

BMJ Open When and why do medical students drop out of extracurricular longitudinal general practice tracks? A cross-sectional study from two German medical faculties

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ABSTRACT

Objectives To explore when and why undergraduate medical students drop out of longitudinal extracurricular general practice (GP) tracks and to describe their future career plans.

Design Cross-sectional online survey and descriptive analysis of routine data.

Setting GP tracks at two German medical faculties, data collection took place between September 2020 and April 2021.

Participants Of 111 students who had taken part in one of the two GP tracks and dropped out prematurely, 101 were contactable via email. Overall, the response rate was 72.3% with 73 completed questionnaires and 75.3% of the participants were female.

Primary and secondary outcome measures Reasons for leaving the GP track (closed and free-text answers), attitudes towards a career in GP and future career plans.

Results Students left the tracks predominantly during the first 2 years of study. Students most frequently stated that structural reasons such as the distance to the GP teaching practice (74.2%), interest in another medical discipline (66.1%), private reasons (58.1%) and the GP mentor (53.1%) influenced their decision to drop out. However, 87.1% of the students indicated that their exit could not have been prevented by the project administration.

Conclusions Reasons for dropping out differ between GP tracks and not all reasons are within reach of programme design and staff. Addressable issues include student selection with regard to career plans, support and strengthening of student–mentor relationships, the location of GP practices, and/or travel and accommodation support.

INTRODUCTION

The impending and/or incurred shortage of primary care physicians in Germany and worldwide has led to substantial research about medical students' career choice towards general practice (GP)/family medicine with the aim to build evidence and identify interventions that can attract more undergraduates

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The comparison of two longitudinal teaching projects increases the relevance of the study.
- ⇒ Overall, a high response rate was achieved.
- ⇒ Due to the small number of participants in the study, only descriptive analyses were executed.
- ⇒ Recall bias might have occurred in some cases due to the long time lag between exit from the project and interview.

to the field.^{1–4} Especially longitudinal exposure, as for example experienced in longitudinal programmes, compulsory clerkships, electives and positive GP experiences during medical school including positive role models might positively impact the number of graduates entering GP careers.^{5–11}

Longitudinal exposure to general medical content is already firmly established in some contexts (eg, in the form of 'longitudinal integrated clerkships'), but varies internationally in length, scope, coverage (whole vs partial cohort), and is offered either as part of or in addition to curricular teaching.^{12–18}

In Germany, undergraduate medical education lasts 6 years. GP is usually taught in the clinical study section (years 3–5) through a 2-week clerkship, a lecture series and a 4-week clinical elective in primary care. In addition, GP may be chosen as one of three full-time clinical rotations in the final (clinical) year. Please refer to Chenot for more details about German undergraduate medical education.¹⁹

Due to recruitment challenges in GP, some medical faculties in Germany have developed initiatives in addition to the standard curriculum.²⁰ In Halle (federal state Saxony-Anhalt), a longitudinal GP track was established with the 'Klasse Allgemeinmedizin'

(‘General Practice Class’, KAM) in 2011 and in Leipzig (federal state Saxony), the “Leipziger Kompetenzpfad Allgemeinmedizin” (‘Leipzig Competency Pathway for General Practice’, LeiKA) was introduced in 2016, both of which accompany and train students over the whole course of the undergraduate studies. The KAM is offered as an elective in the preclinical and clinical phases of study. It started with 20 students per year (out of 230 students per year) and has increased to 40 students per year since 2017 due to the high number of aspirants. The KAM addresses students with a basic career aspiration for or interest in GP. Its main goal is to increase the number of medical students from Halle who settle down as general practitioners in ambulatory care in rural areas after their postgraduate training.^{21 22}

Similarly, LeiKA aims to attract more students to GP careers. Each year, LeiKA offers 30 slots for study entrants (out of 320 students per year currently) with basic interest in GP and ambulatory care who are recruited on a first come, first served basis. Details about student numbers, demographic characteristics and motives to take part in the LeiKA GP track have been published.¹⁶

Both KAM and LeiKA provide each student with an individual GP preceptor (called ‘mentor’) that enables and supervises regular visits (minimum 2 days per semester) in his or her community teaching practice over the whole course of the programme, beginning in year 1. In addition, faculty-hosted seminars and workshops are offered to represent the breadth and variety of GP topics (eg, wound care, economics in GP, naturopathic treatments) and to allow the formation of a GP peer group among the participants. Networking is also supported by regular social events.

Both GP tracks exclusively address students from the respective medical faculty. Basically, all students are eligible to apply to participate. Participation in both GP tracks is voluntary and extracurricular and does not include financial incentives. Dropping out is possible at any time without penalty and there is no obligation regarding career choice.

International research on (optional) longitudinal tracks is among others that deals with the effects of GP exposure on students’ readiness to pursue careers in family medicine.^{22–24} To our knowledge, little evidence exists regarding why and when participants drop out of such longitudinal programmes. Understanding why students leave longitudinal programmes may guide further improvement and can help to integrate students’ needs and desires into future projects. Furthermore, as resources are usually limited, a better understanding of students’ decisions to discontinue could potentially support a more tailored allocation of slots in the programme and improve the provision of personal and financial resources. Therefore, the main goal of this study is to explore at which point in the programme and for which reasons members dropped out and to examine which career aspirations exist among the dropouts.

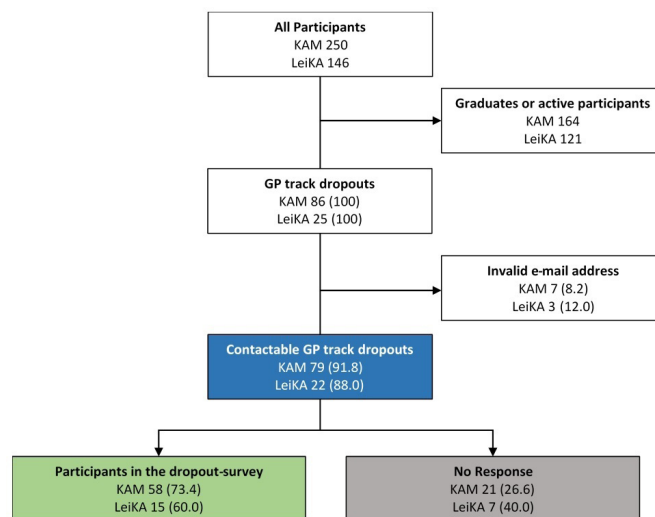


Figure 1 Sampling flow chart, in n (%). GP, general practice; KAM, Klasse Allgemeinmedizin; LeiKA, Leipziger Kompetenzpfad Allgemeinmedizin.

Our results are of interest for medical faculties and stakeholders involved with the planning or running of similar projects aiming to support adequate recruitment of junior doctors.

METHODS

Sampling and design

This study used a cross-sectional design and included students from the medical faculties of Leipzig and Halle-Wittenberg who had at any point in time taken part in the KAM (since 2011) or LeiKA (since 2016) GP track and dropped out before the scheduled termination in study year 5 (KAM) or 6 (LeiKA) and who were contactable via email.

Data were collected between September 2020 and April 2021. All students who had left the GP track by the start of data collection in September 2020 were included. Students received an electronic letter containing a link to our anonymous online questionnaire. Two reminders were sent 3 and 6 weeks later. Only students who left the GP track were surveyed. A disaggregated overview of this group is shown in figure 1.

Routine data from the programme administration from KAM and LeiKA were analysed as well, to describe dropout times based on complete data.

Questionnaire

In the present study, a self-developed questionnaire created by an interdisciplinary team of professionals (social scientists, GP specialists) was used (an English translation is given in online supplemental file 1). Students were asked to provide information regarding the following five different points: programme termination (1 item), reasons for exit from the GP track (11 items), how the exit might have been prevented (2 items), GP as a career choice or consideration (2 items) and future career plans (3 items). Open-ended and closed-ended

questions were incorporated. For certain items, participants were asked to indicate their agreement with the responses on a 4-point Likert scale ranging from ‘not at all’ to ‘strongly’. Students who in the first item stated that they had dropped out of medical school altogether were redirected to the sociodemographic part as students no longer enrolled at the school were dismissed from the KAM and LeiKA projects automatically. The questionnaire was based on a year-long experience with student dropouts and on previous internal research on students’ motives.

In a series of stages, the questionnaire was revised, pretested, and piloted with general practitioners and student assistants of the Institute for General Medicine and Family Practice, University of Halle-Wittenberg. Due to the small sample size and the small number of completed free-text responses, data analyses were descriptive and explorative. Statistical analyses were carried out with IBM SPSS V.25. Frequencies are presented as % (n/n_{valid}). Open-ended questions were also displayed via SPSS and comparatively analysed.

Patient and public involvement

No patients and no members of the public were involved in the planning or implementation of this study.

RESULTS

The overall dropout rate from the programmes was 28.0% (111 of 396), with 34.4% (86 of 250) of KAM participants and 17.1% (25 of 146) of LeiKA participants who had at any point taken part in the programme and left prematurely. Of 111 total dropouts, 101 were reachable via email (LeiKA: 22 of 25, KAM: 79 of 86). The overall response rate of our survey was 72.3% (73 of 101), divided in 73.4% (58 of 79) for KAM and 68.2% (15 of 22) for LeiKA. The characteristics of the participants in both groups are shown in [table 1](#). While the age distribution appears comparable, the participants in the LeiKA group are more likely to be female and more likely to be from the city.

[Figure 2](#) shows the point in time at which students left the GP tracks. KAM participants mostly dropped out after

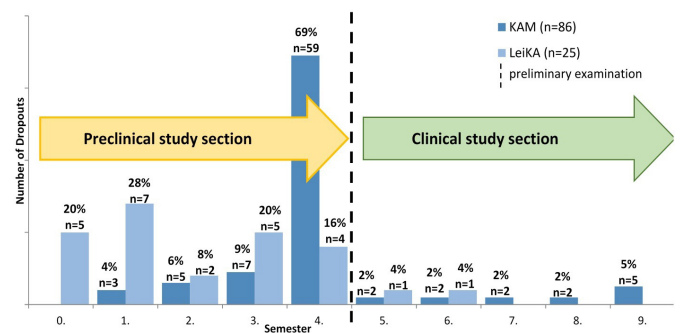


Figure 2 Time of dropout by participants of KAM and LeiKA after completed semester and project. KAM, Klasse Allgemeinmedizin; LeiKA, Leipziger Kompetenzpfad Allgemeinmedizin.

the fourth completed semester, while participants of LeiKA dropped out during the first semesters.

Of the students who dropped out, 15.5% (9 of 58) of KAM participants and 13.3% (2 of 15) of LeiKA participants left the project because they did not continue medical school. For the majority who continued medical school, [figure 3](#) lists their reasons for leaving KAM and LeiKA. Both interest in another medical discipline and structural reasons (eg, travel distances) were frequently chosen by KAM and LeiKA participants. For participants of LeiKA, private reasons and the mentor were further influential factors that contributed to premature dropout rates.

In the free-text section, 22.4% (11 of 49) of the KAM students named other reasons for leaving the project (maximum of two reasons per student, 16 free-text answers in total). Seven answers referred to the students’ wish to explore other medical disciplines, often in the context of KAM as an elective (‘interest in another elective’, ‘happy to try something new/diversity’), three to the demand of time (‘time-consuming’, ‘time expenditure’) and project content/lack of added value (‘lack of added value/progress after four semesters’, ‘many very similar patients, little diversity’). Only two answers referred to structural reasons (‘my mentor was difficult to reach, otherwise the project was fun’). In LeiKA, 46.2% (6 of 13) of the students gave up to three additional reasons for

Variable	KAM % (n/n _{valid})*	LeiKA % (n/n _{valid})*
Female	70.7 (41/58)	93.3 (14/15)
Age in years at the time of survey (mean±SD, min–max)	26.2±3.3, 21–38	25.0±4.8, 19–35
Mainly grew up in (number of inhabitants)		
Large city (>100 000)	40.8 (20/49)	53.4 (8/15)
Mid-sized town (>20 000–100 000)	16.3 (8/49)	20.0 (3/15)
Small town (>5000–20 000)	24.5 (12/49)	13.3 (2/15)
Rural area (<5000)	18.4 (9/49)	13.3 (2/15)

*Unless otherwise indicated.
KAM, Klasse Allgemeinmedizin; LeiKA, Leipziger Kompetenzpfad Allgemeinmedizin.

How much did the following reasons influence your decision to drop out of KAM or LeiKA?


Figure 3 Reasons for dropout, in %. GP, general practice; KAM, Klasse Allgemeinmedizin; LeiKA, Leipziger Kompetenzpfad Allgemeinmedizin.

dropout in the free-text answers (11 free-text answers in total): three free-text answers referred to reasons related to family and private life ('pregnancy', 'child started kindergarten', 'promotion'), while six referred to a lack of added value, partly because of the short nature of the clinical visits in the mentor's community practice ('do not see how I can profit personally, as I have worked as a nurse for many years', 'lack of being integrated into the community practice's dynamics', 'short duration of clinical stays'). One free-text answer referred to the pandemic situation of COVID-19 and one to the expenditure of time for LeiKA.

When asked if the administration could have prevented them from dropping out, 83.7% (41 of 49) of KAM participants and 100% (13 of 13) of LeiKA participants replied with 'no' or 'rather not'. Those participants of KAM who replied with 'yes' or 'rather yes' listed the following as options for preventing a dropout: 37.6% (3 of 8) of participants mentioned a better relationship with the mentor or the appointment of a new mentor. For 25% (2 of 8) of participants, a less time-consuming curriculum for the GP track and more sophisticated content in seminars were options for preventing an exit.

The dropouts of KAM and LeiKA were further asked about their current career preferences. Students' attitudes toward a career in GP are shown in table 2.

While a substantial part of KAM dropouts indicated that becoming a GP was their preferred career option, this was

Table 2 Attitude towards a career in general practice

Variable	KAM % (n/n _{valid})	LeiKA % (n/n _{valid})
For me, becoming a general practitioner is...		
The preferred career option	28.6 (14/49)	0.0 (0/13)
An imaginable career option	49.0 (24/49)	46.2 (6/13)
No career option	22.4 (11/49)	53.8 (7/13)

KAM, Klasse Allgemeinmedizin; LeiKA, Leipziger Kompetenzpfad Allgemeinmedizin.

not the case for any of the LeiKA dropouts. In contrast, the percentage of LeiKA dropouts that could not envision GP as a career option was substantially higher than that of KAM dropouts.

DISCUSSION

In our comparison of GP tracks at two German medical faculties, we found that most students dropped out in the first 2 study years. Most of the students denied that the programme administrations could have prevented them from discontinuing their participation. Main reasons for dropping out were a changed career interest, structural problems like distances to reach the GP mentor's practice, private reasons, as well as discontent with the relationship with the individual GP mentor.

Interpretation and literature comparison

Dropout timing

Students predominantly left during the preclinical study phase (first 2 years of undergraduate training).

This could be related to the fact that students' career orientations are still dynamic in the beginning of their studies. The extent to which specialty preferences switch over the course of undergraduate medical studies has been explored in various studies. Longitudinal data from Australia showed that between the first and last year of medical school, 75.7% of medical students changed their career plans.²⁵ This is consistent with a study from the USA, where 69.2% of the participating students changed their career aspirations during medical school.²⁶ A 2018 study concluded that students were more likely to correctly predict subsequent residency training in the third year of medical school than at the beginning of medical school.²⁷

On the other hand, the structural design of the programmes may be of relevance. A large number of KAM participants left the GP track after the fourth semester, having received their credit and completed the first part of the medical examination. An important reason might be the design of KAM as a preclinical elective basically ending after four semesters with an extension option for the following years of study. In contrast, LeiKA is designed as a continuous 6-year programme without the option to leave the programme between the preclinical and the clinical study period. Consequently, LeiKA dropouts distributed more evenly over the course of studies.

In both programmes, some of the students who dropped out had initially underestimated the time commitment the GP track required in addition to the standard curriculum load. The amount of time spent was given as a reason for dropout in both projects. Dropout rates due to this reason could be prevented by giving students more detailed information beforehand regarding the expected time commitment to the GP tracks.

Dropout reasons

Typical reasons for dropout were structural reasons, interest in another medical discipline, private reasons and the relationship with the GP mentor. While private reasons for dropout can hardly be tackled by the GP track administration and changing career aspirations is an expected occurrence over the course of studies, other causes for dropout are within the reach and responsibility of the GP track administration. These causes deserve a closer look in order to influence the premature dropout rate in the future.

Changed career aspirations

With respect to GP as a career option, the number of dropouts with a preference for GP differed between KAM and LeiKA. Different career aspiration may be related to the differences in the selection process. While KAM is intended for students who are undecided or already interested in becoming general practitioners, LeiKA also wants to reach students without a distinct interest in a GP career including non-GP-committed students.^{15 16} The LeiKA administration aims to appeal to a broad spectrum of students to make GP (and primary care) attractive to students without existing commitment, according to the model by Bennett and Phillips.² Consequently, LeiKA admits a small number of students who state that GP is not a career option at the beginning of their studies.¹⁶

A closer look at whether or not the track succeeds in remaining attractive to those students in the long run or produces preventable dropouts is not possible based on the present data but should be in the focus of future examination to allow a more tailored allocation of resources and human investments, especially in the context of limited slots for a great number of applicants.

With regard to the KAM students' career aspirations, it is notable that over three-quarters still regard GP as a possible or even preferred career option. Possibly, these students, if not already repelled by structural reasons or the mentor, do not gain sufficient additional benefit or do not succeed in balancing their participation with other needs such as the exploration of other medical specialties, although they have a basic interest in GP. If, as we believe, this is the 'wrong project for the right target group', this group might benefit from less time-consuming, low-threshold activities as a more effective and efficient way to reach the project aims.

Structural reasons

Structural reasons were another key point contributing to student dropout of the GP tracks. Various factors including long travel distances to the mentors' GP practices, the time spent for travelling, travel costs including costs for overnight stays, overlaps with university schedule and private activities, and inconveniences to the students might have motivated them to select that item, but our data do not allow further delineation. As many of our mentors' practices are located in rural areas, potential measures of improvement might include covering not only travel costs, but also costs incurred for overnight stays. Collaborations to provide students with a rental car/institute car for travel into regions that are very difficult to reach by means of public transportation could be innovative and pragmatic solutions to be tested in the future. This way, students would spend less time commuting and would, as a result, save a lot of time, reducing the time burden of the GP tracks. These ideas are supported by data from another project hosted by our faculty that involved fostering clerkships in rural areas. Herget *et al* found out that 'financial and organisational issues including remuneration of the clerkship, cost absorption for travelling and accommodation, and accessibility by public transport were the most important side conditions to increase the attractiveness of rural clerkships'.²⁸

The mentor

There is substantial knowledge on student–preceptor relationships in general and, more precisely in this context, the benefit of mentoring for medical students.^{29–31}

Brought to the point by Schultz *et al*, students taught in community settings value 'feedback by enthusiastic, open preceptors who are willing to discuss their reasoning processes and delegate responsibility'.³² This is in line with findings from Fernald *et al* that identified active teaching (as opposed to just observing), a relationship based on trust and respect, time for discussion and a 'shared sense of preceptorship objectives' as important aspects of a successful student–preceptor relationship from the students' perspective.³³

Our study did not allow detailed insights into what students have subsumed under the umbrella term 'mentor'. However, in a recent qualitative study investigating preceptors' insights and views of a Canadian longitudinal family medicine project for undergraduate students, the authors highlighted the difficulties experienced by GP mentors,¹⁷ and that the perceptions of the extent of feedback and the opportunity to practise clinical skills differed substantially between students and preceptors.¹⁸

Consequently, 'clarifying course learning objectives and students' and preceptors' mutual expectations (...) and facilitating student-to-preceptor and peer-to-peer feedback'¹⁷ have been proposed by the Canadian research group to support successful student–preceptor relationships.

Certainly, we acknowledge that there are important differences in project design and context; however, we believe that some of the issues raised, including gender and local conditions, could explain at least some of the dropouts from our projects.

Earlier and targeted intervention by the administration in case of problems arising between students and mentors might be a suitable tool, requiring an intensified student feedback process to the administration rather than what we currently receive through regular but anonymous feedback questionnaire surveys. This is in line with Fernald *et al*, who identified the exchange of expectations between students and preceptors and support of relationships to enhance trust and student autonomy as key responsibilities of faculty members in charge.³³ Based on the Canadian findings, one might also discuss the extent to which community preceptors enrolled in our project should be selected and matched to the students based on experience, location and gender, which has, due to a scarcity of community preceptors, only been possible to a very limited extent in the past.

Certainly the student–mentor relationship should remain in the focus of continued evaluation of the GP tracks to gain further insights into its character, mutual expectations, arrangements and starting points for improvement.^{32 34}

In this context, one should keep in mind that, according to the students' statements, the majority of dropouts would not have been preventable. However, we should interpret these findings with care because our study did not include students who continued the programmes in case of difficulties that were resolved through interventions from the programme administration, nor can we say whether those dropouts could have been prevented at an earlier stage. This means that dropout prevention within the given structures and design will not be easy and might require extensive efforts from the administration, including personal and financial investments.

Whether or not this is feasible and worthwhile in the context of dropout rates that we regard as acceptable must certainly be discussed.

Implications for practice and research

Although this is an exploratory study and generalisability is limited, it nevertheless reveals important starting points. We identified the following implications for the planning and improvement of longitudinal GP projects and implications for further research:

1. While this study gives a broad overview, our questionnaire does not allow detailed insights into students' experiences and ideas. Qualitative research is needed to explore their reasons for dropout in more depth. This includes a more detailed examination of what students might have summarised under the headings 'the mentor', and 'structural reasons', the individual difficulties experienced that led to the dropout, and opportunities for improvement.
2. A project design without intermediate preset exit points might be more suitable to keep students on

track over the whole course of their studies. This hypothesis could be confirmed in future studies.

3. Not all students are successful candidates to reach our project aim. A given number of premature exits should be scheduled beforehand and suitable alternatives offered to those still interested in the field.

Undoubtedly, further research is needed for a more in-depth investigation of possibilities for improvement, especially by analysing students' and GP mentors' needs for administrative support and their ideas for optimisation of content, timing and processes. Additional research could also target alternative forms of continuing support for GP-committed students who wish to leave the GP tracks.

Limitations

This study has several limitations. Although response rates were comparably high, the overall sample size was relatively small and the data were analysed descriptively. This limits the generalisability of the findings. Further, the analysis of the qualitative free-text responses followed a pragmatic approach rather than a more sophisticated method, simply due to the small number of statements. Differences in the number of participants and duration of the projects should be kept in mind when interpreting our data.

Another limitation is the long time lag between exit and interview, which could have led to recall bias. Participants might overestimate or underestimate dropout reasons after such a long period of time, which could affect the results. A further limitation might be seen in the use of 4-point scales for some items. Although this kind of scale resulted in clearly communicable results, it might have been too insensitive to capture more differentiated nuances. In addition, certain aspects of the programmes are specific for German undergraduate education, limiting the generalisability of these results with comparable international longitudinal GP tracks.

CONCLUSION

Reasons for leaving the GP tracks differ between tracks and not all of them are within reach of programme design and staff. Addressable issues include the student–preceptor relationship, student selection with regard to career aspirations, the amount of time required in addition to the standard curriculum (and communication about required time investment), and facilitation and support of travelling to distant teaching practices and accommodation. The results also showed that some of the dropouts continued to pursue careers in GP.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval As this study based on an anonymous questionnaire did not allow any identification of individual participants, the explicit approval of the ethics committees of the medical faculties of Halle and Leipzig was deemed unnecessary (according to the respective regulations). All participants were informed about the background and intention of the survey and that they would not be personally identifiable by the analysis of the data. Participation in the study was voluntary. Completion of the online questionnaire was taken informed consent to participate.

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REFERENCES

- Fodeman J, Factor P. Solutions to the primary care physician shortage. *Am J Med* 2015;128:800–1.
- Bennett KL, Phillips JP. Finding, recruiting, and sustaining the future primary care physician workforce: a new theoretical model of specialty choice process. *Acad Med* 2010;85:S81–8.
- Pfarrwaller E, Audétat M-C, Sommer J, et al. An expanded conceptual framework of medical students' primary care career choice. *Acad Med* 2017;92:1536–42.
- Pfarrwaller E, Sommer J, Chung C, et al. Impact of interventions to increase the proportion of medical students choosing a primary care career: a systematic review. *J Gen Intern Med* 2015;30:1349–58.
- Davison I, McManus C, Brown C. Factors affecting recruitment into general practice: a double binary choice approach. *Adv Health Sci Educ Theory Pract* 2020;25:563–79.
- Bland CJ, Meurer LN, Maldonado G. Determinants of primary care specialty choice: a non-statistical meta-analysis of the literature. *Acad Med* 1995;70:620–41.
- Turkeshi E, Michels NR, Hendrickx K, et al. Impact of family medicine clerkships in undergraduate medical education: a systematic review. *BMJ Open* 2015;5:e008265.
- Marchand C, Peckham S. Addressing the crisis of GP recruitment and retention: a systematic review. *Br J Gen Pract* 2017;67:e227–37.
- Bunker J, Shadbolt N. Choosing general practice as a career - the influences of education and training. *Aust Fam Physician* 2009;38:341–4.
- Shadbolt N, Bunker J. Choosing general practice - a review of career choice determinants. *Aust Fam Physician* 2009;38:53–5.
- Alberti H, Randles HL, Harding A, et al. Exposure of undergraduates to authentic GP teaching and subsequent entry to GP training: a quantitative study of UK medical schools. *Br J Gen Pract* 2017;67:e248–52.
- Worley P, Couper I, Strasser R, et al. Consortium of longitudinal integrated clerkships (CLIC) research collaborative. A typology of longitudinal integrated clerkships. *Med Educ* 2016;50:922–32.
- Richards E, Elliott L, Jackson B, et al. Longitudinal integrated clerkship evaluations in UK medical schools: a narrative literature review. *Educ Prim Care* 2022;33:148–55.
- Brown MEL, Whybrow P, Kirwan G, et al. Professional identity formation within longitudinal integrated clerkships: a scoping review. *Med Educ* 2021;55:912–24.
- Samos F-A, Heise M, Fuchs S, et al. Pilot phase evaluation of the elective general practice class: results of student surveys of the first two years. *GMS J Med Educ* 2017;34:Doc4.
- Geier A-K, Saur C, Lippmann S, et al. LeiKA: an optional German general practice teaching project for first-semester medical students: who is taking part and why? A cross-sectional study. *BMJ Open* 2019;9:e032136.
- Rodríguez C, Bélanger E, Nugus P, et al. Community Preceptors' motivations and views about their relationships with medical students during a longitudinal family medicine experience: a qualitative case study. *Teach Learn Med* 2019;31:119–28.
- Willoughby K, Rodríguez C, Boillat M, et al. Comparing medical students' and Preceptors' views of a longitudinal Preceptorship family medicine course. *PRIMER* 2018;2:7.
- Chenot J-F. Undergraduate medical education in Germany. Medizinstudium in Deutschland. *GMS German Medical Science* 2009;7.
- Blozik E, Ehrhardt M, Scherer M. Förderung des allgemeinmedizinischen Nachwuchses : Initiativen in der universitären Ausbildung von Medizinstudierenden. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2014;57:892–902.
- Steger T, Langosch C, Klement A. "Klasse Allgemeinmedizin": ein Lehrkonzept für zukünftige Landärzte. *Z Allg Med* 2012;88:264–7.
- Ford CD, Patel PG, Sierpina VS, et al. Longitudinal continuity learning experiences and primary care career interest: outcomes from an innovative medical school curriculum. *J Gen Intern Med* 2018;33:1817–21.
- Glynn LG, Regan AO, Casey M, et al. Career destinations of graduates from a medical school with an 18-week longitudinal integrated clerkship in general practice: a survey of alumni 6 to 8 years after graduation. *Ir J Med Sci* 2021;190:185–91.
- Walters L, Greenhill J, Richards J, et al. Outcomes of longitudinal integrated clinical placements for students, clinicians and society. *Med Educ* 2012;46:1028–41.
- Kaur B, Carberry A, Hogan N, et al. The medical schools outcomes database project: Australian medical student characteristics. *BMC Med Educ* 2014;14:180.
- Fischer JP, Ciinite K, Sullivan E, et al. Specialty and lifestyle preference changes during medical school. *Med Sci Educ* 2019;29:995–1001.
- Jones MD, Yamashita T, Ross RG, et al. Positive predictive value of medical student specialty choices. *BMC Med Educ* 2018;18:33.
- Herget S, Nafziger M, Sauer S, et al. How to increase the attractiveness of undergraduate rural clerkships? A cross-sectional study among medical students at two German medical schools. *BMJ Open* 2021;11:e046357.
- Frei E, Stamm M, Buddeberg-Fischer B. Mentoring programs for medical students--a review of the PubMed literature 2000-2008. *BMC Med Educ* 2010;10:32.
- Kadivar H. The importance of mentorship for success in family medicine. *Ann Fam Med* 2010;8:374–5.
- Buddeberg-Fischer B, Herta K-D. Formal mentoring programmes for medical students and doctors--a review of the Medline literature. *Med Teach* 2006;28:248–57.
- Schultz KW, Kirby J, Delva D, et al. Medical students' and residents' preferred site characteristics and preceptor behaviours for learning in the ambulatory setting: a cross-sectional survey. *BMC Med Educ* 2004;4:12.
- Fernald DH, Staudenmaier AC, Tressler CJ, et al. Student perspectives on primary care preceptorships: enhancing the medical student preceptorship learning environment. *Teach Learn Med* 2001;13:13–20.
- Grunewald D, Pilic L, Bödecker A-W, et al. Die praktische Ausbildung des medizinischen Nachwuchses – Identifizierung von Lehrpraxen-Charakteristika in Der Allgemeinmedizin. *Gesundheitswesen* 2020;82:601–6.