

ORIGINAL ARTICLE

The Career Expectations of Medical Students

Findings of a Nationwide Survey in Germany

Bernhard Gibis, Andreas Heinz, Rüdiger Jacob, Carl-Heinz Müller

SUMMARY

Background: Demographic change, technical progress, and changing patterns of service use influence the future demand for physicians in the German health care system. The attitudes of medical students towards their later work in the health system is important for current health care planning. For that reason a nationwide survey aimed to identify major trends in preferred specialty, workplace characteristics (regional location, hospital) and perceived hindrances for clinical work.

Methods: A questionnaire consisting of 34 closed questions was developed at the University of Mainz in 2009 and administered over the Internet in June and July 2010 to all medical students in Germany. The questions addressed the students' intentions regarding specialty training, location of practice, workload, and regional preference, as well as potential reasons why they might choose not to practice clinical medicine in the future.

Results: 12 518 web-based questionnaires were filled in (approx. 15.7% of all medical students in Germany in 2010). The mean age was 24.9 years, with 64% female and 36% male. Favored specialties were internal medicine (42.6%), family medicine (29.6%), pediatrics (27.0%) and surgery (26.8%). Nearly all respondents (96%) stated that they attached importance to compatibility of work and family life. Working in a salaried position (92.2%) was preferred to working in private practice (77.7%). General practice, in particular in rural locations, was significantly less favored than work as a specialist in cities.

Conclusion: Although the coming generation of physicians anticipate working in clinical settings in the future, shortfalls in the areas of primary care and in rural locations are likely if medical students adhere to their preferences stated in the questionnaire.

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Experts believe that demographic developments and medical progress are combining to bring about large-scale changes in the medical care of the general population (1). Increasing life expectancy and the associated multimorbidity, together with increasing urbanization and the breakdown of social support structures such as the family, are changing the settings of care and influencing medical service provision. Physicians are also affected: The average age of the membership of the German National Association of Statutory Health Insurance Physicians rose from 46.6 years in 1993 to 51.9 years in 2009, and the Association estimates that around 28 000 vacancies will have to be filled by 2015. Simultaneously, expectations regarding the medical profession are changing, as shown by numerous surveys of medical students (2–4).

In the German context, two large quantitative nationwide surveys have shed light on the attitudes of medical students towards their later work as doctors (5, 6). The results of qualitative investigations are also available (7). In common with surveys from other countries, these studies reveal increasing preferences for working as a specialist and for practicing medicine in urbanized regions. They also reflect the increasing proportion of women in the medical profession.

In view of the emerging challenges to health care provision, the University of Trier, supported by the National Association of Statutory Health Insurance Physicians, adapted a survey initially conducted in the German federal state of Rheinland-Palatinate for application nationwide. Accurate knowledge of medical students' preferences for future specialty, their flexibility regarding location and workload, and their views on the compatibility of work and family life is essential for the planning of provision. We therefore set out to survey medical students' attitudes towards their later work in the medical profession, specifically their intentions with regard to specialty, workplace characteristics, and location.

Methods

Based on a previous survey of all students of medicine at the University of Mainz in 2009, a web-based questionnaire consisting of 34 predominantly closed questions was administered to the students of all medical faculties in Germany via personally addressed e-mails in June 2010. With the support of the Medical Faculty Conference (*Medizinischer Fakultätentag*), all

TABLE 1

Preferred specialties by sex (% , n = 12 058)

	Women	Men	Difference (women–men)	Statistical significance
Gynecology	27.6	5.1	22.5	p <0.01
Pediatrics	33.1	19.7	13.4	p <0.01
Psychiatry	15.5	11.5	4	p <0.01
Family medicine	31.4	28.4	3	p <0.01
Dermatology	5.8	3.3	2.5	p <0.01
Ophthalmology	5.4	4.8	0.6	not significant
Neurology	19.6	20.2	-0.6	not significant
ENT	5.6	7.3	-1.7	p <0.01
Urology	4.1	7	-2.9	p <0.01
Radiology	8.9	16.6	-7.7	p <0.01
Anesthesiology	24.5	32.4	-7.9	p <0.01
Surgery	23.6	32.6	-9	p <0.01
Internal medicine	40	49.4	-9.4	p <0.01
Orthopedics	14.5	25.5	-11	p <0.01
Others	13.0	12.8	0.2	not significant

Analysis by chi-square test; modified from: Heinz A, Jacob R: Medizinstudenten und ihre Berufsperspektiven. In welcher Fachrichtung, wo und wie wollen sie arbeiten? Bundesgesundheitsbl 2012; 55: 245–53. Reproduced by kind permission of Springer-Verlag, Heidelberg

faculties were requested to forward the invitation to participate in the survey to their students. The software SPSS 18.0 was used for statistical evaluation; the analysis is described in detail in the *eMethods* and in a recently published monograph (8).

Results

Sample: response rate and respondents

A total of 12 518 questionnaires were completed. Disregarding the possibility of multiple response, which cannot be absolutely excluded, this represented a response rate of 15.7%, based on the total of 79 929 medical students registered at the 36 medical faculties in Germany in 2010. At six faculties (Essen, Halle, Münster, Regensburg, Witten-Herdecke, and Würzburg), fewer than 10 students completed the questionnaire. Sixty-four percent of the respondents were female, corresponding closely with the proportion among medical students in general—61.3% in the winter half-year 2009/10, according to the data of the German Federal Statistical Office (9). The average age of the participants was 24.9 years (standard deviation 3.6). Some 96.5% of the respondents were German citizens. With regard to geographical location, 27.1% of the sample were studying at medical schools in southern Germany, 9.0% in the city states of Berlin, Bremen, and Hamburg, 18.8% in the federal states corresponding to the territory of the previous East

Germany, and 45.0% from the remaining states of western Germany (n = 9945).

According to the data provided by the students who responded, 32.1% were at the preclinical stage of education at the time of the survey, 53.0% in the clinical phase, and 15.0% in their final year of practical training (n = 10 104). There was a strikingly high rate of previous contact with the health care sector: 55.3% reported practical experience in the health services before starting to study medicine, 24.2% had physicians as parents, 31.1% had other family members who were physicians, and as many as 13.6% stated that they might have the opportunity of taking over the office of an acquaintance or relative (multiple answers possible). Some 5.5% of the respondents (n = 12 516) already had children (women 6.0%, men 4.5%). In this respect the medical students in our survey resembled students in general: The 19th survey of the German National Association for Student Affairs, carried out in 2009, showed that 5.0% of students had children (10).

Compatibility of work and family life

Altogether, 95.5% of the respondents stated that good compatibility of work and family life was important to them (n = 11 776). There was hardly any difference between the sexes: 97.0% of the women and 93.0% of the men placed importance on a balanced relationship between work and family. The sexes also differed hardly at all with regard to desire for children. Overall, 88.8% of the medical students (n = 9705) wanted children later (women 89.7%, men 87.3%).

Specialty training

From a list of 14 medical disciplines, the participants were asked to name no more than three preferences for future specialty training (n = 12 058). *Table 1* summarizes their responses. The favored specialties varied as students progressed through their training, but the five most popular specialties remained stable. Moreover, the number of disciplines nominated decreased significantly with increasing duration of training. Preclinical students chose an average of 3.1, clinical students picked 2.8, and those in the final year of practical training selected 2.3 specialties. A total of 12.6% of the respondents specified one or more unlisted specialties under “Others”, most frequently pathology (149 nominations) and forensic medicine (141 nominations).

The preferences for future specialization differed considerably and, given the sample size, significantly between men and women. The greatest variations were seen in gynecology, pediatrics, orthopedics, and surgery.

Working hours

A total of 75.5% of the respondents (n = 10 245) thought it would be important to decide for themselves when and how long they worked, and 60.9% expressed the wish to be able to work part-time. There was no difference between women (74.7%) and men (75.7%) in the desire to determine their own working hours, but a

clear difference regarding part-time work. While 77.2% of the female medical students thought it important to have the possibility of working part-time, only 32.1% of their male counterparts shared this view. The proportion of respondents who wanted to be able to work part-time increased during the course of training: 54.2% at the preclinical stage, 63.7% in the clinical phase, and 64.8% in the final year of practical training (n = 10 081).

The great majority of the sample—around 87%—expected to work (at least initially) in a full-time post, and almost half assumed they would work more than 50 hours per week. The mean values were similar, and the averages for men and women and for students in the different phases of training also lay between 51 and 52 hours (Table 2).

Type of employment

The questionnaire listed nine options for future type of employment; more than one box could be checked. Overall, “salaried physician in a hospital” and “specialist with own office” were chosen equally often. The students expressed a preference for working in patient care. Other options, e.g., employment in research (nominated by only 18.9%), were much less popular. Salaried employment was much more attractive than self-employment, but only if a hospital post was involved. The differences between men and women were statistically significant at greatly varying levels almost throughout, with two exceptions: working as a specialist in one’s own office was equally attractive for both sexes, while employment by a health insurance provider was equally unattractive.

Women selected salaried employment much more frequently than men, and also had a somewhat higher preference for employment in a public health service post or in primary care. The overall willingness to set up an office (as specialist or primary care physician) was comparable for men and women (Table 3).

Analysis of barriers to establishment of an office and hospital employment

A total of 11 095 respondents answered the question regarding factors that speak against establishing one’s own office. These were, in descending order:

- High financial risk (62.7%)
- Non-medical tasks and bureaucracy (57.8%)
- Low income or inadequate remuneration (53.4%)
- The threat of recourse claims by health insurance providers (49.9%)
- The high purchase price for an office (48.7%)
- High workload (37.4%).

Principal component analysis showed associations among the items, which can be grouped as follows (varimax rotation, KMO.659):

- Low income, financial risks, and bureaucratic hurdles
- An unfavorable balance between working time and leisure time, with (too) little time for the family

TABLE 2

Weekly working hours after specialist qualification (%; n = 10 212)

	N	%
Up to 20 hours	27	0.3
21 to 40 hours	1343	13.1
41 to 50 hours	4323	42.3
51 to 60 hours	3472	34.0
More than 60 hours	1050	10.3
N	10 212	100
Standard deviation	9.6	
Arithmetic mean	50.6 hours	

- The danger of practicing routine medicine in isolation in a rural area, with “standard patients” and little opportunity to talk to other physicians.

The respondents expressed the wish for these obstacles to be overcome by:

- Support regarding financing, including financial incentives to set up an office
- Guidance on questions of law and bureaucracy
- Targeted support for establishment of offices in financially unattractive locations and for doctors’ families in rural areas.

Different emphases emerged when the medical students checked the factors that spoke against hospital employment. A total of 10 688 students specified reasons for not taking up a hospital post. The most frequently mentioned reasons were high workload (63.1%), poor compatibility of work and family life (60.5%), the inadequate amount of time available for treating patients (55.1%), and the rigid hierarchy in hospitals (53.2%). Fewer than half of the respondents named, in descending order, “little leisure time,” “low income,” “on-call duty and night shifts,” “high degree of non-medical tasks and bureaucracy,” and “little opportunity for promotion” as reasons not to work in a hospital. Principal component analysis (varimax rotation, KMO.816) extracted two central factors: An unfavorable balance between work and leisure time deterred 65.5% of the students from working in a hospital, and 27.6% would be put off by (excessively) low income and precarious career perspectives.

Expected income

The distribution of anticipated net earnings is striking (Table 4). The phase of training at the time of the survey had no influence on income expectations—no significant differences were found between students at the beginning of their course and those in the final year of practical training. The differences between the sexes, however, were significant. Judged by the standard deviations of expected incomes, female students were

TABLE 3

Office-based and salaried employment by sex (%)

	Women	Men	Difference (women-men)	Statistical significance
Salaried physician in a hospital (n = 10 906)	75.7	80.5	-4.8	p <0.01
Specialist with own office (n = 11 555)	73.6	74.5	-0.9	not significant
Salaried physician in an ambulatory healthcare center (n = 11 486)	61.6	46.2	15.4	p <0.01
Salaried physician in an office (n = 11 481)	57.9	32.5	25.4	p <0.01
Primary care physician with own office (n = 11 468)	39.2	36.3	2.9	p <0.01
Salaried physician in research (n = 11 491)	20.2	28.5	-8.3	p <0.01
Salaried physician in public health service (n = 11 472)	20.6	15.7	4.9	p <0.01
Salaried physician in pharmaceutical industry (n = 11 493)	9.0	18.6	-9.6	p <0.01
Salaried physician for a health insurance provider (n = 10 854)	5.2	6.2	-1.0	not significant
Own office (overall)	77.2	77.5	-0.3	not significant
Salaried employment in clinical care (overall)	94.1	90.5	3.6	p <0.01
Salaried employment in ambulatory care	74.7	53.9	20.8	p <0.01

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much more homogeneous than their male counterparts and were content with much lower earnings.

Location of practice, regions

Only 3.4% of all respondents stated they by no means wanted to work in Germany, while 7.9% said they would definitely not take up a post abroad. With regard to working within Germany, the students showed a clear preference for staying close to home as they had done when choosing where to attend university. Over half of them (52.2%, n = 10 413) would definitely consider working in their home area, just under half (49.7%, n = 10 375) in their own federal state, and under one third (28.0%, n = 10 382) in another state. The emphasis was therefore very clearly on Germany.

Attachment to home area showed regional differences, however. It was strongest in southern Germany (93.1%), followed by the city states (91.8%), western Germany (85.6%), and finally eastern Germany (76.7%). Among the students prepared to move to another region, the three federal states most frequently mentioned were Hamburg (63.1%), Bavaria (57.2%), and Baden-Württemberg (55.2%).

Table 5 shows the respondents' preference for larger towns and cities. Place of origin and sociospatial socialization played a decisive role in aversion to rural areas. Students who themselves were socialized in the countryside were significantly more frequently prepared to live and work in a small town or village. The sex of the respondents also had a significant influence: Women were more willing than men to go to a rural

area. In contrast, the phase of training at the time of the survey had no influence on the responses (Table 5).

Discussion

The results of this study show that the medical students who represent the coming generation of physicians are highly interested in working in clinical care and anticipate having to work more hours than average, upwards of 40 hours per week. The survey reflected the general trend towards women making up a higher proportion of physicians than used to be the case. It also mirrored general developments in our society. Living and working in the country was considered relatively unattractive; doctors too are attracted to larger towns and cities. Compatibility of work and family life has become much more important to both men and women, and this is shown not least by the increased interest in salaried employment.

Our findings are largely in agreement with those of the two previous German surveys (5, 6) and studies from other countries (2, 3, 11–13). Differences from the two large German surveys (5, 6) can be seen in the choice of future specialty and in the definitive intention to work abroad. While internal medicine is the most popular specialty in all of the surveys, it was followed in the two earlier German surveys by surgery, family medicine, anesthesiology, and then pediatrics. In our study the ranking is different with family practice on the second rank, pediatrics on the third, and surgery on the fourth. Comparing the preferred specialties of students in the final year of practical training with those

in earlier phases of their medical education, the top five specialties are the same but in a different order. In the study by Osenberg et al. (5) there is a further significant difference: A far higher proportion of respondents stated they would be willing to work abroad, albeit with differently weighted questions.

There are considerable discrepancies between the specialty preferences and actual future requirements. The eventual choice of specialty is affected by various factors after qualification, so the preferences stated in the survey are not necessarily final. If all students were to follow these preferences, however, shortfalls could be anticipated (compared with the status quo) in primary care, and also in ophthalmology and ENT. This development is accentuated by the tendency to view primary care as unattractive, particularly in the countryside, and by the unfavorable assessment of career prospects expressed by practicing primary care physicians in an international comparison (14). Studies in other countries also show that primary care in rural areas constitutes a particular problem (11). In interviews with Australian medical students, Tolhurst and Stewart established that great importance was attached to the future physician's own family, the potential for working part-time, and the opportunity to take extended sabbaticals (4).

Numerous studies have highlighted the significance of a student's training in the subsequent decision on where to work (15) and in what specialty (16). It seems clear that the availability of internships and periods of practical training in rural areas have a positive influence on medical students' career choices (17, 18). According to the respondents to our survey, intensified provision of advice and the financial security of the future work were crucial. These points should play a role in planning health care provision for the future, and indeed have already been adopted to some extent. Our study may thus help to show how future physicians can be won over to clinical care.

Limitations

This nationwide survey of all medical students has limitations. It is difficult to determine whether the results are representative, because the preferences of the non-respondents are unknown. The estimated response rate of 15.7%, without accurate knowledge of the total number of medical students in summer 2010, reinforces this effect. Moreover, multiple responses cannot be excluded.

Conflict of interest statement

The authors declare that no conflict of interest exists.

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TABLE 4

Income expectations: adequate monthly net income (€) according to sex

	Gender	Arith. mean	SD	Sigma
Salaried physician with five years of experience	Women	4170	2245	0.0001
	Men	4617	3769	
Resident physician, urbanized region	Women	5032	2930	0.0001
	Men	6080	5036	
Resident physician, rural region	Women	5017	3174	0.0001
	Men	5927	4756	

F-test; Arith. mean, arithmetic mean; SD, standard deviation

TABLE 5

Aversion to location according to population size (%; n = 10 604)

Number of inhabitants	N	%
Up to 2000	5761	54.3
2000 to 5000	4874	46.0
5000 to 10 000	3857	36.4
10 000 to 50 000	2139	21.5
50 000 to 100 000	1125	11.3
100 000 to 500 000	850	8.0
More than 500 000	1719	16.2

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KEY MESSAGES

- The medical students who took part in the survey expressed a high degree of interest in working in clinical care after qualification.
- Larger towns and cities were favored over rural areas.
- There was a predominant preference for specialization.
- The most frequently mentioned barriers to salaried employment in a hospital were excessive bureaucracy, incompatibility of work and family life, and, in the case of those considering establishment of their own office, financial risks including recourse claims by health insurance providers.
- Targeted support measures could help to overcome these barriers.

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ORIGINAL ARTICLE / eMETHODS

The Career Expectations of Medical Students

Findings of a Nationwide Survey in Germany
Detailed Description of Methods

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The survey of medical students was divided into two stages. In 2009, in cooperation with the Association of Statutory Health Insurance Physicians of Rhineland-Palatinate, a questionnaire was distributed to the students of the medical school at the University of Mainz. This study served as a pilot study for the ensuing nationwide survey.

Both surveys were administered online. The target group was all medical students of the participating medical schools; thus, a whole-population survey was planned. The students were contacted via the medical school mailing lists. The coverage rate therefore depended on how complete and up-to-date these lists were. Organizational and financial restraints ruled out postal contact using the addresses on file at the university registrar's office.

It emerged during the course of the nationwide survey that the quality of the faculty mailing lists was extremely variable, so we cannot say how many of the registered medical students even received an e-mail or how many of them read it. To minimize this problem, the medical schools informed their students about the survey directly, rather than using the university's internal collective mail system. The high degree of heterogeneity in the individual medical school mailing lists remains a problem, however. We therefore cannot make any statement regarding the coverage of the target population.

Accordingly, the study participants represent a self-selected sample of a population of unknown size, which is, in turn, mostly a non-random selection of the total population. Because the participants were not chosen at random, the results cannot be extrapolated in any mathematically or statistically meaningful way to the total population.

Nevertheless, some central structural characteristics of the sample, such as sex ratio, age structure, and proportion of parents who were themselves students, correspond to the total population of medical students. For this reason, and also because of the homogeneity of the survey's central results and its high structural convergence with other surveys, we see no reason to assume that the results are an imprecise representation of the attitudes, opinions, and expectations of the coming generation of physicians. Rather, we work on the

assumption that the findings are typical of the motives and sentiments of the target population.

Because the questionnaire had already been used in the pilot study in Rhineland-Palatinate and most of the questions had proved valid, we dispensed with a further pretest in the target population of the nationwide survey. However, in March and May 2010 we carried out expert pretests with representatives of the National Association of Statutory Health Insurance Physicians (NASHIP) and the Medical Faculty Conference (MFC; *Medizinischer Fakultätentag*), leading to a small number of modifications to the original instrument.

In mid-April 2010 the NASHIP wrote letters to the deans of the medical schools in Germany to inform them about the planned survey and request their support (details in *eMethods Table*). In parallel, the 17 regional associations of statutory health insurance physicians were informed of the project, also by post. At the end of April, e-mails were sent to the medical schools that had not yet replied. In May, the deans of students of the medical schools that had still not responded were contacted by telephone to request their support. At the same time, the regional associations of statutory health insurance physicians were asked to contact the universities concerned and persuade them to participate. As a result of these measures, 34 of the 36 medical schools in Germany were prepared to support the survey. Only the universities of Essen and Würzburg declined to participate.

The survey started on 14 June 2010, when the participating faculties sent the corresponding e-mail to their medical students. Unfortunately a few faculties had already drawn their students' attention to the survey before this date by forwarding the e-mails in which the deans had been informed about the forthcoming survey, including a link to the online questionnaire, without further comment. The consequence was that 642 students opened and completed the questionnaire before the official starting date. This was, however, unproblematic, with one exception, namely the question about the other federal states in which the respondent would be prepared to work. For this question there were deviations: In the original version of the questionnaire (before June 2010) the wording was "In which other federal states would you definitely not be willing

eMETHODS TABLE

Summary of methods

General	
Aim of survey	Information about the career perspectives of medical students and the currently perceived hindrances for later clinical work
Planning and execution of survey, analysis	University of Trier
Survey period	14 June to 9 July 2010
Type of survey	Online survey with the support of the deans (or deans of students) of the medical schools in Germany
Link	www.unipark.de/uc/medizinstudierende/
Target group	All medical students nationwide
Survey phase	
End of March 2010	First questionnaire conference at the National Association of Statutory Health Insurance Physicians
Beginning of April 2010	Revision of the questionnaire
Mid-April 2010	The deans of the medical schools are informed of the survey by post and asked for their support. In parallel, the 17 regional associations of statutory health insurance physicians are informed of the project, also by post.
End of April 2010	First follow-up: e-mails are sent to the deans (or deans of students) of the medical schools that have not yet offered support.
Mid-May 2010	The Medical Faculty Conference is involved in the design of the questionnaire. Second follow-up: telephone calls to the deans (or deans of students) of the medical schools that have still not offered support. At the same time, regional associations of statutory health insurance physicians are asked to contact the medical schools that have not yet agreed to participate.
Beginning of June 2010	Before the start of the survey the article "Ärztmangel: Was tun wenn der Nachwuchs ausbleibt?" ("Not enough doctors: what if too few new physicians enter the medical profession?"), announcing the survey, appears in <i>Deutsches Ärzteblatt</i> . E-Mail reminders to all participating universities that the survey starts on 14 June.
14 June 2010	The survey starts.
End of June 2010	By the end of June 2010, around 6600 medical students have already completed the questionnaire and sent it in. Depending on the number of responses, the universities are contacted again in a third follow-up: – more than 300 respondents (n = 9) : university receives e-mail of thanks – between 50 and 299 respondents (n = 15): university receives e-mail of thanks with additional request to remind the students – fewer than 50 respondents: (n = 10): university is contacted in person and also receives a reminder by e-mail
9 July 2010	The survey ends. Around 12 500 medical students have taken part.

to work?", while in the final version, after consultation with the NASHIP and the MFC, this was changed to "In which other federal states would you be prepared to work?". The differing case numbers for these two (alternative) questions are explained by these events.

Shortly beforehand an article announcing the survey, entitled "Ärztmangel: was tun, wenn der Nachwuchs ausbleibt?" ("Not enough doctors: what if too few new physicians enter the medical profession?"), was published in *Deutsches Ärzteblatt*. By the end of June, around 6600 medical students had completed the survey. As in all other online surveys we have conducted, the great majority of respondents completed the questionnaire within 3 days of receiving the e-mail. The first wave of responses was distributed as follows: 14 June, 3320; 15 June, 1591; 16 June, 867; 17 June, 380; 18

June, 205; 19 to 22 June, ca. 100 per day; 23 June, 1. The second wave reproduced this pattern of distribution, but at a much lower level.

At this time an e-mail was sent to each university. Universities with more than 300 respondents (n = 9) were thanked for their participation. Those with between 50 and 299 respondents (n = 15) were also thanked, but with the addition of a request to remind their students about the survey. Medical schools where fewer than 50 students had completed the questionnaire (n = 10) received an e-mail reminder and were also contacted by telephone.

The survey closed on 9 July, by which time 12 518 students had filled out the questionnaire (more or less) completely. Some questions were very selectively answered, so there were often only 10 000 to 11 000 valid responses.

According to the Federal Statistical Office, a total of 79 929 persons studied medicine in Germany in 2010 (see Federal Statistical Office: *Bildung und Kultur. Studierende an Hochschulen*, Fachserie 11, Reihe 4.1, Wiesbaden: 2011). The overall response rate was therefore 15.7%.

The response rates of the individual universities could not be determined because we had no information regarding the completeness and up-to-date-ness of the medical school mailing lists and also had no means of knowing how many of the students who received the e-mail had actually read it. At our own university in Trier, prior to the introduction of obligatory use of standard university e-mail addresses many students were registered with providers such as GMX, Web.de, or Yahoo.

The ambitious plan of surveying the whole population foundered at the outset, owing to the above-mentioned problems. The survey participants represent a self-selected sample: No randomization was involved. The results therefore cannot be extrapolated to the total population, even with the aid of inferential statistical procedures; the data analysis is purely descriptive. Generalizations remain theoretical and can be substantiated only by employing plausibility assumptions.

The online survey software EFS Survey (www.unipark.info/1-0-online-befragungssoftware-fuer-studenten-und-universitaeten-unipark-home.htm) was used for data acquisition.

Chi-square tests according to Pearson and correlation analyses for nominal and ordinal scale data (with the chi-square-based coefficients phi or Cramer's V) were used for quantitative data analysis.

For dimensional testing and data density we conducted principal component analysis (PCA; varimax rotation, determination of factor number by Kaiser criterion). We checked whether the respondents had rated particular statements ("items") similarly, so that they could be combined into supraordinate terms ("components"). If items belong to a component and represent a particular attitude, then they should "load" onto the component concerned, i.e. correlate closely with the component, achieving values approximating to 1 or -1; moreover, they should not load onto other components. If this is the case, as with the survey discussed here, the component matrix is said to have a "simple structure". The value of the "measure of sample adequacy according to Kaiser-Meyer-Olkin" indicates the suitability of the correlation matrix for principal component analysis. This measure ranges between 0 and 1, where 0 indicates unsuitability and values of 0.5 or higher show suitability for factor analysis; the latter was true for the principal component analyses conducted.

We have reported only highly significant differences. In view of the relatively small differences in relative frequency, even these should not be overinterpreted, because the case numbers meant that small deviations of the observed from the expected values led to significant results. Therefore, for the sake of better readability and interpretability of the bivariate analyses, we have often reported only percentage differences, which show the deviations in relative frequency between the various parameter values of the independent variables.

The software package SPSS 18.0 was used for data analysis.