



ORIGINAL ARTICLE

Who wants to become a general practitioner? Student and curriculum factors associated with choosing a GP career - a multivariable analysis with particular consideration of practice-orientated GP courses

TOBIAS DEUTSCH, STEFAN LIPPMANN, THOMAS FRESE & HAGEN SANDHOLZER

Department of Primary Care, Leipzig Medical School, Leipzig, Germany

Abstract

Objective. Because of the increasing shortage of general practitioners (GPs) in many countries, this study aimed to explore factors related to GP career choice in recent medical graduates. Particular focus was placed on the impact of specific practice-orientated GP courses at different stages of the medical undergraduate curriculum. **Design.** Observational study. Multivariable binary logistic regression was used to reveal independent associations with career choice. **Setting.** Leipzig Medical School, Germany. **Subjects.** 659 graduates (response rate = 64.2%). **Main outcome measure.** Choice of general practice as a career. **Results.** Six student-associated variables were found to be independently related to choice of general practice as a career: age, having family or friends in general practice, consideration of a GP career at matriculation, preference for subsequent work in a rural or small-town area, valuing the ability to see a broad spectrum of patients, and valuing long-term doctor-patient relationships. Regarding the curriculum, after adjustment independent associations were found with a specific pre-clinical GP elective (OR = 2.6, 95% CI 1.3–5.3), a four-week GP clerkship during the clinical study section (OR = 2.6, 95% CI 1.3–5.0), and a four-month GP clinical rotation during the final year (OR = 10.7, 95% CI 4.3–26.7). It was also found that the work-related values of the female participants were more compatible with those of physicians who opt for a GP career than was the case for their male colleagues. **Conclusion.** These results support the suggestion that a practice-orientated GP curriculum in both the earlier and later stages of undergraduate medical education raises medical schools' output of future GPs. The findings are of interest for medical schools (curriculum design, admission criteria), policy-makers, and GPs involved in undergraduate medical education. More research is needed on the effectiveness of specific educational interventions in promoting interest in general practice as a career.

Key Words: Career choice, curriculum, general practice, Germany, primary care physician shortage, undergraduate medical education

Introduction

Like many other countries, Germany is faced with an increasing shortage of general practitioners (GPs) due to recruitment problems and demographic change [1]. It is therefore crucial to learn more about the factors influencing medical students' career considerations and decisions. Although there has been substantial international research in this field since the 1980s, there is a need for studies that may verify and expand on those earlier findings. Because of significant changes over time (e.g. gender ratio of the medical student population, different job

opportunities and working conditions, young physicians' values), it cannot necessarily be assumed that the results of past studies are still fully applicable [2]. Furthermore, a large number of the existing studies have been conducted in a limited number of countries (e.g. USA, Canada). In Germany, research on factors influencing medical students' career choice is still in the early stages [3].

Factors consistently shown to be associated with considering or choosing a career in general practice include socio-demographic variables, personal and professional preferences, career considerations at

Correspondence: Tobias Deutsch, Department of Primary Care, Leipzig Medical School, Philipp-Rosenthal-Str. 55, 04103 Leipzig, Germany. Tel: 00 49 341 97 15 710. Fax: 00 49 341 97 15 719. E-mail: tobias.deutsch@medizin.uni-leipzig.de

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Up-to-date evidence on factors associated with choice of general practice as a career is needed to counter the increasing shortage of GPs. Independent positive associations were found for:

- age, having family or friends in general practice, consideration of a GP career at time of matriculation;
- preference for subsequent work in a rural or small-town area, valuing the ability to see a broad spectrum of patients, valuing long-term doctor–patient relationships;
- a pre-clinical GP elective, a four-week GP clerkship (clinical study section), and a four-month GP clinical rotation during the final year.

matriculation, and medical school experiences [4–7]. The understanding of the impact of specific curricular and extra-curricular undergraduate medical education experience on career choice is still limited [8,9]. However, such knowledge would appear to be essential to guide medical schools' curricular planning.

The aim of the present study was to explore factors independently related to choice of general practice as a career among German medical school graduates. As a first step, we examined the associations of several student characteristics (socio-demographic, preferences, value orientations, and other factors consistently reported to influence a GP career choice in the existing international literature) with choice of general practice as a career. As a second step, the additional impact of four specific practice-orientated GP courses offered at different stages in medical school was analysed.

Material and methods

Sampling and design

This observational study was conducted at Leipzig Medical School, Germany. It combines data from a cross-sectional medical graduate survey with continuously documented data on medical students' participation in various GP courses. As the addresses of students usually change after graduation, the graduate questionnaires were sent to graduates' "home addresses" (mostly the parents' addresses). These addresses were collected on a voluntary and informed basis within the only general practice clerkship that was mandatory (eighth semester), at the same time as the collection of data for later non-responder analysis (age, gender, regional origin, parents practising medicine, currently favoured career option). The

graduate survey was carried out in 2011. All those who potentially could have finished their undergraduate medical studies at the time of the survey were contacted. To increase the response rate we sent the questionnaire three times by surface mail (July, October, and December), always with a formal covering letter. This letter briefly explained the background and the importance of the study, stated the mean time needed for completion (found in piloting to be four minutes), assured anonymity, and offered feedback on the results. All communication was personalized and contained the university logo to highlight the academic origin. Completed questionnaires could be returned by fax or surface mail (postage paid).

Questionnaire

The graduate questionnaire was developed on the basis of the existing literature regarding choice of general practice as a career. It contained items addressing factors consistently shown to be associated with GP career choice in previous international studies (both reviews and original articles). In addition, questions regarding the respondent's current professional development and future plans regarding work as a medical specialist were included. The final version was the result of a multi-level revision process involving two research-active GPs, two social scientists, and four medical graduates (two male, two female, representing the target group). An English translation of the questionnaire items analysed in this paper is given in Appendix 1 (supplementary material).

Undergraduate medical education and specific general practice courses

In Germany, undergraduate medical education consists of six years (12 semesters) and is divided into three sections: pre-clinical (basic science, two years), clinical (clinical science, three years), and the final clinical year (three four-month full-time clinical rotations: internal medicine, surgery, and one optional speciality). For detailed information please refer to Chenot [10]. Only a relatively limited number of educational possibilities is dedicated to general practice. The mandatory general practice curriculum includes a lecture series (eighth semester) and a two-week clerkship (eighth semester). Optionally, students can complete a four-week general practice clerkship during the clinical study section, as well as a four-month GP clinical rotation during the final year. As a special feature at Leipzig Medical School, two general practice electives are offered *in addition* to the usual GP curriculum to prepare students for, and attract them to, the field.

With regard to the European context, despite general practice becoming increasingly established as an academic discipline, its integration into the undergraduate medical curriculum varies substantially between and even within countries. It can vary from the absence of any GP curriculum, to its longitudinal integration including mandatory clinical components of several weeks or months [11].

An overview of the four optional general practice courses examined in the present study is given in Table I. All the study participants had the opportunity to take part in all of the courses described.

Statistical analysis

The anonymized data were analysed with IBM® SPSS® Statistics 20. Mann–Whitney U-tests and chi-squared tests were used to examine group differences. Binary logistic regression analyses were used to predict general practice career choice. In a first regression model, the independent influence of variables frequently found to be relevant in earlier studies (excluding curricular experiences) was examined. For this, the *purposeful selection of covariates* method, as described by Hosmer et al. [12], was used to build a parsimonious multivariable model while ensuring the inclusion of all relevant independent predictors and potential confounders. Besides careful variable selection, beginning with univariable analyses, this procedure adequately addresses testing for possible interactions, checking of important statistical assumptions, and thorough regression diagnostics [12]. In a second regression model, the independent influence of the four defined under-

graduate GP courses, adjusted for the variables included in the first model, was examined. Statistical significance was assumed at $p < 0.05$.

Results

Overall, 659 out of 1027 of those contacted on the basis of valid home addresses participated in the graduate survey, giving a response rate of 64.2%. A majority of 501 participants (76.0%) had completed their licensing examination at the time of participation. A non-responder analysis based on the data gathered during the mandatory clerkship (see paragraph “Sampling and design”) revealed no significant bias except for a slightly higher proportion of female participants. The socio-demographic sample characteristics are given in Table II. Of the 659 participants, 81 (12.3%) stated that they had opted for a career in general practice. Further descriptive statistics and some basic group comparisons have been published previously [13].

The results of the two logistic regression analyses predicting GP career choice are presented in Table III. The purposeful variable selection process revealed a set of six independent predictors (see Model 1). Regarding the effect of the four undergraduate GP courses, the data show independent positive associations between choice of general practice as a career and the pre-clinical GP elective, the four-week GP clerkship during the clinical study section, and the four-month GP rotation during the final year (Model 2). These effects persisted after adjustment for the variables shown to be relevant in Model 1.

The results of group comparisons between future GPs and other participants regarding the job-related

Table I. Description of the optional undergraduate general practice courses examined in this study.

Study section	Optional courses
Pre-clinical study section (years 1 and 2)	Pre-clinical elective “general practice” <ul style="list-style-type: none"> • Aim: motivation for general practice via acquisition of clinical skills and early patient contact • Form: introduction/preparatory course (14 TU¹) + practical training (one-to-one) in an associated GP’s office² (11 TU) + debriefing/oral exam (3 TU)
Clinical study section (years 3–5)	Clinical elective “general practice” <ul style="list-style-type: none"> • Aim: motivation for general practice via acquisition of clinical skills (adapted to the advanced level of education) and experiences in general practice • Form: preparatory course (6 TU) + practical training (one-to-one) in an associated GP’s office (21 TU) Clerkship in general practice <ul style="list-style-type: none"> • Duration: 4 weeks • Full-time experience in the GP setting • Optional organizational support by the Department of Primary Care
Final (clinical) year (year 6)	Clinical rotation in general practice <ul style="list-style-type: none"> • Duration: 4 months • Content structured by the Department of Primary Care (defined catalogue of learning objectives) • One-to-one training by specifically trained GP • Supervision of students and GP tutors

Notes: ¹TU = teaching unit (= 45 minutes). ²The Department of Primary Care of Leipzig Medical School collaborates with a large number of associated, specifically qualified GPs.

Table II. Sample characteristics.

Variable	Valid (n)	n (%) ¹
Age [mean ± SD]	659	27.9 ± 2.5
Female gender	659	441 (66.9)
In a relationship	658	463 (70.4)
Has children	658	127 (19.3)
At least one parent with higher education degree	658	521 (79.2)
Being a physician's child	659	201 (30.5)
Family or friends in general practice during schooldays/years of study	657	172 (26.2)
Mainly grew up in ...	653	
... big city		231 (35.4)
... small town		246 (37.7)
... rural area		176 (27.0)

Note: ¹Unless otherwise indicated.

value orientations examined in this study are shown in Table IV. Additionally, male and female participants were compared, since previous studies suggested respective differences [14,15].

Discussion

In this study, six variables were independently positively related to GP career choice: age, having family or friends in general practice, consideration of a GP career at time of matriculation, preference for subsequent work in a rural or small-town area, valuing the ability to see a broad spectrum of patients, and valuing long-term doctor–patient relationships. In addition, there were independent associations with having had a pre-clinical GP elective, a four-week GP clerkship during the clinical study section, and a four-month GP clinical rotation during the final clinical year.

In our study, 12.3% of the participants had decided to become a GP. Although direct comparisons are difficult, this seems to be a relatively high proportion compared with other German studies (16–18).

With regard to the variables related to GP career choice, our findings are consistent with previous evidence on the influence of career considerations at matriculation [5,9,19,20], and a preference for later rural practice [4–6]. The association with higher age has also frequently been reported [5,17,19,21], although a recent literature review described the respective evidence as not being homogeneous [4]. Our finding that having GPs among family and friends is positively related to GP career choice contrasts with a recent study from Canada [21] that did not find such an influence. The positive associations shown for valuing the ability to see a broad spectrum of patients and valuing long-lasting doctor–patient relationships are compatible with earlier findings

[7,14,21], including recent findings of German, Swiss, and Finnish studies [3,22,23]. In accordance with a recent German study [3], we found no difference between future GPs and other participants regarding the desire for prestige. Nor could we detect any independent associations between choice of general practice as a career and a desire to have a variety of everyday tasks or be involved in research in the multivariable analysis, although there were significant group differences (see Table IV). The previous evidence on these variables is not homogeneous [4]. Although female gender has frequently been reported to predict GP career choice [4,7,17], this was not a predictor in our data. Results of recent studies imply that any gender effect might be caused, or at least mediated, by gender differences regarding job-related values and motivation (e.g. the importance of continuity of patient care, or of work–life balance) [14,15]. This is compatible with the results of our group comparisons based on gender, showing a slightly more “GP-associated” value profile for women (see Table IV).

Regarding the influence of practice-orientated curricular experience on choice of general practice as a career, previous findings suggest that prolonged experience, of several weeks or months, during the clinical study section is particularly beneficial [4,7]. This is in line with our results relating to the four-week GP clerkship and the four-month GP clinical rotation. Several studies have also underlined the importance of optional courses for the career choice process and their potential to increase students' interest in general practice [24,25]. In line with our results, Kassebaum et al. found a positive association between a GP elective and a later choice of general practice as a career in a study of high methodological quality using multivariable analysis adjusting for a large number of covariates [19]. With regard to the question of how practice-orientated courses produce their effect, several studies emphasize the experience of positive role models, the opportunity to dispel negative stereotypes, and the chance to get a more accurate view on general practice [23,26,27]. The evidence for the benefit of GP courses early in medical school is not homogeneous, and several studies are weakened by participant self-selection [28]. Despite adjustment for other significant influencing factors, particularly career considerations at matriculation, a possible bias due to participant self-selection of additional GP electives cannot be completely excluded from this study either. However, in a former study we showed that our pre-clinical GP elective positively influenced students' career considerations, including those participants who previously had less or no interest in a GP career [29]. Studies focusing on medical schools

Table III. Multivariable binary logistic regression analyses predicting GP career choice, n = 648 (valid data for all included variables).

Variable	Model 1 ¹			Model 2 ²				
	(Pseudo-R ² _{Nagelkerke} = 0.362)		(Pseudo-R ² _{Nagelkerke} = 0.234)	(Pseudo-R ² _{Nagelkerke} = 0.350)		(Pseudo-R ² _{Nagelkerke} = 0.486)		
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p		
Participation (vs. no participation) in ...								
... pre-clinical elective course in general practice (pre-clinical study section)			2.2 (1.2–4.0)	0.011	2.1 (1.1–4.0)	0.022	2.6 (1.3–5.3)	0.006
... clinical elective course in general practice (clinical study section)			1.8 (0.7–4.8)	0.234	1.7 (0.6–4.4)	0.318	1.4 (0.5–4.2)	0.536
... four-week clerkship in general practice (clinical study section)			3.8 (2.2–6.8)	<0.001	2.4 (1.3–4.4)	0.005	2.6 (1.3–5.0)	0.005
... four-month clinical rotation in general practice (final year)			7.5 (3.7–15.2)	<0.001	7.3 (3.4–15.7)	<0.001	10.7 (4.3–26.7)	<0.001
Age ≥ 25 years at the time of the mandatory two-week general practice clerkship (vs. ≤ 24 years)	2.4 (1.3–4.3)	0.004	2.6 (1.5–4.7)	0.001	3.0 (1.6–5.7)	0.001	3.0 (1.6–5.7)	0.001
Family or friends in general practice during schooldays/years of study (vs. not)	2.0 (1.1–3.5)	0.016	2.1 (1.2–3.7)	0.012	2.3 (1.2–4.3)	0.010	2.3 (1.2–4.3)	0.010
Consideration of general practice as a career option at study entry (preferred or possible option) (vs. no option)	5.5 (2.7–11.0)	<0.001	5.6 (2.8–11.3)	<0.001	3.6 (1.7–7.7)	0.001	3.6 (1.7–7.7)	0.001
Preference for later work in a rural or small-town area (vs. not)	2.3 (1.3–3.9)	0.004			2.5 (1.4–4.6)	0.004	2.5 (1.4–4.6)	0.004
Personal (job-related) importance of ...								
(five-point Likert-scale from 1 = unimportant to 5 = very important)								
... broad spectrum of patients	1.6 (1.1–2.3)	0.026					2.1 (1.3–3.4)	0.001
... long-term doctor–patient relationships	2.7 (1.9–3.8)	<0.001					2.6 (1.8–3.8)	<0.001

Notes: ¹Model 1 was the result of the *purposeful selection of covariates* process (see paragraph “Statistical analysis”) considering the influence of variables frequently found to be relevant in earlier studies (excluding curricular experiences). The following variables were taken into consideration within the model-building process: age, gender, having a partner, having children, being a physician’s child, regional background, family or friends in general practice during schooldays/years of study, at least one parent with higher education degree, preference for later work in a rural or small-town area, consideration of general practice as a career option at study entry, and the seven variables addressing job-related value orientations presented in Table IV. ²Model 2 examines the independent association of the four optional undergraduate general practice experiences (see Table I) with GP career choice adjusted for the variables shown to be relevant in Model 1. To uncover possibly meaningful changes, variables were included in three steps: undergraduate general practice courses, complemented by the definitely unalterable variables of Model 1, complemented by the variables of Model 1 that may have altered over time.

Table IV. Job-related value orientations: Comparisons based on career choice and gender.

Personal (job-related) importance of ... (five-point Likert-scale from 1 = unimportant to 5 = very important)	n	All Mean ± SD	Future GPs Mean ± SD	Other Mean ± SD	p ¹	Female Mean ± SD	Male Mean ± SD	p ¹
... variety of everyday tasks	658	4.3 ± 0.6	4.5 ± 0.6	4.3 ± 0.6	0.007	4.3 ± 0.6	4.3 ± 0.6	0.539
... broad spectrum of patients	659	3.9 ± 0.8	4.2 ± 0.7	3.8 ± 0.8	<0.001	3.9 ± 0.8	3.8 ± 0.8	0.032
... high income	658	3.5 ± 0.8	3.4 ± 0.9	3.5 ± 0.8	0.147	3.4 ± 0.8	3.6 ± 0.8	0.065
... prestige	654	2.7 ± 0.9	2.5 ± 0.9	2.7 ± 0.9	0.176	2.6 ± 0.9	2.8 ± 0.9	0.001
... positive work-life balance	657	4.6 ± 0.7	4.7 ± 0.5	4.5 ± 0.7	0.124	4.6 ± 0.6	4.4 ± 0.8	<0.001
... involvement in research	656	2.6 ± 1.1	2.3 ± 1.0	2.6 ± 1.1	0.011	2.4 ± 1.0	2.9 ± 1.2	<0.001
... long-term doctor-patient relationships	659	3.3 ± 1.0	4.2 ± 0.8	3.2 ± 1.0	<0.001	3.4 ± 1.0	3.2 ± 1.0	<0.001

Note: ¹Mann-Whitney U-test.

as the unit of analysis show that the existence of a GP department and a sound GP curriculum positively correlate with the number of graduates choosing to become GPs [30,31].

Strengths and weaknesses

Following current recommendations, the present work built on previous research, studied general practice separately from other primary care specialties, and used multivariable statistical analyses [5]. Moreover, while many other studies are based on students' undergraduate career *considerations*, in this study the stronger outcome criterion of career *choice* after or at graduation (the majority of respondents were in postgraduate training) was used. Both the highly satisfactory response rate compared with similar studies in Germany [17] and the non-responder analysis indicate representativeness. In our setting a randomized controlled study was not feasible. We therefore chose an observational study design and a multivariable statistical methodology, despite it offering a lower level of evidence. As already mentioned, the present study combines data continuously documented in the course of medical studies, data gathered within the only GP clerkship that was mandatory, and data from a graduate survey. Some of the variables that were gathered cross-sectionally at the time of the graduate survey may have altered over time. Causal inferences regarding these variables should be made with care, although the overwhelming majority of them can be considered as being very stable over time. While some may consider the sample size to be relatively small, current simulation studies indicate that plausible and highly significant associations hypothesized a priori can be interpreted, with a minor degree of extra caution, in logistic regression models that have five to nine events per predictor variable [32]. While a criticism could be that not all of the participants had completed their licensing examination, the study design ensured that all those participants were at least close to their graduation. Finally, it should be

stated that the results are based on the data from one medical school, which may limit the generalizability of the findings. The effects of educational interventions may differ depending on the local didactic context and individuals involved [33].

Conclusions

This study contributes to an understanding of the factors influencing the choice of general practice as a career today. Information on the characteristics of those who are more or less likely to become GPs can be useful in different ways. While in some countries there is discussion on how to adapt medical school admission criteria to meet the workforce needs, in Germany the main focus is on persuading medical students to become GPs. Research findings may therefore be used to define target groups for interventions or to guide the development of a convincing external presentation of the speciality, perhaps specifically tailored for different subgroups. The data also support the hypothesis that a practice-orientated general practice curriculum, in both the early and later stages of undergraduate medical education, will aid the recruitment of future GPs. Although further research is still needed to confirm and extend the evidence on the impact of specific curricular interventions, the results are in line with previous studies suggesting that a broad establishment of a practice-orientated GP curriculum at medical schools could be one important component to counter recruitment problems. This might be promoted by supporting the academic institutionalization of the speciality. Our findings should be of interest to medical schools, policy-makers, and GPs involved in undergraduate medical education.

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Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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