

Education Research in German Non-Medical Health Care Professions compared to International Developments: a Bibliometric and Content-Related Publication Analysis

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Abstract

Background

In Germany academic degree programs for non-medical health care professions (nursing, physical, occupational and speech language therapy, midwifery) have been established only recently, even if they play a key role in today's complex patient-centered health care. The aim of this study was to evaluate the development and current state of German education research in these professions as well as to conduct a comparison to international research activities in this field.

Method

To achieve these objectives a bibliometric and content-related publication analysis was performed from 2008 to 2017 in four international high-impact journals. Based on appropriate inclusion criteria (bibliographical and biographical criteria, focus on first and last author, original study) and their development into a coding scheme, articles were recorded systematically and results analyzed quantitatively and content-wise. Group comparisons between German and international health care professions as well as interdisciplinary comparisons between the individual professions were performed.

Results

On the whole, 11.891 articles were analyzed for participation of the respective target groups, either as first or as last author. Of these, 164 original studies met the inclusion criteria with 157 publications pertaining to international and only seven to German health care professionals. The majority of authors belonged to the discipline of nursing science (n=138). North America (36.63%), Australia (18.32%) and Asia (14.85%) rank among the regions that publish most frequently. Publications by German health care professionals are rare but showed an overall high level of quality.

Conclusion

International publication activities by non-medical health care professionals have been on the rise in recent years. Specific funding measures as well as transnational and interdisciplinary collaborations may be potential ways of strengthening and expanding education research in countries with only young academic experiences.

Background

New, modern and transprofessional training concepts are getting more and more important in the health sector [1]. In view of increasing challenges and changing dynamic contexts, the qualification of patient-centered health care professionals has an essential role to play. Demographic and epidemiological changes, progressive medical technological and telematic developments, as well as increasing economization and globalization of health care provision keep presenting new challenges to health professionals [2].

These dynamic developments demand severe changes in the skills required, professional tasks and qualifications of health care professionals. The World Health Organization (WHO) already established the necessity and demand for improvement in the education of health care professionals at the international level in 2013 and initiated appropriate measures [3]. Despite diverse demands on skills, range of knowledge and scope of action of health care professionals, education research in this area has received little attention for a long time, particularly in Germany. Awareness of and interest in appropriate research projects has increased only in recent years [4, 5, 6].

Non-Medical Health Care Professions

Non-Medical Health care professions, like nursing science, therapeutic professions (physical, occupational and speech language therapy) and midwifery play an essential role in patient-centered health care. Apart from the individual curative support of patients in case of illnesses, disabilities or other impacts, these professions focus on prevention, health promotion and rehabilitation. Therefore, they play a key part in promoting patients' physical, mental and social well-being [7].

Whereas academic health care disciplines such as medicine, dentistry, psychology or pharmacy have long been established, undergraduate higher education of the non-medical health care professions has been offered in Germany only recently [8]. At international level, however, teaching these professions at higher education institutions started much earlier at the end of the 19th century [9, 10]. In contrast acquiring professional qualifications in these non-medical health care professions at higher education institutions is still not obligatory in Germany. It was not until the start of the 1990s that demographic change and an increasing complexity in the context of these professions led to rethinking and the establishment of the first higher education initiatives, which initially focused on the conveyance of management skills and teaching abilities. Only the introduction of model curricula at the beginning of the new century enabled these professionals to graduate in primary qualifying academic degree programs [9, 11].

Education of Health Care Professionals

Health care education is marked by a complex historical process, which has been and still is influenced by various scientific-technological, socio-economic, political and cultural developments. The "international commission for the education of health care professionals for the 21st century" [1] has put various approaches to explaining the synergies and interdependence between the educational and the health care system into concrete terms, based on its analyses. It assumes that the population's demands and needs affect the structure of both systems. Services resulting from the educational system lead to a supply of correspondingly trained specialists, who in turn meet the demand for health expertise in the labor market. The balance between both systems depends on the effectiveness and efficiency of the resources offered. Accordingly, a balance between the needs of society, the demands on health care professionals and the qualification of these professionals through the educational system would constitute an optimum condition of the interplay between the two systems. The qualified and evidence-

based education of health care professionals recently established at higher education institutions is therefore an important factor in ensuring health care provision for the population.

Educational research is an instrument for optimizing teaching and learning methods in the qualification and skills development context of (non-medical) health care professions. North America in particular has a long history of integrating education research at medical schools. According to Davis et al. [12] the first chair of medical education research was established in Ohio as early as 1958. The 1970s were marked by establishing further medical education research chairs around the globe – partly on WHO initiative. In Europe, the first pertinent institutes were founded in Great Britain and the Netherlands during the same period, whereas at German universities the establishment of education research and development departments in the medical context has been initiated only in recent years [13].

Research performance in this area varies from country to country. A study by Doja et al. [4] comparing the publication rates in the field of medical education research indicates that particularly countries having a long history of education research activities are highly productive in publishing scientific papers, such as North America, Australia, New Zealand, Great Britain and the Netherlands [13]. The same study demonstrates that the publication rate – with regard to medical education research contents – has steadily increased worldwide over the past few decades.

In Germany, interest in medical education research has grown only lately [5, 6]. The amendment of the Medical Licensing Regulations for physicians in 2002 and the necessity involved to enhance curricula may have caused this increase. On the other hand there is not much information available about the status of education research in non-medical health care professions. The research activities of these professions are still developing in many areas and offer huge future potential [9]. Therefore the aim of this study was to analyze the development of German education research in the professions concerned and to compare these findings with publication activities of international authors belonging to the same disciplines. Based on these findings, recommendations to strengthen future research in this area were elaborated.

Method

To evaluate the development and current state of education research in German and international non-medical health care professions (nursing, physical therapy, occupational therapy, speech language therapy, midwifery) a bibliometric and content-related publication analyses were conducted in four international journals from 2008 to 2017. The multimodal method addressed – in addition to bibliometric properties – also the study characteristics and quality of relevant publications by the target groups. Systematic accumulation and analysis of past research performance through publication analysis enable a structured representation of the stage of development and indicate potential trends for future research intentions [14].

The following journals served as research material for the study: 1) 'Academic Medicine'; 2) 'BMC Medical Education'; 3) 'Medical Teacher'; and 4) 'Nurse Education Today'. The first three journals are more than

over 10 years established journals in medical education. Concerning the intense development in interprofessional collaborations between medical and non-medical professions in the past years [1, 3] there was distinctive evidence to carve out publications of the target groups in these journals. While the first three journals are high-impact journals on medical education research, the 'Nurse Education Today' journal was additionally included in the study as an example of an education-related journal by a specific non-medical health care discipline. It should be evaluated how frequent the publication activity of German authors is assigned to a discipline-related journal – as an example. So the general search in the journals 'Academic Medicine', 'Medical Teacher' and 'BMC Medical Education' concentrated on original studies by German and international authors from the fields of nursing, physical therapy, speech therapy, occupational therapy and midwifery, while the focus in 'Nurse Education Today' was on a German involvement.

The focus in all journals was on first and last authors as the 'first-last-author-emphasis' standard is applied in many scientific publications. The major part of the scientific performance is often attributed to these author positions [15].

The classification of an author into professional categories was possible via the bibliographical criterion of a pertinent professional orientation of the associated institution as well as via the biographical criterion of a pertinent educational or professional background. If the author information found was not clear, for example regarding gender or professional background, the personal data was complemented by searching the respective information on the Internet. Examined and coded author information contained thus: name, discipline, gender and country.

In addition to the quantitative analysis, a content analysis of the identified original studies was conducted for the target group of German health care professionals. With this additional analysis research contents, methodological aspects of the research design, as well as the quality of the study should be examined to detect accordances or differences with other German and international research contents in this area. Quality levels were assigned to original studies according to the criteria of Cook et al. [16], who classify the quality of medical education research studies by the subcategories 'description', 'justification' and 'clarification'. 'Description studies' are studies of a purely descriptive and observational character. By definition, this quality level does not include group comparisons. 'Justification studies' are the next higher level of study quality assessment. These studies concentrate on group comparisons in order to draw conclusions regarding the effectiveness of interventions. Most of the time, however, they lack a conceptual framework or model to be verified by the findings of the study. 'Clarification studies' represent the highest study design level. They illustrate the entire scientific process – from observation, model and theory development through to the verification of these assumptions – and therefore attempt (beyond the preceding quality levels) to systematically verify the reasons for the effectiveness of interventions.

This study considers a publication period of ten years, from 2008 to 2017 to evaluate a large sample of articles since the beginning of the academic process in Germany. Data coding was based on the

inclusion criteria for the study described above. Trial coding was performed first with 50 articles randomly selected from all included journals. In order to ensure the stability and reproducibility of results, two intracoder and intercoder reliability tests were conducted [17].

Results

Quantitative Results

On the whole, 11.891 articles were analyzed by reviewing all issues of the journals, amounting to 362 journal issues. Altogether, 164 original studies were identified meeting all the inclusion criteria (i.e., German or international first and/or last author from the fields of nursing science, physical therapy, speech therapy, occupational therapy and midwifery). The flow diagram in Figure 1 illustrates the course of the research process.

The majority ($n=157$) of the identified relevant articles were published by international authors of the non-medical health care professions in question. The frequency of publication slightly increased over the period under review. While in 2008 just 9 relevant articles were published, research activities rose to 23 publications in 2017, with a maximum of 27 articles in 2016. In contrast, only 7 international original studies of the German target group could be identified, most of which were published in 'Nurse Education Today' ($n=6$) [18 - 24]. A clear trend was not detectable. Figure 2 shows the development of the publishing activities of both target groups.

The 157 identified articles published by international authors were written by 202 first and last authors, who were assigned to different countries owing to their current workplace. According to the large number of different identified countries the results were clustered into agglomerations to get a structured overview. The majority of international authors came from North America (36.63 %), followed by Australian (18.32 %) and Asian authors (14.85 %). First and last authors from Great Britain accounted for a share of 7.92 %. Authors from Africa, New Zealand, South America and the Netherlands were among the authors several times (Figure 3).

A close examination of the professions of both target groups showed that most of the articles were published by nursing scientists. In case of the international professions, 127 authors (62.87 %) had a nursing science background. Further 58 authors were physical therapists, thus accounting for a share of 28.71 %. Eight authors came from a speech language therapy background (3.96 %). Six authors from the field of occupational therapy (2.97 %) contributed to publications, while another three authors (1.49 %) were specialized in midwifery. Figure 4 illustrates the distribution across disciplines.

A similar result emerged regarding original studies published by German authors ($n=14$). Most of the authors were nursing scientists (78.57 %). Another two authors (14.29 %) from the "Miscellaneous" category (clinical chemistry/molecular diagnostics and therapeutic research) and one author (7.14 %) with a medical background were also co-authors.

Percentage distribution between the two target groups differed in the gender ratio. In case of the international health care professions 75.81 % of all authors were female and 24.19 % male. A similar ratio applies to the differentiation between first and last authors: female authors had a share of 73.00 % in first authors and of 79.07 % in last authors.

At 46.15 % the share of female authors from German health care professions was lower compared to a share of 53.85 % on the part of male authors. Most first authors were male authors (57.14 %), while the ratio was balanced (50.00 %) regarding last authors.

Content-Related Results

After the quantitative publication analysis, articles by German non-medical health care professionals were analyzed in terms of content as well. Most articles focused on 'students' as study subjects (57.14 %). Combinations of students and apprentices, or students and teachers have also been identified (28.57 %). Further stakeholders (e.g. representatives of private and public institutions) accounted for 14.29 % of the studies. Examinations almost exclusively focused on the discipline of nursing science (85.71 %). Interprofessional education was a topic in 14.29 % of the cases. Content-related research topics mostly addressed 'teaching and learning methods', as well as 'curriculum and teaching design' (28.57 % each). 'Examinations and assessments', 'education in general' and 'student health' were further research topics explored by original studies (14.29 % each).

Regarding methodology, the studies conducted showed a balance between quantitative and qualitative data collection methods (42.86 % each). Mixed methods were applied in 14.29 % of the cases. With respect to research design, there was also a balance between quasi-experimental pre-post designs and qualitative evaluation research (42.86 % each). One cross-sectional study adopting an ex post facto research design was also identified (14.29 %) [25].

It was possible to classify most of the articles (57.14 %) as 'clarification studies' at the highest level of quality according to Cook et al. [16]. Further 14.29 % met the medium quality level of 'justification studies'. Almost one third of the articles (28.57 %) were low-quality 'description studies'.

Two intracoder and intercoder reliability tests verified the significance of the overall results of this study. For this, 100 articles were re-coded. Concordance rates of 98.15 % intracoder reliability and 95.81 % intercoder reliability suggest very high reliability of the study findings.

Discussion

This study examined the development of education research by German and international non-medical health care professionals from a multimodal perspective. Trends were analyzed and comparisons between disciplines conducted, resulting in several significant findings.

German Health Care Professionals

With seven identified original studies, the publishing activity of German non-medical health care professionals is rather low. This small number of published articles corresponds to the assumptions on the current state of education research on the part of health care professions, which are still at the beginning in this respect, as academic degree programs for these disciplines have been established not long ago. Only after introducing model clauses based on occupational law – starting with nursing care professions from 2003 – health care professionals were able to acquire a degree in primary qualifying academic programs. In addition to academic degree programs, it is still possible to obtain professional qualifications through traditional vocational training. In view of the total number of degree programs and further education options, i.e. Master's degree or doctoral degree programs, setting up the degree programs' infrastructure is still in progress [26]. Furthermore, most of the courses take place at teaching- and application-based universities of applied sciences, while research-intensive universities account for only a small proportion of degree programs offered [9].

Despite the fact that the above findings reveal some structural and content-related challenges caused by turning health care professions into academic disciplines, the identified articles are a sign of initial impetus to education research. The findings of the qualitative content analysis also indicate sound scientific research performance on the part of non-medical health care professionals. It was possible to classify 71.43 % of the identified studies as "clarification" and "justification studies", the added value of which is considered to be high for the respective research area due to systematic proof of effectiveness and integration of results into broader concepts and contexts [16]. Furthermore, research topics and designs are equivalent to past studies from the field of medical education research at the content level [5, 27].

Gender distribution between German female and male authors showed that only 46.15 % of authors were female, whereas the share of female employees in German health care is much higher. The percentage of female nursing staff even amounts to 84.81 % [28]. The bibliographical details of the publications identified, however, do not reflect this distribution. Women may still be underrepresented in (top) academic positions in these fields in Germany, as it is also often the case in medical science [29].

International Health Care Professionals

In summary, there is an increasing trend in publication activities of international non-medical health care professionals, with North America, Australia and Asia, as well as Great Britain and the Netherlands at the European level accounting for the majority of original studies. In most of these regions the academic education of health care professionals has started early on. The finding that an early academic education process may be associated with a larger number of publications is also confirmed by the fact that the majority of international authors are nursing scientists (62.87 %), a discipline which is one of the early (usually the first) academic health care disciplines in most countries. Owing to the work of Florence Nightingale, nursing education in the higher education setting started in Britain and North America already in the 19th century [10]. The first university degree program was established in the U.S. at the

University of Minnesota as early as 1909 [30]. In Germany, most of the articles were also published by nursing scientists, and here, too, nursing was the first academic discipline.

A long tradition in publishing articles on (medical) education research may also have an influence on the publishing activities of international health care professionals. According to a study by Doja et al. [4], the USA, Great Britain, Canada and Australia play a leading role in this area in terms of sheer publication frequency. Regarding the ratio of publication activities to the number of medical schools, Canada, the Netherlands, New Zealand, Great Britain and the USA published articles most frequently. As most of these countries also belong to the frequently publishing countries in this study, broad knowledge in the publication of pertinent research initiatives may have had a positive effect on the publication activities identified.

At a rate of 75.81 %, the gender distribution indicates a high proportion of women in the field of health care education research. It is therefore possible that there are already more women in (top) academic positions in the countries concerned than has been the case in Germany so far.

Strengths and Limitations

Strengths of this study include the explorative character of the first-time collection and analysis of pertinent research activities of both target groups based on a large total sample of 11.891 data records, as well as first-time interdisciplinary comparisons between publication activities, bibliometric data and content analyses. In addition, the excellent results of two reliability tests substantiate the study's high validity. Classification of the results facilitates implications for research and further scientific practice in this subject area.

Some limitations of this study may have had an influence on the results. For example, the fact that the study's research basis was restricted to the four journals mentioned limits the validity of the results as they represent only a fraction of the research activities of the target groups [14]. Other national and international journals on (medical) education research were not part of the analysis. Moreover, articles on education research (by non-medical health care professionals) are probably published in other discipline-specific or educational science journals as well [5].

The fact that this study did not consider other ways of publishing also limits the general validity of the statements on the research activities of the target groups. Their publication activities may be different in the context of conference papers, specialist books, presentations at trade fairs, research reports, etc.

Conclusion

While publishing activities of international health care professions have steadily increased in recent years, publications by German authors have just started to gain momentum. Specific funding measures to support the individual disciplines and to increase the share of female researchers may be appropriate measures to further strengthen and expand research activities. Potential collaborations, for example, with

the research-intensive nursing discipline or with frequently publishing countries may lead to synergies and a further increase in research activities.

Steadily growing development dynamics and changes in health care requirements continue to call for an optimum and evidence-based training of (non-medical) health care professionals, who play a key role in today's complex care process owing to their patient-centered responsibility.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The dataset used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

All authors declare that they have no competing interests.

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Authors' contribution

All authors contributed to the concept and design of the study. SK conducted the acquisition and analysis of the data. All authors interpreted the data together. SK was major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Abbreviations

WHO
World Health Organization

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Figures

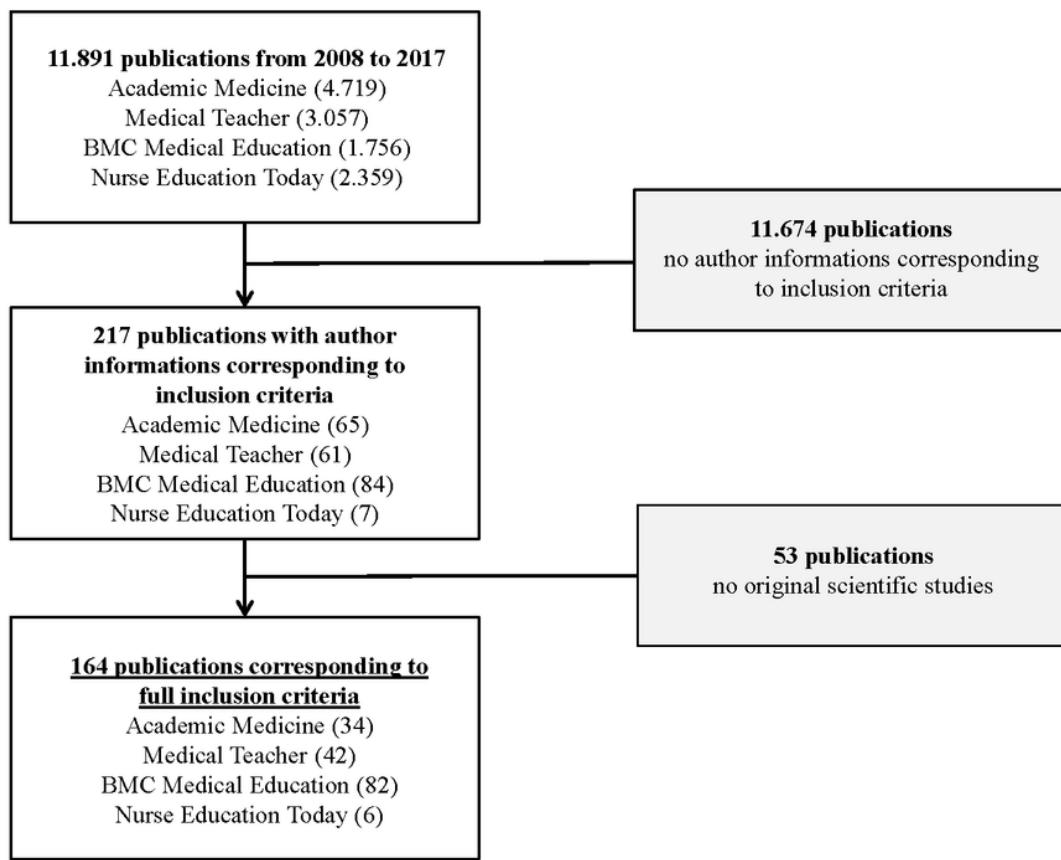


Figure 1

Flow chart of the research process

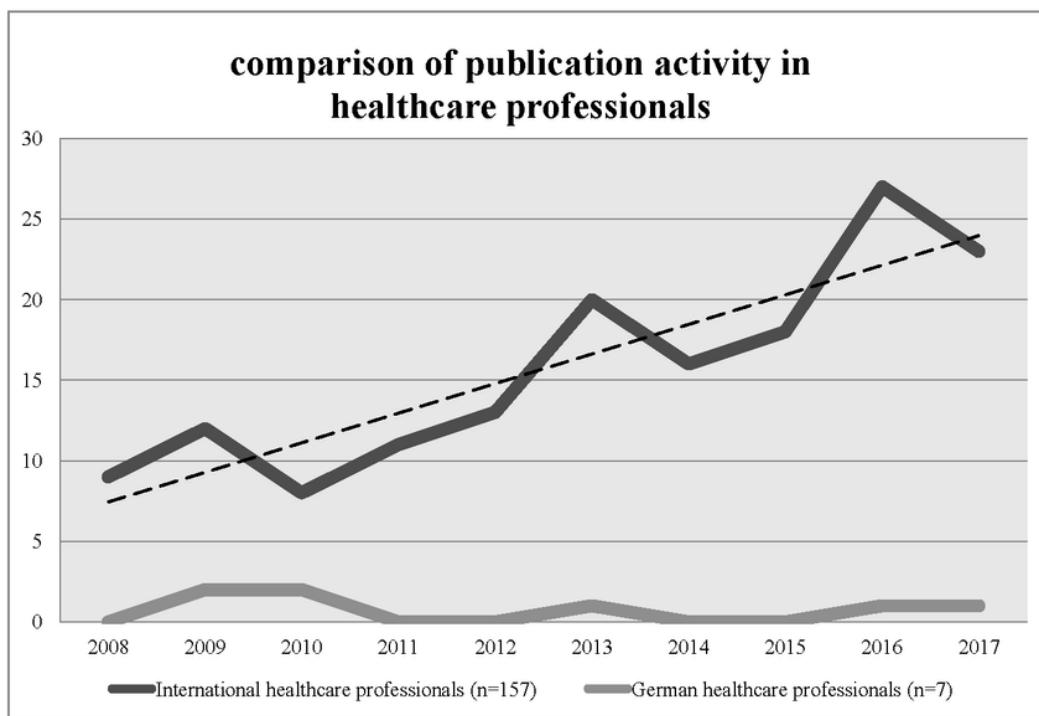


Figure 2

Comparison of publication activity in German and international health care professionals from 2008 to 2017



Figure 3

Distribution of publishing regions of international health care professionals



Figure 4

Distribution of disciplines of international health care professionals