Considerations towards management competencies and their associations with becoming self-employed in a future career – a cross-sectional study with medical students in Germany

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Within the framework of medical education, the CanMEDS-competences, especially leadership, play an important role. This competence includes important aspects regarding practice management and entrepreneurial topics as these are essential for self-employed physicians. The aims were to evaluate considerations towards future work and to identify associations with self-employment from the perspective of medical students. The study was designed as an online survey. The online questionnaire was completed by 292 students. A high proportion of medical students would prefer to work in a team and supported that entrepreneurial issues should be integrated into the medical curriculum. The integration of entrepreneurial topics into the medical curriculum will be necessary to strengthen the future of outpatient care in order to lower entry barriers to self-employment. Furthermore, entrepreneurial knowledge about self-employment could have a positive influence on the medical profession in the future.

1 Background

In recent years, an extension of the physicians' role has been observable. The skills that a modern-day physician has to provide have increased both in complexity and diversity, from being a medical expert to being a leader/member of a health care team that governs cost, finance and human resources (Berkenbosch et al., 2014; Eisemann et al., 2018; Frank et al., 2015; O'Brien et al., 2018). In many countries, outpatient physicians are self-employed and thus, as small-scale entrepreneurs, those additional competencies increase (Groenewegen et al., 2002, S. 200–214). Competency-based medical education has become an integral part of medical education (Schütte & Rödder, 2017, pp. 117–141) and, in Europe, is also often based on the CanMEDS model developed by the Royal College of Physicians and Surgeons in Canada (Frank et al., 2015). This model was developed in the 1990s and contains physician competences exemplified by seven different roles: medical expert, communicator, collaborator, leader, health advocate, professional and scholar (Frank et al., 2015).

The aim of the medical educational curriculum is to provide students with evidence-based knowledge and clinical competences for treating patients. However, practice management issues play an important role for physicians who are working in outpatient care. Skills identified as being crucial for self-employment were knowledge of setting up a practice; business and administration; law; finance; finding the right support and attitudes towards planning security (Bar-Or, 2015; Halbert et al., 1988; Lazarus, 1995). Advantages that are offered by self-employment are a higher remuneration for self-employed physicians than that of the average employed physician (OECD, 2019) in combination with a relatively low risk of becoming insolvent in Germany (< 0.05%) (Statistisches Bundesamt, 2019), self-governance, a higher degree of freedom, independent decision-making, a high degree of satisfaction, compatibility of work and family and dissatisfaction with clinical routines in Germany (Koch et al., 2011; Steinhäuser et al., 2011). Despite these excellent contextual factors, the willingness to become self-employed continues to decline. In Germany, the proportion of employed physicians has increased over the last decade from 59.6% to 69.3% and could be an explanation for the low reoccupation rate for practices in Germany (Bundesärztekammer, 2018; Jacob et al., 2018).

It can be assumed that different stereotypes exist concerning self-employment from the perspective of medical students, which could have an impact for the recruitment of physicians in the future. Moreover, for medical students it is important beside evidence-based knowledge and clinical competences to know what kind of aspects such as contextual factors are relevant to work as a physician and could provide information for the extension of the content of the medical educational curriculum in terms of practice management and self-employment.

Therefore, the aims of the current study were to evaluate considerations towards future work and to identify factors which medical students associate with self-employment. Our research questions were: How would medical students like to work in the future? What kind of role do entrepreneurial issues play in their future work? Which aspects would influence them to consider working on a self-employed basis?

2 Methods

2.1 Design and participants

The study was carried out according to the STROBE-Guidelines (Strengthening the Reporting of Observational Studies in Epidemiology) (von Elm et al., 2007). The study was designed as a cross-sectional survey including all medical students from two medical schools in Germany which were located in the south and the north of Germany. All students from these two medical schools were invited by their student body to

participate in an online survey between January and February 2015 independent of age, gender and years of academic study.

2.2 Measurement

A questionnaire was developed on the basis of preliminary studies with medical students and resident physicians as well as a focus group with participants from different occupational backgrounds (medical students, resident physicians, physicians, health services researchers and health-care managers) (Kiolbassa et al., 2011; Kohlhaas et al., 2017; 2018; Steinhäuser et al., 2011; 2013). Different topics were identified and considered in the questionnaire. The questionnaire was not validated. One topic of the self-developed questionnaire was the evaluation of considerations of medical students towards different aspects of their future work which were divided into ideas of prospective work situation; knowledge transfer of entrepreneurial topics; and capacity and support. These different aspects were measured using 15 items. Each item was rated on a 5-point Likert scale ranging from 1 (fully agree) to 5 (fully disagree). A second topic was the evaluation of the skills needed for self-employment and planning security which were divided into skills for self-employment; support for self-employment; and attitudes towards planning security. These different aspects were measured using 13 items. Each item was rated on a 5-point Likert scale ranging from 1 (fully agree) to 5 (fully disagree). Sociodemographic aspects of the medical students were measured, such as gender, age and number of semesters.

2.3 Data analysis

Analyses were performed using SPSS 24.0 (SPSS Inc., IBM). Continuous data were summarised using means and standard deviations. Categorical data were presented as frequency counts and percentages. A descriptive analysis of the two topics and the related items was conducted. The means, standard deviations (*SD*) and confidence intervals of each item were reported. Internal consistency for each scale was assessed using Cronbach's alpha, which indicates whether an item of a scale is appropriate for assessing the underlying concept of the scale (Cronbach, 1951). Values for Cronbach's alpha range from 0 to 1. The closer they are to 0, the less related the items are to one another. Values above 0.60 are generally considered to indicate satisfactory internal consistency. Spearman rho correlation was used to select the independent variables from characteristics of the study population, the questions about considerations of medical students towards different aspects of their future work; and the questions regarding skills for self-employment and planning security from the perspective of medical students. Variables that showed a significant correlation with the dependent variables "the intention of becoming self-employed" and "considering working as an employee" were included in the linear regression analyses. These were used to explore

potential multivariate associations between the dependent variables "the intention of becoming self-employed" and "considering working as an employee" and the previously selected independent variables. Additionally, the possibility of multicollinearity was considered. The variance inflation factor (VIF) and the value of tolerance were reported for each of the regression models. Values of VIF should not be over 5.0 and for tolerance not lower than 0.25 (Field, 2011). The incidence of missing data (< 10%) was negligible for the data analysis. An alpha level of $p < 0.05$ was used for tests of statistical significance.

2.4 Ethics approval and consent to participate

The ethics committee of the Heidelberg Medical School informed us that approval by an ethics committee was not necessary for a study which does not involve patient data. Anonymity of the participating students and data security were ensured. The return of the anonymous paper-based questionnaire was classified as informed consent.

3 Results

The online questionnaire was answered by 292 students. Table 1 describes the characteristics of the sample. Over 53% of the study population was female. The mean age of the participants was 24.1 years (*SD* = 3.38).

Table 1: Sociodemographic data of participants (n = 292)

Variables*		
Gender	Male	114 (39.00%)
	Female	155 (53.10%)
Age, mean (*SD*)		24.10 (3.38)
Number of semesters, mean (*SD*); min/max		7.54 (3.34); 2/12

* n varies due to missing data; *SD* standard deviation.

The different items for the topic "considerations of medical students to different aspects of future work" are presented in Table 2. It was observed that a high proportion of medical students placed great value on collegial exchange (89.40%) and would prefer to work in a team (71.60%). A lower percentage of medical students would prefer to work as an employee (14.00%) or becoming self-employed (17.80%). The listed mean value of the different items for considerations to different aspects of their future work in Table 2 shows that medical students fully agreed about the item "I attach great importance to collegial exchange" with a mean value of 1.70 (*SD* = 0.72). A lower agreement was found for the item "I can imagine my professional future as an employee" with a mean value of 3.69 (*SD* = 1.11). The section about the knowledge

transfer of entrepreneurial issues showed high agreement for integrating entrepreneurial issues into the training of health professionals with a mean value of 1.93 (*SD* = 0.93). The section on capacity and support showed high agreement for all three items. These were "I feel physically equipped for self-employment" (mean = 1.61 (*SD* = 0.63)), "I feel psychologically equipped for self-employment" (mean = 1.78 (*SD* = 0.74)) and "I feel supported by my social environment" (mean = 1.47 (*SD* = 0.74)).

Table 2: Considerations of medical students to different aspects of future work – descriptive statistics (n = 292)

	Mean *(SD)**	95% *CI*
Thoughts on prospective working situation (α = 0.52)		
I intend to become self-employed.	2.57 (0.98)	2.45–2.68
I can imagine my professional future as an employee.	3.69 (1.11)	3.56–3.82
I would like to keep my professional development completely open over the next few years.	2.09 (0.92)	1.98–2.20
The entrepreneurial risk entailed in self-employment discourages me.	3.01 (1.17)	2.87–3.14
I attach great importance to collegial exchange.	1.70 (0.72)	1.61–1.78
I attach great importance to working in a team.	2.02 (0.91)	1.92–2.13
I would like my future work to be cooperative in some way.	2.39 (0.86)	2.29–2.49
Knowledge transfer of entrepreneurial issues (α = 0.59)		
Entrepreneurial issues should be integrated into the training of health professionals.	1.93 (0.93)	1.83–2.04
I could imagine gaining knowledge through a business game.	2.46 (1.06)	2.34–2.58
I am willing to acquire basic business knowledge.	2.01 (0.78)	1.92–2.11
Capacity and support (α = 0.77)		
I feel psychologically equipped for self-employment.	1.78 (0.74)	1.69–1.86
I feel physically equipped for self-employment.	1.61 (0.63)	1.54–1.68
I feel psychologically equipped for an employed activity.	1.78 (0.75)	1.69–1.86
I feel physically equipped for an employed activity.	1.67 (0.69)	1.59–1.75
I feel supported by my social environment (family, friends).	1.47 (0.74)	1.39–1.56

SD standard deviation; *CI*, confidence interval; α Cronbach's alpha.
* Ranges from 1 "fully agree" to 5 "fully disagree".

The different items of the topic "skills for self-employment and planning security from the perspective of medical students" are shown in Table 3. The section about skills for self-employment had lower scores of agreement in all four items, especially the item "I have knowledge of the legal framework (e.g. labour law)" (mean = 4.45 (*SD* = 0.75)). The section about support for self-employed people showed high agreement between the different groups regarding who could provide support to self-employed medical professionals. As an example, a mean value of 1.64 (*SD* = 0.74) was found for "tax consultant". The section about attitudes to planning security

showed the highest agreement for "financial planning" and "job security", with mean values of 1.65 (*SD* = 0.60 resp. *SD* = 0.73) each.

Table 3: Skills for self-employment and planning security from the perspective of medical students – descriptive statistics (n = 292)

	Mean *(SD)**	95% *CI*
Skills for self-employment (α = 0.75)		
I consider my knowledge of setting up a practice to be sufficient.	4.35 (0.79)	4.25–4.44
I have a knowledge of business administration.	4.22 (0.96)	4.10–4.34
I have a knowledge of the legal framework (e.g. labour law).	4.45 (0.75)	4.35–4.54
I have a knowledge of finance (e.g. loans).	4.14 (0.92)	4.03–4.25
Support for self-employment (α = 0.66)		
A tax consultant	1.64 (0.74)	1.55–1.72
A lawyer	2.03 (0.94)	1.91–2.14
A bank	1.71 (0.72)	1.63–1.80
A specialist for setting up a practice	2.17 (1.03)	2.04–2.29
The family	1.82 (0.94)	1.70–1.93
Attitudes to planning security (α = 0.61)		
Financial planning	1.65 (0.60)	1.58–1.72
Job security	1.65 (0.73)	1.56–1.73
Work-life-balance	1.77 (0.81)	1.67–1.87
Taking a financially manageable risk	1.81 (0.73)	1.72–1.89

SD standard deviation; *CI*, confidence interval; α Cronbach's alpha.
* Ranges from 1 "fully agree" to 5 "fully disagree".

Table 4 shows the linear regression analysis of the characteristics of the study population, the questions to considerations of medical students towards different aspects of their future work and the questions on skills for self-employment and planning security from the perspective of medical students which correlated significantly with the outcome variable "the intention of becoming self-employed". A model with an explained variance with more than 42% (R^2 ~ 0.43) on the outcome variable "the intention of becoming self-employed" was carried out. The higher agreement with the intention of becoming self-employed was associated with higher agreement that entrepreneurial issues should be integrated into the training of health professionals, the opportunity for knowledge transfer through a business game, and the willingness to acquire basic business knowledge. Moreover, higher agreement with the intention of becoming self-employed was associated with lower agreement with the intention of working as an employee in the future and that the entrepreneurial risks entailed in self-employment was discouraging. The statistics of collinearity ranged between 1.62 (VIF-value), 0.62 (tolerance value) for "I attach great importance to collegial exchange" and 1.03 (VIF-value), 0.97 (tolerance value) for "gender".

Table 4: Associations of characteristics of the study population, considerations of medical students to different aspects of future work and skills for self-employment and planning security on the outcome variable intention to become self-employed (results of linear regression analysis, under specification of standardised beta coefficient, α = 5%)

Variables	β (p-value)
Age	–0.10 (0.10)
Semesters	–0.02 (0.73)
Gender	0.09 (0.10)
I can imagine my professional future as an employee.	–0.30 (<0.01)
I would like to keep my professional development completely open over the next few years.	–0.18 (<0.01)
The entrepreneurial risk entailed in self-employment discourages me.	–0.18 (0.01)
I attach great importance to collegial exchange.	–0.05 (0.45)
I attach great importance to working in a team.	–0.06 (0.37)
Entrepreneurial issues should be integrated into the training of health professionals.	0.21 (<0.01)
I could imagine gaining knowledge through a business game.	0.15 (0.01)
I am willing to acquire basic business knowledge.	0.15 (0.01)
I feel psychologically equipped for self-employment.	0.01 (0.93)
I feel supported by my social environment (family, friends).	0.10 (0.07)
I have a knowledge of business administration.	0.09 (0.13)
R^2	**0.43**

Table 5 shows the linear regression analysis of the characteristics of the study population, the questions regarding the considerations of medical students towards different aspects of future work and the questions about skills for self-employment and planning security from the perspective of medical students which correlated significantly with the outcome variable "considering working as an employee". A model with an explained variance with more than 31% (R^2 ~ 0.31) on the outcome variable "considering working as an employee" was carried out. The higher agreement for considering working as an employee was significantly associated with higher agreement that "entrepreneurial risk entailed in self-employment is discouraging". Moreover, a higher agreement for considering working as an employee was significantly associated with lower agreement for the intention of becoming self-employed. The statistics of collinearity ranged between 1.45 (VIF-value), 0.69 (tolerance value) for "I intend to become self-employed" and 1.01 (VIF-value), 0.99 (tolerance value) for "gender".

Table 5: Associations of characteristics of the study population, consideration of medical students to different aspects of future work and planning security on the outcome variable imagine to work as an employee (results of linear regression analysis, under specification of standardised beta coefficient, $\alpha = 5\%$)

Variables	β (p-value)
Age	–0.09 (0.16)
Semesters	0.01 (0.85)
Gender	–0.01 (0.83)
I intend to become self-employed.	–0.36 (< 0.01)
The entrepreneurial risk entailed in self-employment discourages me.	0.26 (< 0.01)
Entrepreneurial issues should be integrated into the training of health professionals.	0.03 (0.61)
I could imagine gaining knowledge through a business game.	–0.07 (0.23)
I feel supported by my social environment (family, friends).	–0.05 (0.39)
R^2	**0.31**

4 Discussion

This study explored considerations to future work and identified associations with self-employment from two medical schools in Germany. Compared to the whole sample of medical students, no differences were found in terms of gender for our study population. Germany-wide there was a proportion of 38% male and 62% female medical students in the year 2018 and was nearly the same (39% male and 61% female) for the year of data collection 2015 (Statistisches Bundesamt, 2020). An acceptable internal consistency for the different subscales was observed.

Most of our participants preferred to work in a team, which is in accordance with research about this generation called Generation Y (Choi et al., 2013). They favour a team-oriented approach for their future working conditions (Choi et al., 2013; Solnet & Hood, 2008). Moreover, we observed that medical students preferred the ability to have professional exchanges with colleagues in their future careers. Colleagues are an important source of social support and could contribute to a reduction in pressure at work (Wallace & Lemaire, 2007).

Furthermore, our data show that it seems difficult for medical students to commit to whether they intend to work as an employee or to become self-employed in their future career. The career choice is influenced by different factors and a decision can be expected at the end of the studies or during the residency (Kiolbassa et al., 2011). Our results show that the intention to become self-employed is associated with the integration of entrepreneurial topics into the training and with the acquisition of basic business knowledge.

An international comparison shows that management competencies as a part of the CanMEDS framework need to be improved from the perspective of medical residents as well as medical students (Berkenbosch et al., 2013). This is in line with the rather low scores of agreement for the items that consider the skills for self-employment observed in our study. In general, offers of education in entrepreneurship at university departments positively affect students' self-employment intentions (Walter et al., 2013). However, usually these offers are concentrated on those participants that already have an entrepreneurial intention (Liñán et al., 2011). Many of the students may attempt to become self-employed even without taking any course. However, educational offers might encourage these students towards self-employment and to provide knowledge about specific steps to becoming self-employed successfully, e.g. developing a business plan (Honig, 2004). To increase the willingness to becoming self-employed among a broader range of medical students, educational content with entrepreneurial awareness aiming to change their belief systems about self-employment might be helpful (Fretschner & Weber, 2013). For instance, making students aware and interested in this career option. Therefore, it can be assumed that the integration of entrepreneurial topics is a useful educational tool within the medical curriculum. Different universities have already integrated business games as part of e-learning within their medical curricula. It was observed that computer-aided serious games can be a teaching tool for medical students to experience more about organisational and conceptual basics of medical practice (Hannig et al., 2012). Furthermore, a simulated physician assistant's first day in hospital was introduced by different universities in Germany and was rated as a useful tool in preparing medical students for their future professional life and to experience additional management competencies (Fürstenberg et al., 2018).

The perceived entrepreneurial risk of failure is found to be an inhibiting factor on the intention of becoming self-employed. This is in line with findings of other related studies considering students from other subjects (Fretschner & Weber, 2013; Nabi & Liñán, 2013). Wu and Knott (2006) find that entrepreneurs face two different kinds of risks: uncertainty regarding market demand (exogenous risks), and uncertainty regarding their own entrepreneurial ability (risks over which one believes to have some control). The former uncertainty might be reduced by providing information to the students about the positive environmental factors, e.g. the expected shortage of physicians (especially in rural areas) (Kopetsch, 2010; Steinhäuser et al., 2012) and the low risk of insolvency (Statistisches Bundesamt, 2019). To address the latter, it has been shown that including practice management skills and entrepreneurial issues within the medical curriculum may be useful in making them feel more confident about their own entrepreneurial ability (Crites & Schuster, 2004). Therefore, it can be assumed that the acquisition of these skills supports the reduction of the perceived entrepreneurial risk that is an inhibiting factor as observed in our results.

A promising tool for teaching entrepreneurial skills is the integration of simulation games within the medical curriculum that have proven to be useful in reducing uncertainty in abilities (Kohlhaas et al., 2017). Moreover, it has been shown that undergraduate nursing students benefit from the Friday Night at the ER simulation game concerning their complex problem solving strategies (Bacon et al., 2018). To deal with the complexity of health-care it is important to get adequate management competencies for future work in a health-care team.

4.1 Limitations

Our study does have some limitations. A basic limitation of our online survey was that we cannot calculate an exact response rate because it is not certain whether all medical students from the two medical schools had received the invitation to the survey by their student body. Due to data protection we received no access to the mailing list of the student body and therefore, we had no number of students who were invited to participate on the online survey. Furthermore, due to voluntary participation, a selection bias in favour of students more interested in the issue of self-employment and entrepreneurial aspects cannot be excluded. The developed questionnaire was not validated. Therefore, a further study should test the psychometric properties in detail. As the study is based on a cross-sectional survey, we cannot conclude causality in the analysis. Therefore, generalisation of our findings is limited. In addition, this was an exploratory study; p values should be interpreted with care. Significant results might be due to chance and will need to be confirmed in further targeted studies.

4.2 Conclusions

We concluded that the integration of entrepreneurial issues into the medical curriculum will be necessary to strengthen the future of outpatient care in order to lower entry barriers to self-employment and enable service providers to acquire the skills and abilities to fulfil CanMEDS role as leaders. Moreover, entrepreneurial knowledge for self-employment could have a positive influence on the future medical profession and continue to play a decisive role in shaping outpatient medical care.

List of abbreviations

CI: confidence interval; *SD*: standard deviations; SPSS: Statistical package of social science; VIF: variance inflation factor

Competing interests

The authors declare that they have no competing interests.

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