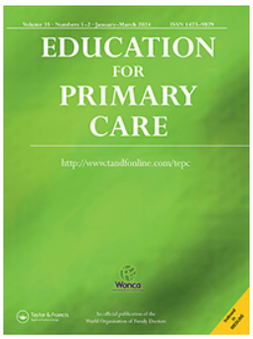

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RESEARCH ARTICLE



# Medical trainees' speciality considerations at their transition from under- to postgraduate education: a descriptive, cross-sectional study

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**ABSTRACT**

**Purpose:** This paper aims to provide knowledge on medical trainees' considerations about specialisation as they move from undergraduate to postgraduate medical education; especially their interest in general practice compared to other specialities.

**Method:** We developed and content-validated a questionnaire to examine medical trainees' speciality considerations and conducted a descriptive, cross-sectional study. All medical trainees initiating their internship in Denmark in 2022 ($N = 1,188$) were invited to participate in the study. Medical specialities were categorised as hospital service specialities, internal medicine specialities, primary care, psychiatry specialities and surgery and emergency specialities. Descriptive statistics were used to describe the cohort and examine the participants' speciality considerations by assigning them to one of the following three orientations: committed, undecided or non-committed to a speciality.

**Results:** The response rate was 38.8% ($n = 461$), and participants' mean age was 27.4 years with a majority of females (68.1%). Nearly 25% of the participants had general practice as speciality preference, and only 13.9% had excluded general practice for future specialisation. Overall, around half of the participants had general practice as a first, second or third preference for specialisation.

**Conclusion:** Danish medical trainees show considerable interest in general practice at the time of their transition from undergraduate to postgraduate education. However, to meet future demands on the primary care, further recruitment of general practitioners is still needed. This knowledge of the specialities' recruitment potential will likely be of interest to medical educators and healthcare planners alike.

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Career choice; speciality choice process; medical education; health workforce; general practice

## Introduction

Difficulties in recruiting physicians in many specialities and geographic areas have contributed to a sense of physician workforce crisis associated with public concerns about access to health care [1]. To overcome this problem, the supply of physicians must be sufficient to meet demand, and efforts made to ensure an appropriate distribution of physicians to relevant specialities [2,3]. An important aspect of this issue is future medical specialists' preferences for different medical specialities and how these preferences subsequently match their final medical career choices. In Denmark, a total of 1,134 specialist training positions were offered in 2022, and 88% of them were filled. Twenty-one specialities experienced full occupation of the positions, while general practice had 93 vacant positions, corresponding to 27% of the training positions offered in general practice nationwide. The number of offered positions in Denmark ranged from two (forensic medicine) to 350 (general practice) [4].

Primary healthcare is a cornerstone of universal health coverage, and increasing the primary care workforce has been a centre for both research and public attention for decades. A primary care career choice is described as a rational choice consisting of an ongoing and complex matching process between students' perceptions of speciality characteristics and their personal and social needs [5–8]. Newer theoretical models have added a temporal dimension to the understanding of the speciality choice process by distinguishing between speciality intentions before as well as during medical education, and the final speciality choice [9,10]. Bennett and Phillips (2010) introduced students' trajectories that rely on students' commitment to different specialities during the undergraduate primary care career choice process. A recent longitudinal study has examined such trajectories in a cohort of undergraduate medical students over a four-year period showing that the proportion of students who intend to become primary care physicians

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increases during undergraduate education [11]. To our knowledge, research is sparse into these speciality choice trajectories of medical trainees in their postgraduate career. Most overviews of studies in the field of the speciality choice process focus only on a single speciality such as paediatrics [12], general practice [13–15] or surgical specialities [16–18], and only a few have investigated the lost recruitment potential related to medical trainees as they reject or do not consider one or another speciality [19–21].

In the present study, we have adapted Bennett and Phillips' concept by defining different trajectories towards specialisation as medical trainees' 'speciality orientations' during medical education. With this study, we set out to examine the distribution of speciality orientations in a national cohort of medical trainees to understand both the interest in general practice specialisation and the differences between general practice and other specialities' workforce recruitment potential during medical education. We did this by developing and content-validating a questionnaire that measures medical trainees' speciality orientations and a set of potentially influencing factors over time. In the present paper, we examine the cohort's speciality orientations at the time of their transition from undergraduate to postgraduate medical training.

## Methods

### Educational context

In Denmark, undergraduate medical education is conducted at four medical schools, each with a six-year curriculum. After graduation, medical trainees can begin basic clinical training (BCT) consisting of six months of employment at a hospital department followed by six months of employment in general practice. Approval of the BCT is a prerequisite for entering a postgraduate training programme in one of the 39 specialities, which includes an introductory training programme (6–12 months) followed by a 4–5-year main training programme in the same speciality (Figure 1) [22]. Nine internal medicine specialities (cardiology, endocrinology, gastroenterology and hepatology, haematology, geriatrics, infectious diseases, nephrology, respiratory medicine and rheumatology) have individual programmes, but an approved introductory training programme in one of these nine specialities gives the medical trainee access to apply for a main training programme in any of the nine specialities.

### Study design, setting and participants

This descriptive, cross-sectional study forms part of a nationwide longitudinal cohort study on the speciality orientation of medical trainees in Denmark and factors associated with intentions to become a general practitioner. The participants of this study were medical trainees assigned for BCT in Denmark in 2022 who were invited to participate via an email from the Danish Health Authority. Participation was voluntary and no incentives were offered. The study was conducted and reported in accordance with the STrengthening the Reporting of OBservational Studies in Epidemiology (STROBE) guidelines [23]

### Questionnaire development

We developed a questionnaire enquiring about the demographic background, speciality priorities and rejections and potential influencing factors, using the seven-step approach by Artino et al. [24,25]. Systematic literature searches on speciality preferences and choice were performed in PubMed and Embase and supplemented by searches in Google Scholar and manual reference checking to identify additional studies. Seven online focus group interviews concerning the speciality choice process in a Danish context were conducted with the participation of medical students representing all four Danish medical schools ($n = 14$), junior physicians ($n = 4$), general practice residents ($n = 3$) and general practitioners ($n = 6$). We used storytelling as an approach to the interviews to include experiences and perspectives embedded in the past, present and future alike [26]. The interviews were audio/video recorded and transcribed verbatim by the principal author. Data were analysed using a thematic approach, and results

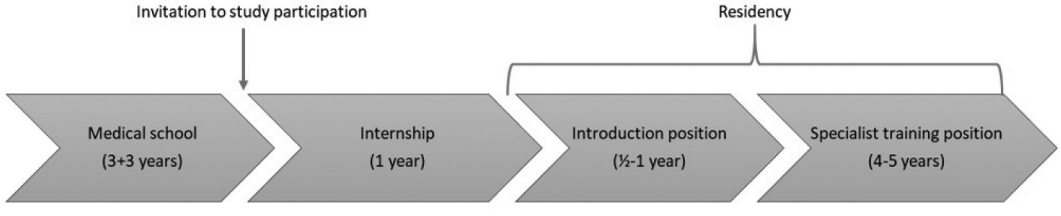


Figure 1. The Danish medical educational system from matriculation to holding specialist registration.

were entered into a time-ordered matrix in which themes were allocated to the stages of medical education [26–29]. The findings from the literature and results from the qualitative interviews were discussed within the research group and items were developed by the principal investigator based on conceptual domain mapping guided by the expanded conceptual framework of medical students' primary care career choice by Pfarrwaller and colleagues [9]. All items were reviewed by the research group members in an iterative process.

### Expert validation and item testing

Six experts including medical educators, medical education researchers and senior and junior physicians were recruited to participate in questionnaire content validation. Each expert was provided with a 138-item draft along with a cover letter stating the purpose of the study. Content validation was achieved through oral feedback according to the rating of relevance and clarity on a four-point Likert scale. Each item in the draft was then discussed in detail with the research group members. The discussion gave rise to some minor changes and the adoption of a few additional items including some from a previous Danish survey on speciality choice and factors influencing speciality choice [30]. A representative sample of the target population pretested the questionnaire using cognitive interviewing. Two groups of medical students consisting of seven first-year and three final-year master's students were provided with a draft of the questionnaire and asked to complete it using a combination of the think-aloud technique and general verbal probing [31]. Furthermore, two final-year medical students and three newly-graduated physicians did a test of the questionnaire in the planned delivery mode. The sessions were used to estimate the time spent completing the survey and to provide information on data entry, coding and handling. Pretesting was an iterative process with minor adjustments of wording, correction of typos and survey design until saturation had been reached. The final electronic instrument consisted of 113 items divided into six sections: stable demographics, dynamic demographics, speciality orientation and three sections exploring potentially associated and influencing factors. This study concerns data from the first three sections.

### Potential bias and confounders

Potential selection bias was minimised by using a total population sample. To address non-response bias, invitations to participate and one reminder were sent to the potential participants' email addresses by the Danish Health Authority. Moreover, the questionnaire was promoted in a social media group for graduating medical students and newly graduated physicians moderated by the Danish Junior Doctors Association. Potential sources of confounding were variations in the medical school curriculum [32] and differences in background variables.

### Data collection

Data were collected in two rounds using REDCap electronic data capture tools hosted at Aalborg University, Denmark [33,34]. Participants who were assigned an internship beginning in the first half of 2022 were invited to the survey in November 2021, and participants beginning an internship in the second half of 2022 were invited to the survey in May 2022. A reminder was sent in November 2021, and another in May 2022. The electronic questionnaires were inactivated in early January 2022 and early July 2022. Data were then transferred from REDCap to a secured network drive, processed in Microsoft Excel [35] and reviewed for accuracy and missing values. Processed data were imported into STATA [36] for statistical analyses. Data for non-responder analyses consisting of graduation university, age and gender of the total population were provided from the register of internship placements.

### Variables and data analysis

All variables were categorical except for age, which was a continuous variable. Medical specialities were classified into five groups (i.e. speciality groups) as described by Bexelius et al. in 2016 and outlined in Table 1 [37]. We used descriptive statistics to summarise the participants' characteristics and speciality preferences. Comparisons were performed using Pearson's Chi-square test or Fischer's exact test for categorical data and one-way ANOVA for age. The distribution of speciality orientations relied on self-reported priorities and rejections based on lists displaying all 39 specialities. Participants were asked '*If you had to choose specialisation today, what would be your first priority?* The same question was asked about the second and third priorities. However, if the participants were completely sure of their first or second priority, they were asked not to prioritise any further specialities. Missing data were not included in the statistical analyses. Non-responder and late-response analyses were performed using Pearson's Chi-square test and Fisher's exact test for categorical variables and t-test for independent samples for age. All analyses were conducted using version 17 of STATA [36]. P-values below 0.05 were considered statistically significant.

Table 1. Categorisation of the 39 medical specialities into speciality groups.

| Hospital service specialities | Internal medicine specialities | Primary care | Psychiatric specialities | Surgery and emergency specialities |
|---|---|---|---|---|
| Clinical biochemistry | Clinical oncology | General practice | Adult psychiatry | Anaesthesiology |
| Clinical genetics | Dermatology and venereology | | Child and adolescent psychiatry | Emergency medicine |
| Clinical immunology | Internal medicine: cardiology | | | General surgery |
| Clinical microbiology | Internal medicine: endocrinology | | | Neurosurgery |
| Clinical pharmacology | Internal medicine: gastroenterology and hepatology | | | Obstetrics and gynaecology |
| Clinical physiology and nuclear medicine | Internal medicine: haematology | | | Oto-rhino-laryngology |
| Community medicine | Internal medicine: geriatrics | | | Ophthalmology |
| Diagnostic radiology | Internal medicine: infectious diseases | | | Orthopaedic surgery |
| Forensic medicine | Internal medicine: nephrology | | | Plastic surgery |
| Occupational medicine | Internal medicine: respiratory medicine | | | Thoracic surgery |
| Pathology | Internal medicine: rheumatology | | | Urology |
| | Neurology | | | Vascular surgery |
| | Paediatrics | | | |

## Results

### *Participant characteristics*

A total of 477 unique participants fully or partially completed the survey, yielding a 40.2% response rate. However, 16 participants were excluded due to missing data for the key study variables on speciality orientation (see Figure 2), leading to an adjusted 38.8% response rate. Nearly all participants (98.5%) indicated an intention to become medical specialists in the future, whereas the remaining 1.5% were unsure. Table 2 provides the summary statistics of the participants' demographic background categorised into speciality groups according to the named first priority for specialisation. Non-responder analyses revealed no significant bias

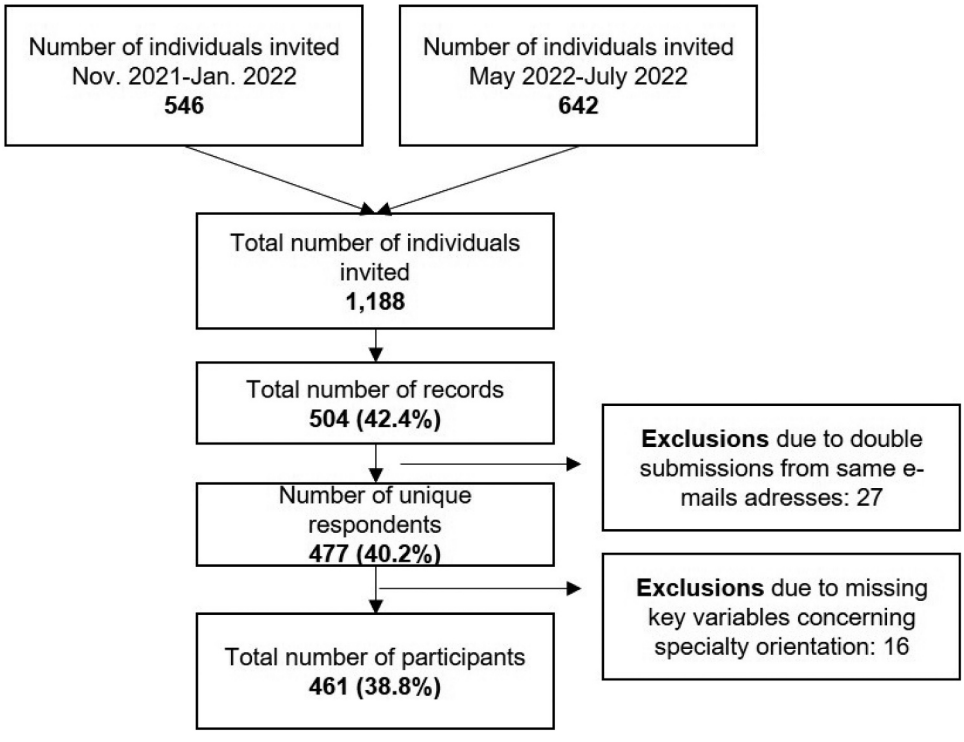


Figure 2. Flowchart of study participation.

**Table 2.** Descriptive characteristics of the cohort by speciality group preference.

| | | Total | | Hospital service | | Internal medicine | | Primary care | | Psychiatry | | Surgery and emergency | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | n | % | n | % | n | % | |
| | | 461 | 100 | 22 | 4.8 | 120 | 26 | 115 | 24.9 | 19 | 4.1 | 167 | 36.2 | p-value |
| Gender | Male | 146 | 31.7 | 10 | 45.5 | 34 | 28.3 | 27 | 23.5 | 6 | 31.6 | 63 | 37.7 | 0.058 |
| | Female | 314 | 68.1 | 12 | 54.5 | 86 | 71.7 | 88 | 76.5 | 13 | 68.4 | 103 | 61.7 | |
| | Missing | 1 | 0.2 | | | | | | | | | 1 | 0.6 | |
| Nationality | Danish | 433 | 93.9 | 21 | 95.5 | 110 | 91.7 | 110 | 95.7 | 18 | 94.7 | 159 | 95.2 | 0.667[a] |
| | Other | 28 | 6.1 | 1 | 4.5 | 10 | 8.3 | 5 | 4.3 | 1 | 5.3 | 8 | 4.8 | |
| In which type of area did you grow up? | Urban | 322 | 69.8 | 12 | 54.5 | 85 | 70.8 | 77 | 67.0 | 17 | 89.5 | 119 | 71.3 | 0.147 |
| | Rural | 136 | 29.5 | 10 | 45.5 | 34 | 28.3 | 38 | 33.0 | 2 | 10.5 | 47 | 28.1 | |
| | Missing | 3 | 0.7 | | | 1 | 0.8 | | | | | 1 | 0.6 | |
| Which language was spoken in your home when growing up? | Danish | 373 | 80.9 | 17 | 77.3 | 90 | 75.0 | 96 | 83.5 | 15 | 78.9 | 140 | 83.8 | 0.341[a] |
| | Other/multiple | 88 | 19.1 | 5 | 22.7 | 30 | 25.0 | 19 | 16.5 | 4 | 21.1 | 27 | 16.2 | |
| Is any of your parents a physician? | Yes | 63 | 13.7 | 5 | 22.7 | 17 | 14.2 | 7 | 6.1 | 4 | 21.1 | 27 | 16.2 | **0.031a** |
| | No | 398 | 86.3 | 17 | 77.3 | 103 | 85.8 | 108 | 93.9 | 15 | 78.9 | 140 | 83.8 | |
| Civil status | Single | 102 | 22.1 | 6 | 27.3 | 33 | 27.5 | 14 | 12.2 | 6 | 31.6 | 40 | 24.0 | **0.023a** |
| | In a relationship | 359 | 77.9 | 16 | 72.7 | 87 | 72.5 | 101 | 87.8 | 13 | 68.4 | 127 | 76.0 | |
| Children | No | 357 | 77.4 | 18 | 81.8 | 96 | 80.0 | 85 | 73.9 | 17 | 89.5 | 129 | 77.2 | 0.599[a] |
| | Yes (including expecting first child) | 104 | 22.6 | 4 | 18.2 | 24 | 20.0 | 30 | 26.1 | 2 | 10.5 | 38 | 22.8 | |
| Do you own your house? | Yes | 120 | 26.0 | 2 | 9.1 | 25 | 20.8 | 33 | 28.7 | 7 | 36.8 | 48 | 28.7 | 0.140 |
| | No | 339 | 73.5 | 20 | 90.9 | 93 | 77.5 | 82 | 71.3 | 12 | 63.2 | 119 | 71.3 | |
| | Missing | 2 | 0.4 | | | 2 | 1.7 | | | | | | | |
| Age (years) | Range | 24–47 | | 24–30 | | 24–46 | | 24–39 | | 25–30 | | 24–47 | | |
| | Mean (SD) | 27.4 (2.44) | | 26.8 (1.45) | | 27.1 (2.21) | | 27.3 (2.38) | | 27.4 (1.54) | | 27.5 (2.58) | | 0.834[b] |

*Note*: Chi-square test used unless otherwise noted. [a]Fisher's exact test used [b]One-way ANOVA used.

except for the participants on average being 0.67 years younger than the total population ($p = 0.000$). Overall, no significant difference was detected between participants having responded to the survey before and after the reminder regarding demographic variables.

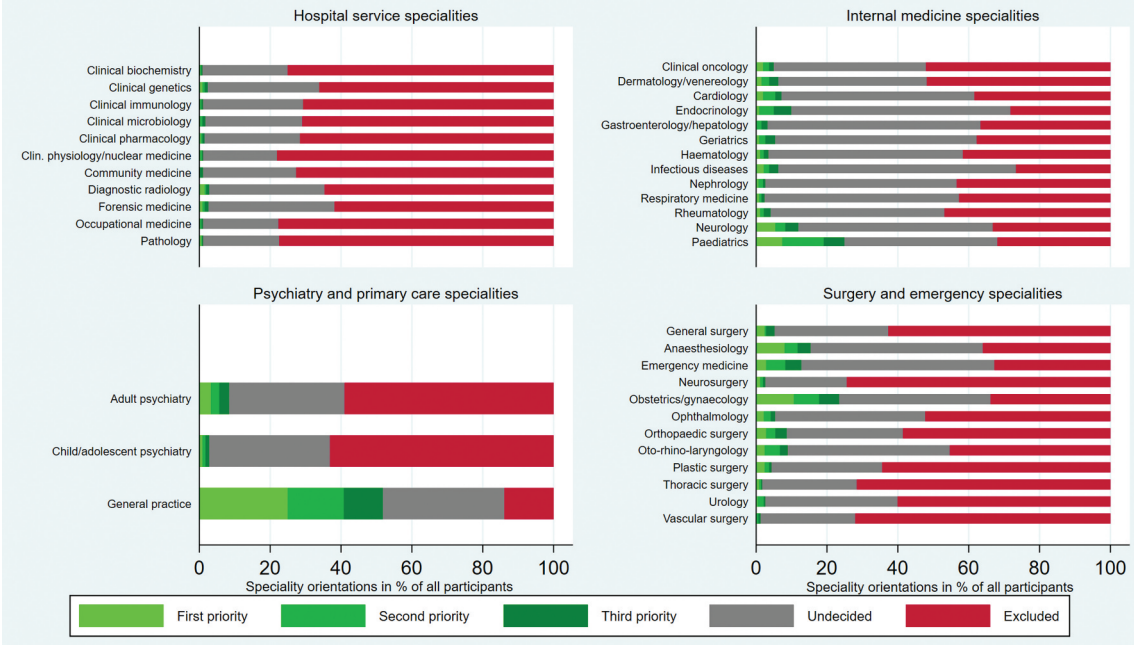


**Figure 3.** Distribution of the speciality orientations in per cent of total participants presented on speciality groups. The bars show the proportion of participants with the given speciality as first preference (light green), second preference (middle green) or third preference (dark green) and the share who are undecided (grey) or who have rejected the speciality (red).

### Specialty considerations

Figure 3 depicts the speciality considerations on speciality level and shows a remarkable commitment to a primary care career. Overall, 25% of the participants had general practice as their preferred speciality, and in total, a full half of the participants placed general practice as either a first, second or third preference for specialisation. General practice was only rejected by 13.9% of the participants. Even though many participants showed commitment to paediatrics, and obstetrics and gynaecology, these proportions were still much lower than those of general practice, and the rejection rate was also much higher. We found that about one third of participants were undecided about general practice specialisation, which was similar to psychiatric and hospital service specialities. Most participants were undecided about the internal medicine specialities, while the majority of participants had rejected the hospital service specialities as their future choice of career.

## Discussion

This paper explored a national cohort of medical trainees' speciality considerations during the career choice process. We found that general practice was in a good position in terms of future specialist recruitment in Denmark. Even though we found a high commitment to general practice, the future demand on the primary care health system in Denmark presents a challenge for the recruitment of new general practitioners. Thus, it has been estimated that there is a need for 5,000 general practitioners in 2030 compared to 3,284 in 2022, which requires full occupation of the 350 annual main training positions [38,39]. To accomplish this goal, roughly 30% of the medical trainees in our cohort should chose general practice for specialisation. Therefore, despite participants' high commitment to general practice compared to other specialities in this study, recruitment of more medical trainees is still needed after graduation.

Just like medical education continues in the postgraduate years, speciality choice is also a dynamic process that is shaped in the years after medical school. The career choice process of young doctors keeps changing even after medical school in light of postgraduate experiences – in their professional as well as in their private lives [40]. A prospective study on the stability of medical students' career interests in Canada showed that as much as 77.5% of 1,370 medical students had included their exit choice as one of their top three career interests on entry to medical school [41]. Also, a recent review report that 65.3% of UK medical trainees did not change their mind about their career choice during the foundation programme [42]. This indicates that the high commitment to general practice we found among Danish medical trainees is an important first step in future general practice recruitment. Future longitudinal studies are needed to investigate whether this high commitment is consistent when medical trainees' gain postgraduate working experience.

Longitudinal examinations of the changes in speciality orientations after medical school will reveal information on the speciality considerations in general. Besides general practice, we noticed a high commitment to paediatrics, and obstetrics and gynaecology, in our study. It is well-described that undergraduate and clinical exposure play a role in increasing medical student interest in these specialities [12,43,44]. As opposed to these specialities, we found a general low commitment to the hospital service specialities. A possible explanation for this low interest is that clinical exposure to these specialities is less compared to many other specialities at Danish medical schools. Lastly, we must emphasise that the timely placement of the clinical exposure to the specialities can affect both the reported intentions about specialisation in cross-sectional examinations, called 'a proximity effect' [45], and the actual choice [46].

Our results draw attention to the importance of the timing and type of recruitment interventions to accommodate the differences in recruitment potential [9,10,47]. The fluidity and uncertainty of the speciality choice process is significant, and we recommend that medical educators and healthcare planners employ this knowledge about speciality considerations and undergraduate exposure to develop interventions attentive to this and the potential to increase recruitment for the primary care physician workforce.

### Strengths and limitations

The systematic development and content validation of an extensive questionnaire for the specific purpose of the study provides a strong methodological grounding for our findings. The study is a multicentre study conducted on a national cohort of medical trainees. The study is limited by its quantitative nature, and potential concerns in this manner are selection bias and non-response bias, especially when considering the response rate of 38.8%. The medical trainees responding to the survey are potentially different than those who did not respond but the percentage of male and female respondents and their graduation university was comparable to the entire population of medical trainees beginning BCT in 2022. The respondents were found to be slightly younger than the entire population, which might result in an underestimation of the priority of general practice

since studies have suggested that a higher medical trainee age is associated with intentions to become a general practitioner [48]. However, the age difference is marginal, and it seems reasonable to expect that it has caused no substantial bias in the present study.

## Conclusion

Medical trainees show great interest in general practice specialisation as they transition from undergraduate to postgraduate education. However, the societal need for primary care workforce places an even greater demand for general practitioners in the future. Therefore, attention should be drawn towards maintaining the high interest in general practice after medical school, so that this interest translates to an equally high proportion of medical trainees choosing to become members of the general practice community.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Ethical approval

This study complies with the principles of the Declaration of Helsinki, and all subjects provided informed consent to participation. Ethical approval was obtained from Aalborg University's Research Ethics Committee [Journal no. 2023-505 -00,082]. All data was collected and kept confidential according to the EU General Data Protection Regulation (GDPR). Complying with the European data protection rules, the data processing activities were registered by the Center for General Practice at Aalborg University [Journal no. 197–1].

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