimeSurvey in Excel (Microsoft Corporation, WA, USA) and Prism 8.0 (GraphPad Software Inc., CA, USA). Both completed and partially completed questionnaires were analyzed with the item-specific number of complete responses as the denominator. Demographic characteristics and survey items regarding attitudes/awareness were compared between parent and non-parent participants using Mann–Whitney *U* test or *t*-test for continuous variables and chi-square or Fisher's exact test for categorical data. The statistical significance level was set at 0.05.

Ethical considerations

Participation in the survey was voluntary. Before filling out the questionnaire, each participant was informed about the purpose and anonymity of the survey. No financial or other incentive was provided to the participants. Because of the voluntary nature of the survey, ethical approval was not required. The principles outlined in the Declaration of Helsinki were followed.

Results

A total of 1206 individuals received the official society newsletter containing the invitation to the survey, of whom 413 (34.3%) opened the email. Ultimately, 105 respondents (25.4%) participated in the survey.

Demographics

The demographic data are depicted in Table 1. In brief, the mean age (standard deviation) of the participants was 37.3 (6.6) years, the majority were female (72%) and had children (63%) and the median number of children per participant with children was two (interquartile range: 1–2). The prevalence of caregiving duties for relatives was 5.4% (five of 93). The largest fraction of the study cohort consisted of biologists without specialization (27 of 89; 30.3%) followed by trainee physicians in clinical microbiology (13 of 89; 14.6%), specialists in clinical microbiology (18 of 89; 20.2%), consultants and biologists with specialization (each eight of 89; 9%) and heads of

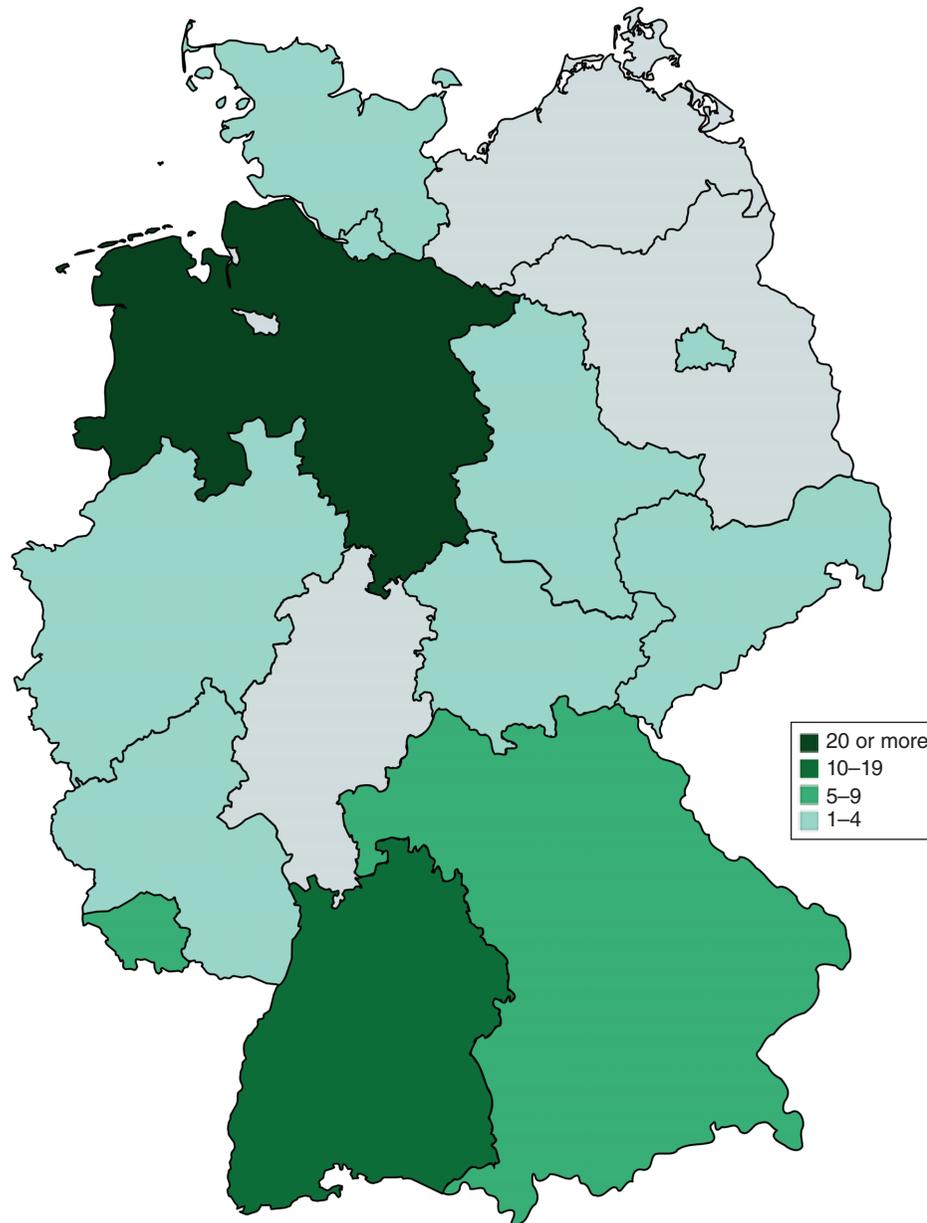


Figure 1. Geographical distribution of participants. Shades of green indicate the number of participants per federal state. Dark green = 20 or more participants; medium dark green = ten to 19 participants; medium light green = five to nine participants; light green = one to four participants. Figure created with mapchart.net.

their department (two of 89; 2.3%). Most participants reported working in an academic setting (75 of 89; 78.9%). The geographical background was diverse, with participants representing 12 of the 16 German federal states, with most respondents from North Rhine-Westphalia and Lower Saxony (both more than 20 respondents) (Figure 1). The majority of participants (49 of 89; 55.1%) declared themselves to be on fixed-term contracts, with 16 of 89 (18.0%) being on contracts of ≤ 1 year's duration.

The actual average work hours per week was indicated to be 43.7 (standard deviation: 8.2), which was significantly higher than contractual working hours (i.e., 37.7 h per week) (standard deviation: 5.3; $p = 0.016$). Participants in the study population with children were older (39.2 vs 34.4 years; $p = 0.0007$) and more likely to have taken leave for caregiving (86.4 vs 5.88%; $p < 0.0001$) and worked fewer hours per week (40.6 vs 48.8; $p < 0.0001$) than participants without children (Table 1). Parents did not differ from non-parents in terms of contractual working

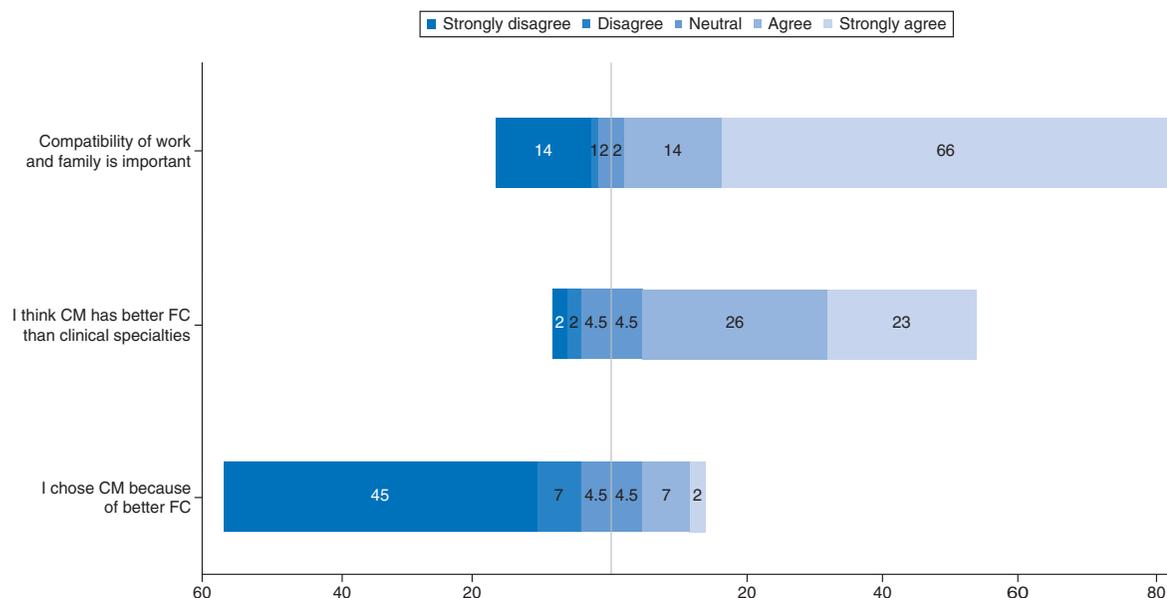


Figure 2. Distribution of participants' responses on the items 'Compatibility of work and family is important', 'I think clinical microbiology has better family compatibility than clinical specialties' and 'I chose clinical microbiology because of better family compatibility'.

CM: Clinical microbiology; FC: Family compatibility.

hours or hierarchical level of their working position. For the demographics of survey participants per gender, please refer to Supplementary Table 1.

Attitude & awareness

Overall, career–family balance was perceived to be an extremely important topic by the majority of participants (mean Likert scale score: 4.7). Microbiology was regarded by the majority of participants to be a specialty that is more compatible with family and care duties than other medical specialties with, for example, their own inpatient wards (mean Likert scale score: 4.1). However, the majority of respondents did not factor in compatibility with family and care duties when they chose microbiology as a career (mean Likert scale score: 1.8) (Figure 2). Of note, these results were non-divergent between parent and non-parent participants (data not shown).

About half of the participants indicated that they had already taken a career break for either parental leave or care of a relative (parental leave: 49 of 92; care of a relative: four of 92). In contrast to their actual work hours, the participants favored working a median of 30 h per week (interquartile range: 30–35). The main reasons for the discrepancy between actual and contractual work hours were 'expectation of the employer' (34 of 141 answers; 32.4%), 'fear of falling behind in career' (28 of 141 answers; 26.7%) and 'inefficient workflow organization' (18 of 141 answers; 17.1%), whereas the main reasons for the discrepancy between actual and favored work hours were 'financial loss' (37 of 162 answers; 35.2%), 'fear of falling behind in career' (32 of 162 answers; 30.5%), 'expectation of the employer' (31 of 162 answers; 29.5%) and 'prestige' (12 of 162 answers; 11.4%).

The authors asked whether participants ever thought about changing jobs because of their employer's attitude toward family/care duties, a position that 31 of 105 (29.5%) participants affirmed. Factors that influenced the choice of a new employer were stated to be 'flexibility of workplace infrastructure, e.g., home office' in 61 of 197 (58.1%) answers, 'credible family friendliness and a workplace culture of support for parents and families' in 54 of 197 (51.4%) answers and 'general infrastructure, e.g., childcare facilities' in 26 of 197 (24.8%) answers. One-third (35 of 105; 33.3%) of the participants confirmed that there was at least one occasion on which they were not able to attend a scientific conference because care duties could not be delegated or care options were financially inaccessible.

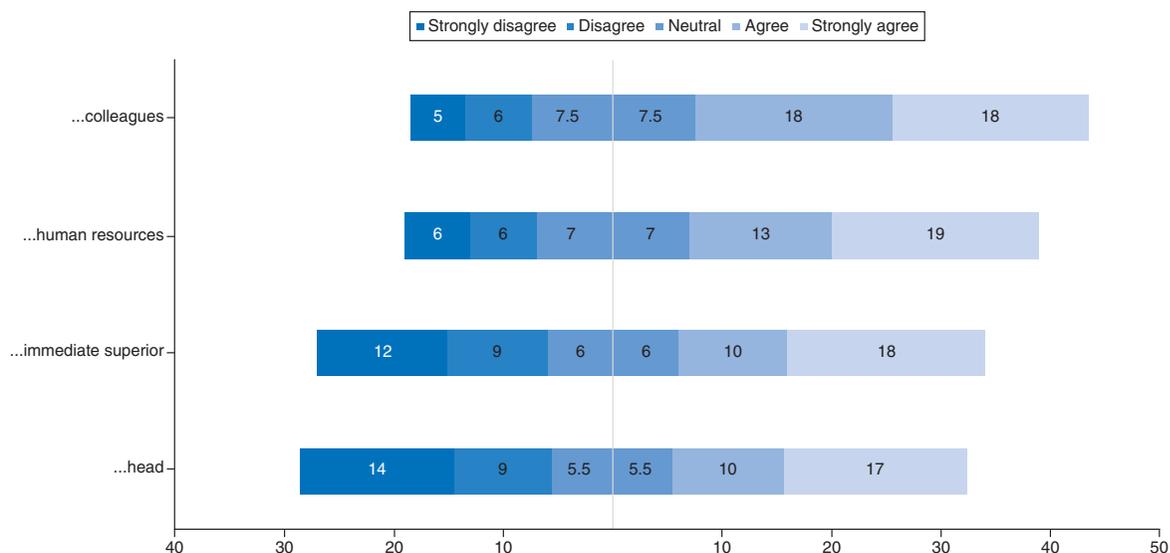


Figure 3. Distribution of participants' responses to the item 'Reducing working hours is a tangible option in relation to...'

Workplace infrastructure

The majority of respondents reported that no specific support infrastructure was available for parents at their workplace, with 68% (53 of 77) answering that they had no parent/child room available and 77% (58 of 75) stating that access to a lactation room was lacking. Concerning options to work remotely ('home office options'), almost half (37 of 78; 47%) of the respondents reported having the opportunity to work from home, whereas 40% (31 of 78) did not have this possibility and 12% were not sure about this option (ten of 78). Moreover, 49% (38 of 77) had no guaranteed access to daycare centers in direct proximity to their workplace, whereas 37% (29 of 77) affirmed this option.

Workplace culture & day-to-day reality

The 'authenticity of family friendliness' was rated on a Likert scale to be higher for colleagues than for the immediate superior or employer (4 vs 3.7 vs 3.3). Similarly, participants reported having had colleagues' support to meet care responsibilities (e.g., by taking over their workload) more frequently (Likert scale score: 3.8) than the support of the immediate superior (Likert scale score: 3.4). A reduction in working hours to increase compatibility with caregiving duties was perceived as a tangible option by participants, especially with regard to their colleagues; however, this option was considered less feasible in relation to the head of the department (Figure 3). Care-related work absence was met by understanding, especially by colleagues and immediate superiors (Figure 4). The authors asked the participants to name the reason for the lack of workplace family friendliness. The employer was named as the main reason in 33 of 125 (31.4%) answers, the immediate superior in 18 of 125 (17.1%) answers and the attitude of fellow colleagues in 15 of 125 (14.3%) answers.

Twenty-seven participants reported in an open-ended answer format that they had experienced job-related disadvantages because of care-related duties (27 of 47 answers), especially in highly competitive work environments in which scientific research was expected to be conducted before and after regular working hours and during weekends. Parental or care leave was the reason for non-extension of their contracts in seven of 105 (6.7%) participants.

The authors asked the participants what facilitating factors they could envision as most greatly benefiting their work-life balance. Most often, participants listed flexible and reduced working hours, including part-time work and home office options (17 times), but also named daycare centers in direct proximity to the workplace as beneficial (three times). Childcare was also considered to be highly helpful as pragmatic support, especially during scientific conferences (four times). Additionally, family-friendly time slots for meetings, seminars and conferences were mentioned (two times). Perceived barriers to a more satisfactory family-career balance pertained most often to the workplace culture and day-to-day reality, such as 'hierarchical structures with few female role models in leading

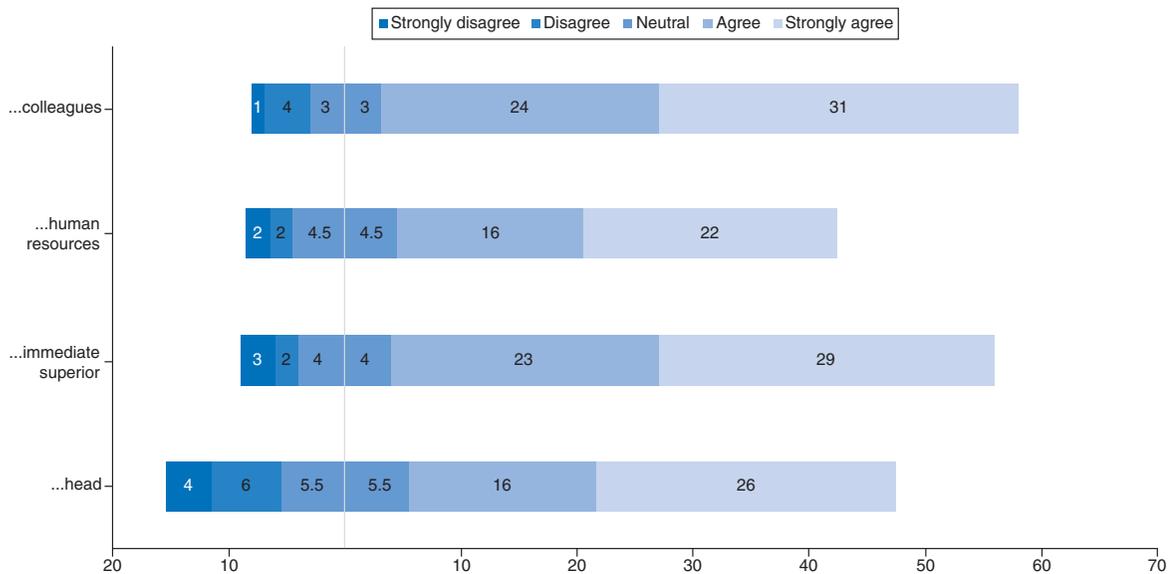


Figure 4. Distribution of participants' responses to the item 'care-related work absence is met with understanding by...'

positions', 'sociocultural norms favoring work over family' (12 of 45 answers) and 'rules of the game within the scientific community' (eight of 45 answers).

Discussion

Main findings

The authors showed that only a few workplace-related support systems, such as parent/child rooms, lactation rooms and home office options, are currently available for clinical microbiologists in Germany. In addition, experiences of job-related disadvantages due to care duties and family responsibilities were frequently reported. One-third of participants stated that they had not attended a scientific conference because of care duties at least once, leading to potential strategic disadvantages for young (female) researchers who miss out on conferences as important networking events at early career stages. The majority of participants considered balancing a career with family life a very important issue, but did not choose clinical microbiology as a specialty for that reason. Although a large majority of respondents had not changed their employer because they were dissatisfied with their handling of family-career balance issues, a considerable minority had done so. Decisions to change jobs along the later career path are strongly influenced by infrastructure support systems and family friendliness at the new working place. In summary, the ill-equipped infrastructure of workplace-related support systems adds to the high overall burden of parenting and caregiving duties among clinical microbiologists in Germany.

Potential solutions

Open-ended text responses suggested that important ways to improve the career-family balance are more flexible work hours, reliable childcare options and an organizational culture and climate of authentic support and family friendliness in the work environment. A lack of female role models in leading positions and sociocultural norms favoring work over family are additional hurdles to advancing to leading positions for (female) parents at early career stages. Although a large number of responding parents felt strongly that their work-life or work-non-work balance and career advances would be greatly improved by several structural changes and also pointed out concrete disadvantages they had experienced, there was no overwhelming dissatisfaction with the field of microbiology and its employers. This is promising but may also reflect socioeconomic privileges of the group relative to other parents in society or a sense of contenting oneself with historical improvements on a larger social scale, such as the German legal claim to childcare options for children under the age of 3 years old introduced in 2013, neither of which the authors studied.

Research in context

The results of the authors' survey add to previous data on parenting and caregiving within academic medicine. To the best of the authors' knowledge, this is the first survey of clinical microbiologists offering an in-depth qualitative assessment of the overall caregiving burden and different barriers as well as perceived disadvantages associated with parenting and caregiving. The risk of a 'productivity gap' for (female) parents and the subsequent 'representation gap' in high-ranking positions appear to be as pertinent to clinical microbiologists as has been demonstrated already for physicians and scientists in academic medicine in general. The authors' study adds childcare options at scientific conferences and female parent role models to the list of needed support mechanisms to enable (female) parents to circumvent the 'parenthood penalty' in the early years after the beginning of parenthood. Reliable childcare options and flexible working hours were regarded as decisive support systems for parents and caregivers. Additionally, as previously described in the literature, parent-unfriendly work environments and a lack of workplace-related infrastructure were confirmed as barriers to achieving a satisfactory family–career balance and maintaining the ability to publish.

Strengths & limitations

There are several strengths of the authors' study. First, the survey was completed by microbiologists from 12 of the 16 federal states, thereby covering a largely representative proportion of Germany. Second, the open-ended format of several questions enabled an in-depth qualitative analysis of personal perceptions regarding career challenges due to family obligations. Third, responses were collected prior to the COVID-19 pandemic, resulting in an analysis that was most likely representative of the baseline level of caregiving and parenting duties with which microbiologists are faced on a daily basis. Limitations of the study are the relatively low response rate and the restriction to one country and microbiologists only. In addition, possible over-representation of participants with a high awareness of the issue of parenting and caregiving may have introduced some degree of bias.

Conclusion

Implications for future research

Future research should expand this general analysis of parenting and caregiving duties of clinical microbiologists in Germany to other countries [24] and neighboring medical specialties, such as infectious diseases. Future surveys on parenting and caregiving duties should incorporate questions on structural barriers in the general academic labor system to evaluate and quantify the extent to which care duties embody the most prevalent early career challenge for women and parents in academic medicine.

Policy implications

More infrastructure support systems, reliable childcare options and a credible culture of family friendliness in the workplace and childcare options at scientific conferences are urgently needed to mitigate the productivity gap of female parents and close the gender gap in leading positions within the field of clinical microbiology in Germany. Our findings are therefore highly relevant to department heads who carry the responsibility not only to render a healthy work–family balance possible, but also to facilitate a cultural change. Policymakers may consider that a changed legal framework with, for example, obligatory workplace-related and infrastructure support systems and flexibility regarding working hours could promote the transition to a modern, family-affirmative culture.

In light of the current scarcity of trainees in clinical microbiology and a majority of heads of clinical microbiology departments being well above the age of 50 years old [25], it is of paramount importance that the academic potential of young women and parents is not jeopardized because of limited support systems for parenting and caregiving. Otherwise, clinical microbiology in Germany risks reproducing and reinforcing the 'leaky pipeline' in academia [7]. Since the 'leaky pipeline' correlates with many reported experiences of gendered structural barriers, it can be surmised that these barriers disproportionately outweigh meritocratic selection criteria.

Future perspective

Future research could specifically compare this pre-COVID-19 situation with the pandemic phase since early 2020, during which an increased diagnostic workload in microbiological laboratories and restricted childcare options have presumably led to an even more challenging situation for female parents and caregivers in clinical microbiology [2,26–29]. This is also exemplified by the gender disparity among principal investigators of COVID-19 clinical trials [30,31].

To circumvent the ‘leaky pipeline’ of academia for clinical microbiology, it will be paramount during the next years to establish more tangible and sustainable infrastructure support systems, with a special focus on early career researchers who suffer from the extra burden of parenting or caregiving. Another challenge will be to mitigate the deleterious effects of the COVID-19 pandemic, which has not only multiplied the clinical burden for microbiological laboratories but has also most probably increased parenting and caregiving duties, especially in the face of childcare and school closures, sick family elders and a higher level of individual stress.

Summary points

- Clinical microbiologists regard a balance between work and family life as very important but do not choose clinical microbiology as a specialty for that reason.
- Experiences of perceived job-related disadvantages due to caregiving duties were frequently reported.
- Among the barriers to a more satisfactory family–career balance are a lack of workplace-related and infrastructure support systems such as flexible working hours, reliable childcare options and a culture of credible support.
- Sociocultural norms favoring work over family and hierarchical structures with few (female) role models in leading positions were perceived as detrimental to family–career balance and advancement to high-ranking positions.

Supplementary data

To view the supplementary data that accompany this paper please visit the journal website at: www.futuremedicine.com/doi/suppl/10.2217/fmb-2021-0197

Author contributions

K Last, C Papan, CM Koch and N Jazmati designed the survey. V Schwierzeck, SL Becker and J Forster contributed to the pilot test of the survey. K Last, C Papan and N Jazmati analyzed the quantitative survey results. K Last, C Papan and CM Koch analyzed the qualitative survey results. All authors have critically revised the manuscript. All authors have read the final version of the manuscript and agreed to its final form.

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Financial & competing interests disclosure

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No writing assistance was utilized in the production of this manuscript.

Ethical conduct of research

Participation in the survey was voluntary. Before filling out the questionnaire, each participant was informed about the purpose and anonymity of the survey. No financial or other incentive was provided to the participants. Because of the voluntary nature of the survey, ethical approval was not required. The principles outlined in the Declaration of Helsinki were followed.

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