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# **Experiences and Attitudes Towards Scientific Research Among Physiotherapists in Austria: A Cross-Sectional Online Survey**

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# **Experiences and Attitudes Towards Scientific Research Among Physiotherapists in Austria: A Cross-Sectional Online Survey**

**Introduction:** Research is important for the development of physiotherapy practice, but several countries have a rather short history of physiotherapy as an academic profession.

**Purpose:** This study investigated physiotherapists' experiences and attitudes towards scientific research in Austria, where physiotherapists have only been qualifying at bachelor level since 2009.

**Methods:** A convenience sample of 597 qualified physiotherapists completed an anonymous cross-sectional online survey.

**Results:** Most respondents were female (n=467, 78.2%) and in age groups between 26-35 years (n=149, 25.0%), 36-45 years (n=178, 29.8%) and 46-55 years (n=173, 29.0%). Seventeen respondents (2.8%) held doctoral degrees, and 61 (10.2%) had substantial research experience beyond undergraduate or master-level student research. More positive research attitudes were observed in participants who were male, younger, without children, had completed their physiotherapy qualification since 2009, were engaged in teaching and education, and held postgraduate degrees. Most frequently reported barriers and/or enabling factors for physiotherapy research were time, training, finances and a "critical mass" of research activity.

**Conclusion:** These findings highlight low levels of research activity among physiotherapists in Austria, despite general appreciation of the importance of research for the profession. The identified attitudinal profiles, barriers, and facilitators may inform initiatives for advancing physiotherapy research in the Austrian context.

**Keywords:** attitude; education; physiotherapy; research; workforce

## **Introduction**

The evidence-based practice movement has enabled physiotherapy in many countries to mature into a more autonomous and academic profession (Schreiber and Stern, 2005). This development includes the introduction of university-based physiotherapy courses (leading to qualifications at bachelor, master and doctorate levels; Italian BFUG Secretariat, no date), and a growing number of physiotherapists holding doctoral degrees and undertaking scientific research to further the evidence base that underpins physiotherapy practice. Scientific research in physiotherapy ultimately benefits patients and the population, enabling individuals to receive the most suitable treatments based on clinical reasoning which incorporates best scientific evidence (Veras, Kairy, and Paquet, 2016). These principles are reflected, for example, in the policy statement on research by the World Confederation of Physical Therapy (WCPT, 2017) and in the physiotherapy practice framework of the Chartered Society of Physiotherapy (CSP, 2011) in the United Kingdom.

The extent to which physiotherapists actively engage in scientific research and knowledge production differs between countries. This likely correlates with national variations in the historical development and traditions of the physiotherapy profession, including differences in education systems. In Austria, physiotherapy education had been provided at “schools” until 1992, and from 1993 to 2005 at “academies”, leading to a diploma qualification (ÖBIG, 2004). Since 2006, in line with the Bologna Process which aims to achieve more compatible higher education systems across the European Higher Education Area (Italian BFUG Secretariat, no date), physiotherapy education in Austria has largely been restructured and housed at newly established Departments of Health Sciences at Universities of Applied Sciences. These institutions provide undergraduate physiotherapy education at bachelor level,

and postgraduate courses at master level. But despite this formal elevation of physiotherapy from a more technical to an academic profession, the infrastructure and support available to physiotherapists in Austria to develop further into doctoral and post-doctoral level scientists remains wanting. Data on post-qualification career development of physiotherapists in Austria are limited, but from the membership profile of the Austrian physiotherapy professional association it is apparent that very few members are educated to doctoral level or hold research-active posts. In contrast, other countries offer opportunity for physiotherapists to participate in, and lead physiotherapy research at post-doctoral and professorial level. Further indicators of research-active physiotherapy communities are also lacking in Austria, such as professional special interest networks for research, peer-reviewed academic physiotherapy journals, or research funding schemes exclusive to physiotherapists.

Against this background, it is both necessary and timely to gather data on current levels of scientific practice and knowledge production among physiotherapists in Austria, to generate evidence and inform future initiatives in support of physiotherapy research. The aim of this study was therefore to explore experiences and attitudes towards scientific research among physiotherapists in Austria. Specific objectives were to describe (a) physiotherapists' attitudes towards research; (b) the extent of physiotherapists' research experience; (c) associations between participant characteristics, attitudes towards research and levels of research experience; and (d) physiotherapists' perceptions of barriers and enabling factors for conducting physiotherapy research in Austria. This study specifically concerned research in the sense of the generation of new knowledge, as opposed to the utilization of existing research findings in the context of evidence-based practice.

## **Materials and Methods**

The study design was a cross-sectional online survey of qualified physiotherapists in Austria (de Vaus, 2014; Kelley, Clark, Brown, and Sitzia, 2003). Reporting followed the Checklist for Reporting of Results of Internet E-Surveys (CHERRIES; Eysenbach, 2004).

### ***Study Setting***

In 2019, there were approximately 14,000 practicing physiotherapists in Austria serving a population of 8,8 million. This equates to approximately 16 physiotherapists per 10,000 of the population. About three quarters of physiotherapists in Austria are female. Nine institutions deliver 3-year bachelor-level qualification programs to approximately 1,400 undergraduates. Membership with the Austrian professional physiotherapy association is voluntary and comprises 4,880 members, including undergraduates and retired members (WCPT, 2019a). Mandatory state registration for allied health professionals, including physiotherapists, was only introduced in Austria in 2019 (BMASGK, 2019). Although comprehensive national workforce statistics based on this state register have not been published to date, it is estimated that approximately 80% of physiotherapists are self-employed (independent/private practice), but that a considerable proportion of self-employed therapists are also in part-time employment.

The scope of physiotherapy practice in Austria is defined by the Ministry of Health. Physiotherapists are not considered autonomous practitioners and may only accept patients who have been referred by a physician. Patients' direct access to physiotherapy is not permitted, but physiotherapists may accept self-referrals from healthy clients for preventive work. Physiotherapy services in both public and private health sectors in Austria are funded through compulsory national insurance premiums and/or additional private or voluntary insurance premiums. Private physiotherapy services may also be funded through personal

payments. Physiotherapy services are billed according to the duration of individual sessions (30, 45, 60 minutes), while the selection and application of assessment and treatment modalities lies within the responsibility of the individual therapist (WCPT, 2019b). The scope of physiotherapy practice in Austria remains restricted to traditional non-invasive modalities, which means that there is currently very little movement towards advanced/extended scope practice such as prescribing medication, performing injections, etc. (Froment et al, 2019).

### ***Ethical Considerations***

At the time of conducting this research, surveys addressing healthcare professionals did not require formal review by a research ethics committee under Austrian research governance. The survey followed ethical research practice as outlined in the Declaration of Helsinki, i.e. voluntary participation; reassurance of anonymity, data protection and confidentiality; advance information of purpose and content; provision of contact details of the research team; and full disclosure of involved organizations. This information was summarized in the survey invitation email and described in full detail on the first two pages of the online questionnaire. No person-identifiable information was collected. Participants were informed that responses would only be stored upon completion of the final page of the online questionnaire, which implied informed consent.

### ***Development and Pre-Testing***

A literature search did not identify any available existing survey instruments in German. A new online questionnaire was therefore developed in a stepwise process. The first author conducted formal face-to-face and telephone conversations with co-authors and further key informants. Co-authors were part of the core project group from the beginning of the project.



The further key informants were identified and recommended by co-authors and approached by the first author. Altogether eight key informants contributed high level expertise and experience regarding physiotherapy education, clinical practice, professional representation and politics, and physiotherapy research in the Austrian context. The purpose of these conversations was to scope views, experiences and suggestions with respect to the direction and purpose of the survey. This directly informed content and format of the online survey questionnaire. The first author then drafted questionnaire items designed to gather views and experiences of physiotherapists with respect to perceived importance of research; interest, barriers, and enabling factors for actively conducting research; and current levels of research activity and research training among respondents. The questionnaire comprised the following domains: personal characteristics, qualification(s) and professional profile; work and career satisfaction (data not presented in this article); attitudes towards physiotherapy research; personal research experience; barriers and facilitators to physiotherapy research. Response options included multiple choice answers, numerical rating scales, Likert scales, and free text answers. An explanation was incorporated to distinguish research (conducting a systematic inquiry according to scientific principles, to answer specific research questions and generate new knowledge) from evidence-based practice (incorporating existing research findings to inform clinical practice; WCPT, 2017), and respondents were instructed that questionnaire items referred specifically to research rather than evidence-based practice. Draft items were reviewed and further refined by co-authors and then incorporated into the online questionnaire (Online Surveys ©2019, Jisc, Bristol, England). The survey was designed in German, using the German language version of the survey platform. The online questionnaire was pilot-tested by seven volunteers (physiotherapy lecturers and final-year physiotherapy students). Volunteers attended a half-day session, during which they each completed the questionnaire “live” online, giving feedback on format, layout, content and wording of items

as well as on the usability of the online platform across different devices (laptop computer, smartphone and tablet). Individual feedback and group discussion resulted in further suggestions for improvement and refinement, which were incorporated to optimize content validity, usability and acceptability of the questionnaire. Lastly, all co-authors reviewed and amended the penultimate version of the online questionnaire and approved the final version.

### ***Recruitment Process***

The survey recruited a non-random convenience sample of qualified physiotherapists who were practicing in Austria, whereby their practice could include clinical practice, public health and prevention, physiotherapy education and/or research. Also included were qualified physiotherapists who held a membership with the Austrian physiotherapy professional association and who were either retired or living and practicing abroad. It was considered relevant to include the latter groups because of their potentially unique insights, for example from personal observations of changes in professional practice over an entire working life, or from comparison with physiotherapy practice and research abroad. The survey was openly accessible via a single link which was circulated by email. The survey invitation included an explanation of the study and the survey link. The invitation was emailed to potential participants via two routes: via the Austrian physiotherapy professional association's mailing list, which at the time included 4,850 valid individual email addresses; and via the course directors of all nine physiotherapy undergraduate program providers in Austria, who were asked to disseminate internally to physiotherapy teaching staff, and externally to clinical placement educators and physiotherapy alumni.

### ***Survey Administration***

Survey invitations were first sent in mid-April 2019, with monthly reminders before the survey closed at the end of June 2019. The online questionnaire consisted of 40 items presented over 24 screens/pages. To reduce the number and complexity of items, adaptive questioning was incorporated where possible, whereby certain items were displayed based on responses to other items. There was no randomization or alternation of items, as later questionnaire sections built on responses and information given in the earlier sections. All items were mandatory and included non-response options such as “not applicable” or “prefer not to say”. Respondents were able to save and continue later, and to change answers via the Back button. Responses were stored on the online survey system after completion of the final questionnaire page. The survey platform also registered the number of views for each page of the online questionnaire, enabling an assessment of respondent progress through the questionnaire. Measures to determine a unique visitor or prevent multiple entries from the same individual, such as cookies, IP check or registration, were not incorporated. Survey incentives included an optional prize draw for gift vouchers, and an offer to receive a summary of the survey results. Participants could enter the prize draw and/or request a summary of results by providing their email address via a link to a separate secure website, so that email addresses could not be matched to questionnaire responses.

### *Analysis*

Due to the mode of survey administration, all data were from completed questionnaires. Responses were exported to Microsoft Excel and SPSS statistical software (IBM Corp., 2019 Armonk, NY) in its recent version. The dataset was screened for atypically short completion times and inconsistent answers, to identify responses which could have been made without due consideration. Based on completion times during the development and pilot testing of the

questionnaire, it was decided to review instances where the survey was completed in under eight minutes. Examples of inconsistent answers are discrepancies between age group and year of qualification, etc. Quantitative data were analysed descriptively, using frequency and percentages or the appropriate measure for central tendency and spread. Kolmogorov-Smirnov tests and inspections of quantile-quantile plots were applied, in order to assess normality of data at group level. Graphs were used to visualize responses.

Associations between respondent characteristics, attitude sets, and level of research experience were explored by cross-tabulation. Mann Whitney U-tests were carried out for non-parametric group comparison of continuous data, and Fisher's exact tests for comparison of dichotomous variables. Corresponding effect sizes were presented as  $r$  and odds ratios, respectively. Multiple testing (56 tests applied to the sample, with alpha 0.05) was corrected by the Bonferroni method, with a  $p$ -value  $\leq 0.0009$  consequently indicating statistical significance. These analyses of associations were exploratory and not based on a prospective sample size calculation. Analysis did not incorporate adjustment for non-representative samples such as weighting of items or propensity scores. For this exploratory analysis of associations, the authors sought to select questionnaire items which would offer meaningful insights in the context of the project aim, without subjecting the data to unwarranted multitudes of statistical analyses. Analyses of associations therefore included six attitudinal statements in relation to individual interest and intentions towards research, and one item summarizing the extent of individuals' current or past research experience. These items were cross-tabulated with eight participant characteristics: gender, age, children, marital status, physiotherapy as primary or secondary qualification, qualification prior to or since 2009 (i.e. prior to or since Austrian undergraduate cohorts first qualified at bachelor level), engagement in teaching and education, and completion of master or doctoral level education. These eight characteristics were selected to explore, for example, aspects of gender (in)equality, potential

influence of family commitments, and possible impacts of career path and education on respondents' individual interest, intentions, and experience in research.

Qualitative data from free text responses were imported to NVivo 12 software and coded using a framework analysis approach (Gale et al. 2013). The first author coded and summarised responses in relation to questionnaire domains (attitudes, facilitators, and barriers to research) and with respect to additional relevant themes which were not reflected in questionnaire items. Two co-authors peer reviewed the analysis against raw data. Findings presented in this article have been translated into English from the original German by the first author.

## **Results**

### ***Response Rates***

The survey link was accessed 1,226 times (survey views). The first survey question was completed 720 times (58.7% of survey views, i.e. participation rate). The survey was completed 597 times (82.9% of first survey page completion, i.e. completion rate; 48.7% of survey views). No responses were excluded due to atypically short completion times or inconsistent answers.

### ***Description of the Sample***

Out of 597 respondents, 467 (78.2%) were female, 344 (57.6%) were married or in a civil partnership, and 383 (64.2%) had children. Most respondents were in the age groups between 26-35 years (n=149, 25.0%), 36-45 years (n=178, 29.8%) and 46-55 years (n=173, 29.0%). The year of completing physiotherapy education ranged from 1969 to 2018 (median 2000,

interquartile range 1991 to 2009). The majority had qualified in Austria (n=525, 87.9%). Most respondents reported working in employment (n=92, 15.4%), self-employed (n=342, 57.3%) or both (n=139, 23.3%). Five (0.8%) were not currently working, and 11 (1.8%) were retired. From those currently working, 201 (34.6%) were also involved in teaching and education: 109 (18.8%) taught in a clinical setting, 78 (13.0%) in undergraduate and/or master-level programs in a university setting, and 42 (7.2%) on stand-alone courses for continuing professional development. Median (interquartile range) weekly working hours were 31.5 (25 to 40) hours. Further characteristics of the sample are given in table 1.

[TABLE 1 ABOUT HERE]

### ***Attitudes Towards Research***

Figure 1 presents participants' ratings of attitudinal statements concerning the relevance or importance of research for the physiotherapy profession. Figure 2 presents attitudinal statements relating to individual interest and intentions towards research. Cross-tabulation of the latter with eight participant characteristics showed statistically significant trends towards more positive research attitudes in participants who were male, younger, without children, had completed their undergraduate physiotherapy qualification since 2009, were engaged in teaching and education, and had completed doctoral or master-level studies (table 2, online supplementary table S1).

[FIGURE 1 ABOUT HERE]

[FIGURE 2 ABOUT HERE]

[TABLE 2 ABOUT HERE]

Sixty-five respondents expanded on their views in free text comments, illustrating further perspectives and discussion points around physiotherapy research. Several respondents commented that research studies often lack relevance for clinical practice, particularly when studies aim to generalize findings to heterogeneous patient groups:

*Only an individualized therapy is meaningful, and we must hold onto this [premise]. The way that research is not infrequently conducted, we sometimes run the risk of developing “recipes” which are very similar to approaches in biomedicine. (Respondent 352)*

Additionally, many respondents stressed their view that physiotherapy is a primarily practical profession, and that clinical experience should underpin all physiotherapy research:

*I find it very important that physiotherapists should have a lot of practical experience with patients before they go into research. Only in this way it can be avoided that research has nothing to do with clinical practice. (Respondent 591)*

Similarly, several respondents acknowledged the need for research, but emphasized that the caring and social side of physiotherapy as well as manual skills and hands-on practice should not be lost to a more cognitive and scientific way of working:

*Research is essential, but it should never be forgotten that we are in a social profession. Therefore, it is important to work using your heart as well as your brain. (Respondent 25)*

Respondents' free text comments described opposing views as to whether research knowledge and skills training should be integrated into physiotherapy education at undergraduate level; or whether it should be an add-on for qualified and experienced therapists:

*Studies often have nothing to do with [clinical] practice and patients' daily lives! If at all, [research] should be a separate education or area of practice. (Respondent 58)*

Similarly, there were differing perspectives on the need to claim and protect the physiotherapy research domain, with some respondents suggesting that physiotherapy research should be conducted exclusively by physiotherapists; while most respondents commented on the benefit of interprofessional and interdisciplinary collaboration in research. Several respondents made free text comments suggesting that the physiotherapy professional association and physiotherapy education institutions should take a more prominent role in furthering physiotherapy research in Austria.

### ***Research Experience***

About half of respondents (n=337, 56.45%) said that they had no practical experience whatsoever as physiotherapists in research, while 260 respondents (43.55%) said they had experience to some extent. This experience mainly related to research projects conducted during undergraduate or master-level studies (n=249, 41.71%). Sixteen respondents (2.68%) had conducted physiotherapy research as part of a doctoral degree, and 33 (5.53%) indicated



that they currently or previously had worked in either full- or part-time physiotherapy research roles. Asked about specific research skills and activities, about two thirds of respondents had experience in data collection (n=392, 65.66%) and analysis (n=356, 59.63%), but only up to a quarter had experience in grant writing, ethics applications, or publication of research (table 3). With regard to research training beyond undergraduate-level education, 52 (8.71%) had completed a master degree at an Austrian University of Applied Sciences; 110 (18.43%) had completed a master degree at a traditional university in Austria; 17 (2.85%) had completed a doctoral degree (with disciplines including health/medicine, sports science, education, natural sciences and social sciences); and 242 (40.53%) had completed other research training such as one-off courses or seminars.

[TABLE 3 ABOUT HERE]

Cross-tabulation with dichotomized participant characteristics revealed that male participants, those engaged in teaching and education, and those holding a doctoral or master-level degree were more likely to indicate a substantial level of research experience, as opposed to none or student/auxiliary research experience (table 4). “Substantial level of research experience” was defined as working (currently or previously) in a physiotherapy research role; having written and submitted a research grant application, or having successfully been awarded a research grant; being responsible for the delivery of a physiotherapy research project; and/or leading a physiotherapy research team or department.

[TABLE 4 ABOUT HERE]

### ***Perceived Barriers and Enabling Factors***

Out of a given list of barriers to physiotherapy research, participants had most frequently experienced or observed insufficient time (n=423, 70.85%) and limited knowledge and skills (n=310, 51.93%). Most frequently reported enabling factors were links with research-active physiotherapists (n=234, 39.20%); working at, or having links to a university (n=216, 36.18%); and opportunities for training and mutual support in professional networks (n=210, 35.18%). Detailed responses are given in table 5.

[TABLE 5 ABOUT HERE]

### **Discussion**

This was the first survey to explore experiences and attitudes towards research among physiotherapists in Austria. In this self-selected convenience sample of 597 qualified therapists, the majority acknowledged the importance of physiotherapy research, and most thought the level of physiotherapy research activity in Austria should aim to match that of other research-active countries. Up to a quarter of respondents indicated interest and intentions towards actively conducting research themselves; however, more than half of respondents indicated no previous or current practical experience with research whatsoever, and only up to 10% had substantial research experience, i.e. research experience beyond auxiliary research activity or undergraduate/master-level student research. Respondents described a combination of time, training, finances and “critical mass” (e.g. links with

research-active environments and a supportive network of research-active colleagues) as the most common barriers and/or enabling factors for conducting research. Within the limitations of this study, our findings provide a snapshot of the current (lack of) research acumen of the physiotherapy profession in Austria.

The Austrian physiotherapy professional association firmly endorses the conduct of research and generation of new knowledge to benefit physiotherapy, patients, and the population (Physio Austria, 2018; Eckler et al, 2017). Importantly, physiotherapists' involvement and experience in conducting research have been linked to more positive attitudes towards research implementation in practice; and it has been suggested that providing greater opportunity for physiotherapists to engage in research can benefit their development of evidence-based practice skills (Scurlock-Evans, Upton, and Upton, 2014). For instance, a qualitative study of Swedish physiotherapists by Dannapfel et al. (2014) provided examples of how experiences and attitudes towards conducting research relate to motivation for evidence-based practice. A culture and climate that is conducive to physiotherapists engaging in research is therefore likely to enhance the quality of evidence-based practice across the profession, in turn benefiting patients and the population at large (Nilsagard, Westerdahl, and Forsberg, 2019). The case for promoting physiotherapy research is clear and its importance is therefore also reflected in strategy and policy of the World Confederation of Physical Therapy (WCPT, 2017), the European Region World Confederation of Physiotherapy (ER-WCPT, 2020) and pan-European physiotherapy networks such as the European Network of Physiotherapy in Higher Education (ENPHE, 2018).

Physiotherapists' attitudes will invariably influence the advancement of physiotherapy research. As in other European and Anglo-American countries, professional identity and clinical practice in Austria have historically developed from a tradition of treatment by means of movement and touch, and an education model with an emphasis on practice-based

learning (ÖBIG, 2004; Westerdahl, 2013). Our survey sample demonstrated an overall appreciative attitude towards research, possibly due to the comparatively large proportion (34.6%) who were involved in teaching and education. Involvement in teaching and education might link to greater appreciation of research due to individuals' heightened self-reflection and questioning of taught content. Nevertheless, respondents' free text comments surfaced several shared concerns that research should be underpinned by relevant clinical experience and that valued qualities of physiotherapy practice should not be "lost" to a more scientific and cognitive way of working. These valued qualities include the importance of manual skills and hands-on practice, an individualized approach to working with patients, and the caring and social role fulfilled by physiotherapists. This may indicate an underlying assumption that research represents a hands-off, formulaic, distant, and uncaring approach to dealing with patients – an assumption that is possibly grounded in limited awareness and knowledge of the many facets of physiotherapy research which encompasses both biomedical and human science paradigms and draws on a range of academic disciplines including education, social science, and qualitative research approaches (Westerdahl, 2013).

Trends towards more positive research attitudes, in the sense of individual interest and intentions to actively engage in research, were observed in those participants who are male, are engaged in teaching, completed doctoral or master-level studies, are younger, without children, and completed their undergraduate physiotherapy qualification since 2009. The latter three aspects possibly describe a profile of young therapists without family commitments, who were educated under the more recent bachelor-level curricula and who are motivated to dedicate their time and focus towards conducting research. Exposure to more diverse and interdisciplinary academic environments at Universities of Applied Sciences could also have contributed to greater appreciation of scientific research and translation of scientific education into professional practice in this group. Greater research experience was

associated with male gender, being engaged in teaching, and having completed doctoral or master-level research training. These associations describe a coherent picture and point to insights, such as the need to actively support gender equality in science (Rosser, Barnard, Carnes, and Munir, 2019), teaching as a potential catalyst for research activity (Westerdahl, 2013), and the importance of making available research training opportunities (ER-WCPT, 2020). Equally, it is important to address attitudes and assumptions of groups which show lesser engagement – perhaps due to lower confidence to get involved in research – such as female therapists, or older therapists who may have qualified at a time when research featured less in undergraduate physiotherapy curricula. Our survey data indicate the potential for gender bias as a potential future barrier, which should be addressed comprehensively within any initiative for fostering physiotherapy research in Austria. Similar to prominent strategies for gender equality in science in the Anglo-American context (Athena SWAN in the United Kingdom and ADVANCE in the United States; Rosser, Barnard, Carnes, and Munir, 2019), there are federal policies and initiatives specific to the Austrian context which should be drawn upon (Wroblewski and Striedinger, 2018).

In addition to capturing attitudes towards research, our survey was novel in that it specifically addressed the extent and circumstances of physiotherapists' research activity (i.e. the generation of new knowledge), as opposed to evidence-based practice of physiotherapists (i.e. the use of existing research findings in clinical practice). In contrast to a relatively large international body of evidence on the latter (Scurlock-Evans, Upton, and Upton, 2014; da Silva, da Cunha Menezes Costa, Garcia, and Costa, 2015; Condon, McGrane, Mockler, and Stokes, 2016; Stander, Grimmer, and Brink, 2018), comparatively little data have been published specifically about research activity by physiotherapists. Our study therefore adds to a small but growing international literature.

Other international studies of physiotherapists' research activity include an early study by Kamwendo (2002) in which 343 physiotherapists in Sweden were surveyed about perceptions, attitudes, intentions, and actual engagement in research. Aljadi et al. (2013) conducted a similar survey of 122 physiotherapists in Kuwait. Grimmer-Somers et al. (2007) conducted a survey of 171 physiotherapists in Australia which aimed to explore barriers and facilitators to evidence uptake and included items on experience and attitude to undertaking research. Janssen, Hale, Mirfin-Veitch, and Harland (2016) conducted a mixed methods study of 25 physiotherapists in New Zealand to explore perceptions towards research. Nilsagard, Westerdahl, and Forsberg (2019) interviewed 26 (mostly) physiotherapists who had contributed to a research study in Sweden, to explore their perceptions and experiences of taking part in the project. Connolly et al. (2018) surveyed 268 critical care physiotherapists in the United Kingdom to characterize the research profile and experience of this group.

The main findings from these studies very much align with the present survey results, in that participants showed generally positive attitudes towards research (Aljadi et al, 2013; Connolly et al, 2018; Grimmer-Somers et al, 2007; Janssen, Hale, Mirfin-Veitch, and Harland, 2016; Kamwendo, 2002; Nilsagard, Westerdahl, and Forsberg, 2019) and highlighted key barriers/enablers of time (Aljadi et al, 2013; Connolly et al, 2018; Grimmer-Somers et al, 2007; Janssen, Hale, Mirfin-Veitch, and Harland, 2016; Kamwendo, 2002; Nilsagard, Westerdahl, and Forsberg, 2019), research knowledge and skills (Aljadi et al, 2013; Connolly et al, 2018; Grimmer-Somers et al, 2007; Janssen, Hale, Mirfin-Veitch, and Harland, 2016), funding (Connolly et al, 2018; Kamwendo, 2002), research-supportive leadership (Grimmer-Somers et al, 2007; Janssen, Hale, Mirfin-Veitch, and Harland, 2016; Nilsagard, Westerdahl, and Forsberg, 2019), and a "critical mass" of research activity (Connolly et al, 2018; Grimmer-Somers et al, 2007; Nilsagard, Westerdahl, and Forsberg, 2019). This emerging literature therefore provides a congruent picture which identifies target

areas and may guide high-level strategic direction to further physiotherapy research in Austria but also in other countries.

Nevertheless, national contexts and idiosyncrasies need to be considered, particularly as physiotherapy presents a rather heterogeneous profession across the world and even within regions. This heterogeneity is reflected in the national and regional profiles of the profession which the World Confederation for Physical Therapy publishes based on data from annual surveys of member organizations (WCPT, 2019b). Of note, most available data for international comparison relate to physiotherapy regulation, education, and scope of practice. Extending this to include data on research activity by physiotherapists could allow for more comprehensive international comparison of scientific knowledge generation in physiotherapy, and over time could support impact analyses of strategic measures. A briefing paper on promoting research in physiotherapy by the European Region of the World Confederation for Physiotherapy (ER-WCPT, 2020) lists 16 such strategic measures, many of which call upon the national professional organizations. The first two actions on this list refer to promoting networks for physiotherapy research and increasing the number of therapists with research competencies at doctoral level and above, including the provision of support, resources, time and funding for master and doctoral studies. This directly addresses the most frequently raised barriers and facilitators in our survey and in other international studies and would seem an obvious strategic priority for any country with a relatively short academic and research tradition in physiotherapy.

In Austria, however, higher education regulations currently complicate the route for physiotherapists to advance to doctoral studies. While master's degrees that are accredited and funded by the federal government in Austria lead to eligibility for doctoral studies, self-funded master's degrees that are accredited locally by Universities of Applied Sciences do not (Pascottini, 2016). Individuals who complete such a self-funded master-level program

may seek out PhD opportunities, but their eligibility to access doctoral studies principally remains at the discretion of the university. This difference presents a peculiarity in the Austrian higher education system and relates mainly to modes of funding and accreditation, rather than any differences in academic content, student workload, or indeed quality of these programs. In the current system in Austria, physiotherapists (and other allied health professionals) are eligible primarily for self-funded master courses at Universities of Applied Sciences, which means that Austrian physiotherapists in pursuit of PhD opportunities are at a structural disadvantage in this academic environment, essentially due to national higher education policy and regulations. This circumstance was also reflected in our survey findings, with 26% of respondents reporting that physiotherapist in Austria find it difficult to access a PhD or doctoral course of studies (Table 5). Highly motivated individuals sidestep this situation by studying abroad, but a long-term solution will likely require lobbying and political maneuvering on behalf of the profession to achieve a change in education legislation.

Our survey has shown that a sub-group of qualified physiotherapists in Austria express interest in actively conducting research and advancing their research knowledge and skills. Under conducive regulatory conditions, it could be expected that these individuals would be receptive to initiatives such as physiotherapy-specific research training and funding schemes. A particularly well-structured example of such a scheme for promoting research careers of physiotherapists and other non-medical healthcare professionals at a national level comes from the United Kingdom, where a government-funded stepwise clinical academic development path specifically for non-medical healthcare professionals was established over a decade ago (UK Clinical Research Collaboration, 2007). This scheme offers master, doctoral, postdoctoral, and senior clinical academic awards, with the strategic aim to develop highly skilled clinical researchers and educators from the non-medical healthcare professions.



This speaks to the foresight of policymakers who recognize the potential in this workforce. But it may also reflect national structures and dynamics in the healthcare workforce. The possibility to establish this type of large-scale support for researchers with non-medical clinical background could also be linked to a multi-disciplinary clinical culture such as in the United Kingdom, in which non-medical healthcare professionals hold comparatively more clinical responsibility (or even autonomy) than in other countries with more rigid medically-led clinical hierarchies.

To promote research in physiotherapy, it is clearly necessary to offer motivation, support, and development opportunities to talented individuals. But in addition to that, evidence from across the non-medical healthcare professions raises further considerations related to structures and dynamics in healthcare research. A systematic review by King, Zlatanovic, and Gillham (2018) sought to identify facilitators and challenges to successful research collaboration between academic researchers and non-medical healthcare practitioners. This study highlighted that, in addition to individuals' personal and professional characteristics such as motivation, interest and academic qualifications, the wider environment needs to be conducive to practitioners' involvement in research. Health and educational institutions and professional communities need to encourage the building of collaborative, collegial networks and provide tangible structural support. This was also a key message in the study by Fletcher, Whiting, Boaz, and Reeves (2017, 2019) who interviewed 29 graduates of the above-mentioned publicly funded master-level research training for non-medical healthcare professionals in the United Kingdom. Exploring whether interviewees had subsequently been able to develop into researcher-practitioner roles, this study illustrates that it is necessary to leverage individual practitioners' research training through concrete managerial and organizational support in order to enable these skills to be put into practice and achieve research-active clinical environments. In this respect, there is opportunity in the Austrian

context to draw on experiences from other countries with a more developed physiotherapy research tradition, to anticipate and avoid potential pitfalls along the way.

### ***Strengths and Limitations***

The findings from this survey need to be interpreted in view of study strengths and limitations. Strengths were the thorough development process of the survey with involvement of high-level stakeholders; and the high survey completion rate, confirming acceptability of the questionnaire. A study limitation was the open recruitment strategy, resulting in a self-selected convenience sample with potentially greater interest and appreciation of research compared to non-responders. The number of completed surveys in relation to survey views equated to 48.7%, which is near the reported average response rate of around 50% in organizational surveys and surveys of health professionals (Baruch and Holtom, 2008; Cho, Johnson and VanGeest, 2013). Analyses of associations between participant characteristics, attitudinal statements and research experience were exploratory rather than confirmatory and should be interpreted with caution. At the time of conducting the survey, it was not possible to establish the number of individuals in the sampling frame (i.e. the entire population of eligible survey participants) and their contact details, because no comprehensive register existed. Since completion of the survey, the newly established state register (BMASGK, 2019) provides, for the first time, a relatively accurate statistic for the number of qualified physiotherapists who are working in Austria. As of November 2019, this number was 14,027. Excluding retirees, the sample in this survey therefore reflects 4.2% of this population. In the future, the newly established register may allow for more controlled survey methods. For example, the register may serve as a sampling frame for probability sampling to enable adequately powered confirmatory statistical analyses; and the register may allow for the

implementation of survey access control measures to increase confidence in the identity of respondents. Similarly, the register may address the current lack of authoritative national workforce statistics for physiotherapists against which the characteristics of our sample could be compared. At the time of writing, data from the register were not publicly available. In the future, a comparison of sample characteristics against official workforce statistics will allow a judgement on the representativeness of our study sample, for example with respect to gender and type of employment.

### ***Conclusion***

This study has generated novel findings. It presents the first survey of research experiences and attitudes among physiotherapists in the Austrian context and adds to a very limited but emerging international literature which documents the extent of research experience and activity by physiotherapists. The findings attest to generally positive attitudes towards physiotherapy research and identify a sub-group of physiotherapists with interest in research-active roles. This study could be useful to higher education institutions, professional associations, and further stakeholders in physiotherapy, in Austria but also in other countries with a relatively short history of academic physiotherapy education. Besides methodological learning points for similar studies in other national contexts, these findings may serve to inform initiatives for advancing physiotherapy research and thereby contribute to the overarching aim of raising the quality of physiotherapy and healthcare provision in general.

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**Table 1.** Characteristics of the sample

Category	Sub-category	Frequency	Percentage
Gender	Female	467	78.2
	Male	119	19.9
	Prefer not to say	11	1.8
Marital status	Married, civil partnership	344	57.6
	Single, divorced, widowed, or separated	219	36.7
	Prefer not to say	34	5.7
Children	Yes	383	64.2
	No	193	32.3
	Prefer not to say	21	3.5
Age group	18-35 years	164	27.5
	36-55 years	351	58.8
	56-75 years	80	13.4
	>75 years	-	-
	Prefer not to say	2	0.3
Time period when qualified as physiotherapist	1960-1979	19	3.2
	1980-1999	293	49.1
	2000-2019	281	47.1
	Invalid response	4	0.7
Undergraduate qualification	Diploma	433	72.5
	Bachelor	164	27.5
Postgraduate qualification(s) <sup>a</sup>	Master	162	27.1
	Doctorate	17	2.8
Country of physiotherapy education	Austria	525	88.0
	Other	71	11.9

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	Invalid response	1	0.2
Professional qualifications prior to physiotherapy education	None	441	75.3
	Massage therapist	30	5.1
	Sports scientist	8	1.4
	Other	118	20.1
Employment status	Self-employed	342	57.3
	Employed and self-employed	139	23.3
	Employed	100	16.8
	Not currently working	5	0.8
	Retired	11	1.8
Place of work <sup>a,b</sup>	Independent physiotherapy practice	436	75.0
	Acute hospital	85	14.6
	Education provider	85	14.6
	Institutional care provider for older people	63	10.8
	Doctor's surgery, outpatient clinic	59	10.1
	Rehabilitation center	52	9.0
	Research organization	19	3.3
	Other (includes home visits, non-profit organizations, sports clubs, companies, etc.)	101	17.2
Clinical specialty <sup>a</sup>	Orthopaedics	471	78.9
	Trauma	346	58.0
	Neurology	210	35.2
	Geriatrics	206	34.5
	Prevention and public health	187	31.3
	Paediatrics	115	19.3

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	Surgery	113	18.9
	Gynaecology and urology	106	17.8
	Medicine (incl. cardiology and respiratory care)	93	15.6
	Physical medicine	64	10.7
	Other (incl. sports medicine, etc.)	56	9.4
	Occupational health	54	9.0
	Oncology	51	8.5
	Intensive care	30	5.0
	Psychiatry	28	4.7
	Dentistry	26	4.4
Teaching and education <sup>c</sup>	Not engaged in teaching and education	392	67.5
	Clinical placement educator <sup>a</sup>	109	18.8
	Undergraduate physiotherapy program <sup>a</sup>	69	11.9
	Master-level teaching <sup>a</sup>	9	1.6
	Continuing professional education (stand-alone courses) for physiotherapists <sup>a</sup>	42	7.2
	Full-time teaching position <sup>a</sup>	29	5.0
	Part-time teaching position <sup>a</sup>	66	11.4
Professional representation and politics <sup>b</sup>	Not engaged in professional representation and politics	359	61.3
	Representative with Austrian physiotherapy professional association <sup>a</sup>	47	8.0

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Other types of engagement <sup>a</sup>	176	30.0
Prefer not to say	42	7.2

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<sup>a</sup> Multiple responses possible

<sup>b</sup> n=586, excluding retired respondents

<sup>c</sup> n=581, excluding retired and those not currently working

1 **Table 2.** Median values and test statistics<sup>a</sup> of eight participant-characteristic comparisons regarding the attitudinal statement “I plan to educate myself further  
 2 about conducting research”.<sup>b</sup>

Participant characteristic	Median [interquartile range]	Effect size r	p-value
Female vs. male participants, n=586	3[4] vs. 4[4]	<b>.21</b>	<.0009*
Participants aged 18-35 years vs. those aged 36-75 years, n=595	4[4] vs. 2[4]	-.19	<.0009*
Participants who have children vs. those who have not, n=576	2[4] vs. 4[4]	.15	<.0009*
Marital status single, divorced or widowed vs. married or in a civil partnership, n=563	3[4] vs. 3[4]	-.04	.378
Qualification <sup>c</sup> completed as first and primary vs. second professional qualification, n=586	3[4] vs. 3[4]	.01	.76
Qualification <sup>c</sup> completed before 2009 vs. completed since 2009 <sup>d</sup> , n=593	2[4] vs. 4[4]	<b>.20</b>	<.0009*
Not engaged in teaching and education vs. those who are, n=586	2.5[3] vs. 4[4]	<b>.23</b>	<.0009*
Not completed a master’s or doctoral degree vs. those who did, n=579	2[3] vs. 5[3]	<b>.34</b>	<.0009*

3 <sup>a</sup> Results of Mann-Whitney-U-tests presented as effect size r (z/sqrt(n)), with bold figures highlighting effect sizes  $|r| \geq 0.2$ , and two-tailed p-values

4 <sup>b</sup> Results of all six attitudinal statements reflecting individual interest and intentions towards research are presented in online supplementary table S1;  
 5 respondents rated attitudinal statements between 1 (fully describes me) to 7 (does not describe me at all); items have been re-coded so that higher values  
 6 indicate more positive attitudes towards research

7 <sup>c</sup> Undergraduate physiotherapy qualification

8 <sup>d</sup> Cohorts graduating since 2009 are largely educated at Universities of Applied Sciences and qualify at bachelor level; cohorts before 2009 were educated at  
 9 academies or schools for physiotherapy and qualified with a diploma in physiotherapy

10 \* Considering a Bonferroni correction for a total of 56 statistical tests on the sample, a p-value  $\leq .0009$  was considered statistically significant

11 **Table 3.** Practical research experience among respondents (n=597).

Category	Response	Frequency	Percentage
Practical experience as physiotherapist in research	I have no practical experience as physiotherapist in research	337	56.4
	I have some practical experience as physiotherapist in research	260	43.6
Context of current or previous experience as physiotherapist in research <sup>a</sup>	Currently or previously in a full-time physiotherapy research role	12	2.0
	Currently or previously in a part-time physiotherapy research role	21	3.5
	Wrote and submitted a research grant application	31	5.2
	Awarded a competitive research grant	19	3.2
	Currently or previously responsible for the delivery of a research project	37	6.2
	Currently or previously the lead of a physiotherapy research team or department	9	1.5
	Primarily in clinical practice and currently or previously contributed to data collection for research	69	11.6
	Currently or previously contributing as physiotherapist to a medically led research project	63	10.6
	Conducted research as part of undergraduate physiotherapy course	109	18.3



	Conducted research as part of master-level physiotherapy course	140	23.4
	Conducted research as part of doctoral degree	16	2.7
Experience with specific research skills and activities (“Have you ever conducted, or are you currently conducting, any of the following research activities?”) <sup>a</sup>	Writing a study protocol	196	32.8
	Writing a research grant application	48	8.0
	Writing an ethics application	101	16.9
	Recruiting study participants, incl. taking informed consent	229	38.4
	Collecting data	392	65.7
	Analysing data	356	59.6
	Writing a study report	258	43.2
	Submitting an abstract for a scientific conference	135	22.6
	Presenting an abstract at a scientific conference	153	25.6
	Submitting an article to a scientific journal	55	9.2
	Having an article published in a scientific journal	47	7.8

<sup>a</sup> Multiple responses possible

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14 **Table 4.** Level of research experience according to participant characteristics. “Substantial level of research experience” was defined as working (currently or  
 15 previously) in a physiotherapy research role; having written and submitted a research grant application, or having successfully been awarded a research grant;  
 16 being responsible for the delivery of a physiotherapy research project; and/or leading a physiotherapy research team/department.

Participant characteristics	Sub-category (n)	Level of research experience		Odds ratio [95% CI]	p-value <sup>a</sup>
		None or student/auxiliary	Substantial		
Gender	Female (n=467)	431	36	0.37 [0.20, 0.68]	p<.0009*
	Male (n=119)	97	22		
Age group (years)	18-35 (n=164)	150	14	0.76 [0.41, 1.43]	p=.452
	36+ (n=431)	384	47		
Children	Yes (n=383)	342	41	1.53 [0.78, 3.04]	p=.229
	No (n=193)	179	14		
Marital status	Single, divorced or widowed (n=219)	203	16	0.64 [0.33, 1.21]	p=.186
	Married, civil partnership (n=344)	306	38		

Career path	Physiotherapy was first professional qualification (n=441)	394	47	1.21 [0.61, 2.44]	p=.638
	Completed one or more other professional qualifications prior to physiotherapy (n=145)	132	13		
Time of graduation <sup>b</sup>	2009 and later (n=164)	152	12	0.63 [0.31, 1.26]	p=.174
	Prior to 2009 (n=429)	381	48		
Teaching activity	Engaged in teaching and education (n=194)	155	39	4.45 [2.45, 8.11]	p<.0009*
	Not engaged in teaching and education (n=392)	371	21		
Level of research training	Doctoral or master level (n=171)	127	44	8.34 [4.60, 15.10]	p<.0009*
	None/other (n=426)	409	17		

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<sup>a</sup> Fisher's Exact test (2-tailed)

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<sup>b</sup> Cohorts graduating since 2009 are largely educated at Universities of Applied Sciences and qualify at bachelor level; cohorts graduating prior to 2009 were educated at academies or schools for physiotherapy and qualified with a diploma in physiotherapy

\* Applying a Bonferroni correction for a total of 56 statistical tests on the sample, a p-value  $\leq .0009$  is considered statistically significant

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19 **Table 5.** Barriers and enabling factors for physiotherapy research. Respondents were asked to indicate from a given list, which barriers and enabling factors  
 20 they had personally experienced or observed, and to add any additional barriers or enabling factors in free text.

Category		Response	Frequency	Percentage
Perceived barriers to physiotherapy research, which respondents have personally experienced or observed	Multiple-choice response options <sup>a</sup>	Insufficient time to conduct research	423	70.8
		Limited knowledge and skills of physiotherapists regarding research methods	310	51.9
		Lack of confidence to initiate and carry out research	280	46.9
		Lack of interest in conducting research	257	43.0
		Many physiotherapy treatment approaches are considered too complex for scientific research	170	28.5
		Physiotherapists in Austria find it difficult to access a PhD or doctoral studies	155	26.0
		Other professional groups and academic disciplines take over physiotherapy research topics (e.g. medical doctors, sports science)	141	23.6
		Research conducted by physiotherapists is not valued by other professional groups and other academic disciplines	136	22.8
		Physiotherapists in research earn less than physiotherapists in clinical practice and education	122	20.4
		Research conducted by physiotherapists is not valued within the profession	99	16.6

Additional free text responses <sup>b</sup>		Not knowing how to develop into a research role	14	2.3
		Family commitments, e.g. children	14	2.3
		Lack of funding schemes	14	2.3
		Lack of research training opportunities (incl. master-level or PhD/doctoral studies)	14	2.3
		Overall lack of capacity, resources and interest in physiotherapy research in Austria	13	2.2
		Lack of physiotherapy researcher posts	9	1.5
		Older age	8	1.3
		Rural/remote location	6	1.0
		Unsupportive employer	5	0.8
		Restrictive and competitive mind-sets in Austrian physiotherapy and research communities	5	0.8
Perceived enabling factors for physiotherapy research, which respondents have	Multiple-choice response options <sup>a</sup>	Links with research-active physiotherapists	234	39.2
		Working at, or having links to a university	216	36.2
		Opportunities for training and mutual support in professional networks	210	35.2
		Means to finance further studies	175	29.3

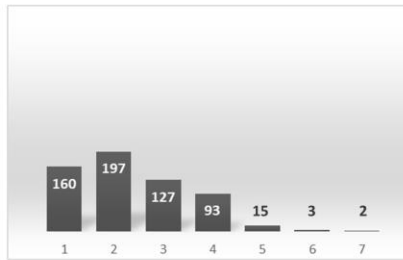
personally experienced or observed	Links with researchers from other professional groups and academic disciplines	169	28.3
	Working at, or having links to a university hospital	136	22.8
	Position with protected time for research	111	18.6
	Research funding schemes open exclusively to physiotherapists	75	12.6
Additional free text responses <sup>b</sup>	Individual factors, e.g. personal motivation and commitment, pioneering attitude, resilience, etc.	8	1.3
	Leveraging undergraduate and master-level student research for high-quality research projects	4	0.7
	Moving abroad or establishing international collaborations, to conduct research abroad	3	0.5
	Supportive and sharing attitude of research peers and mentors	3	0.5
	Institutions which foster diversity, innovation, critical thinking and discussion	1	0.2

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<sup>a</sup> Multiple responses possible; multiple-choice options were informed by conversations with key informants and relevant literature, (e.g. Hicks, 1993, 1995; Connolly et al, 2018)

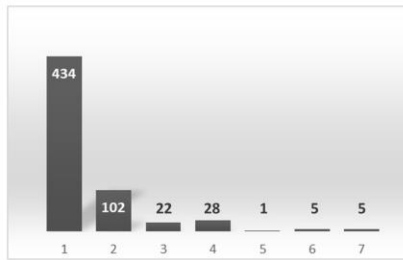
<sup>b</sup> Listed are unique aspects which were not reflected in multiple choice response options, irrespective of frequency

Physiotherapy research in Austria is in its infancy



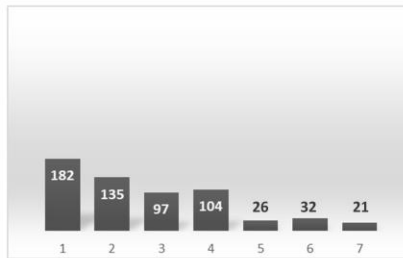
Physiotherapy research in Austria is internationally leading

Research projects with relevance for physiotherapy should involve physiotherapists as researchers



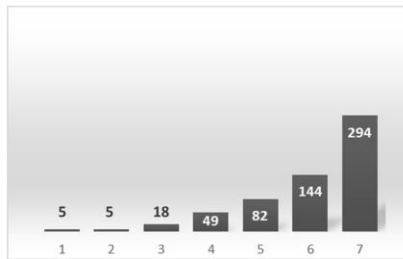
Research projects with relevance for physiotherapy should not involve physiotherapists as researchers

Physiotherapy researchers should be trained within a dedicated academic discipline of physiotherapy science (similar to nursing science)



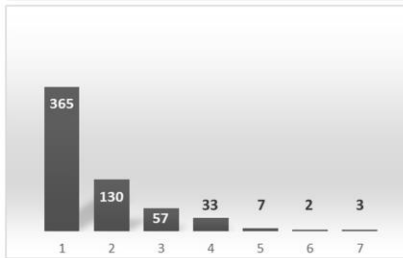
Physiotherapy researchers should be trained within already established academic disciplines, e.g. psychology, sports science, etc.

It is sufficient for physiotherapy research to be conducted mainly in other countries, e.g. Anglo-American or Scandinavian countries



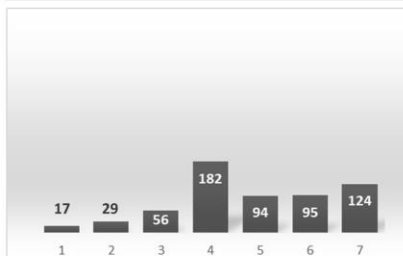
Physiotherapy research in Austria should be conducted at a similar level to internationally leading countries, e.g. Anglo-American or Scandinavian countries

Research is crucial for the future development of physiotherapy



Research is not useful to the future development of physiotherapy

Working with patients, physiotherapists should rely on their personal experience from clinical practice



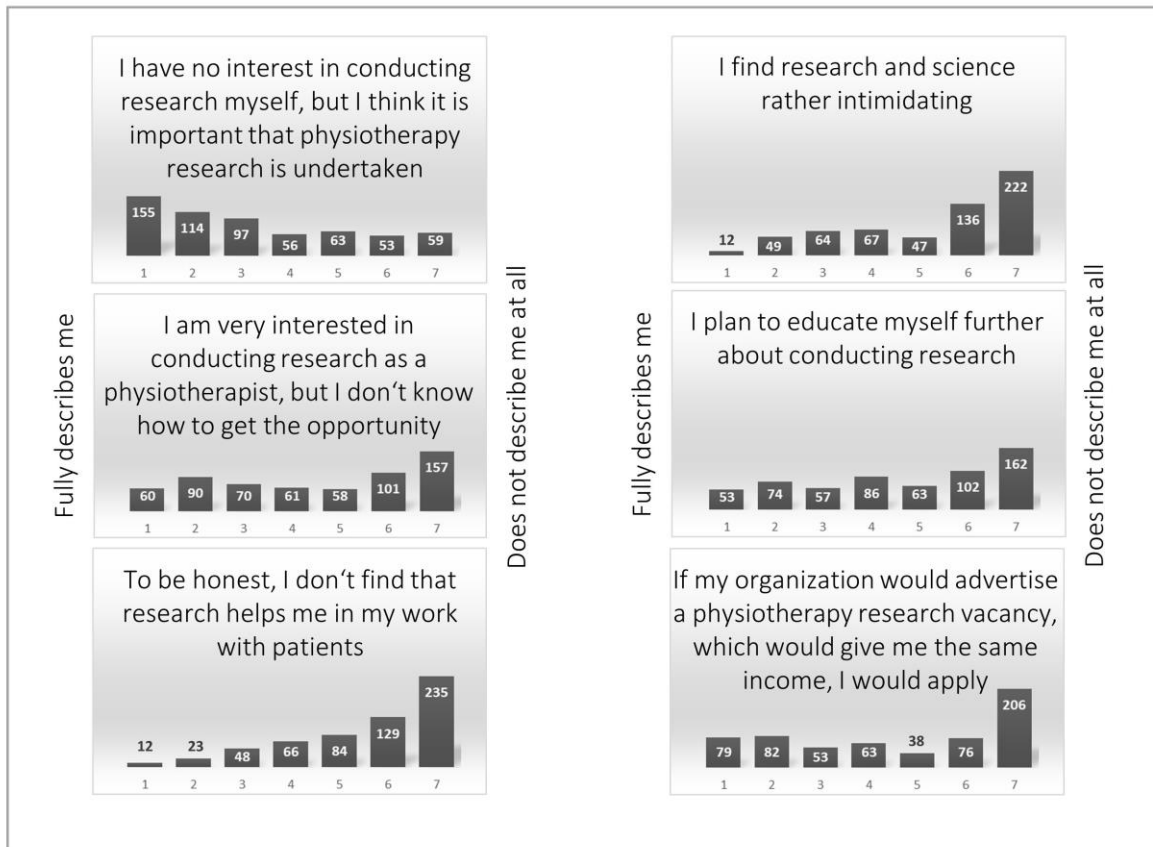
Working with patients, physiotherapists should consider current scientific evidence



24 **Figure 1.** Ratings of attitudinal statements relating to the relevance or importance of research  
25 for the physiotherapy profession. Respondents (n=597) rated their position on a 7-point scale  
26 between pairs of opposing statements, with greater proximity to either statement indicating  
27 greater agreement.

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31 **Figure 2.** Ratings of attitudinal statements relating to individual interest and intentions  
 32 towards research. Respondents (n=597) rated statements from 1 (fully describes me) to 7  
 33 (does not describe me at all).

**Online Supplementary Table S1.** Median values [interquartile range] and test statistics<sup>a</sup> of eight participant-characteristic comparisons regarding six attitudinal statements<sup>b</sup> which reflect individual interest and intentions towards research. Corresponding descriptive data are shown in Figure 2 in the main article.

Participant characteristic	Attitudinal statement					
	I have no interest in conducting research myself, but I think it is important that physiotherapy research is undertaken	I am very interested in conducting research as a physiotherapist, but I don't know how to get the opportunity	To be honest, I don't find that research helps me in my work with patients	I find research and science rather intimidating	I plan to educate myself further about conducting research	If my organization would advertise a physiotherapy research vacancy, which would give me the same income, I would apply
Female participants (vs. male participants), n=586	3[4] vs. 4 [4] U=21392 z=-3.944 r=-.16 p<.0009*	5 [4] vs. 4 [4] U=22021 z=-3.552 r=-.15 p<.0009*	6[3] vs. 6[2] U=32461 z=2.949 r=.12 p=.003	6[3] vs. 6[1] U=34063 z=3.94 r=.16 p<.0009*	3[4] vs. 4[4] U=35886 z=4.994 <b>r=.21</b> p<.0009*	2[4] vs. 5[5] U=36115 z=5.185 <b>r=.21</b> p<.0009*
Younger participants aged 18-35 years (vs. those aged 36-75 years), n=595	3 [3] vs. 3 [4] U=30992 z=-2.360 r=-.10 p=.018	4 [4] vs. 5 [4] U=26885 z=-4.586 r=-.19 p<.0009*	6[2] vs. 6[3] U=30578 z=-2.645, r=-.11 p=.008	5[4] vs. 6[3] U=40952 z=3.099 r=.13 p=.002	4[4] vs. 2[4] U=26794 z=-4.639 r=-.19 p<.0009*	4[4] vs. 2[5] U=30205 z=-2.814 r=-.12 p=.005
Participants who have children (vs. those who have not), n=576	3 [4] vs. 3 [4] U=34452 z=-1.353 r=-.06 p=.176	5 [4] vs. 4 [4] U=31178 z=-3.115 r=-.13 p=.002	6[3] vs. 6[2] U=38838 z=1.036 r=.04 p=.3	6[3] vs. 6[3] U=35387 z=-0.863 r=-.0 p=.388	2[4] vs. 4[4] U=43624 z=3.595 r=.15 p<.0009*	2[4] vs. 4[5] U=42675 z=3.113 r=.13 p=.002
Marital status single, divorced or widowed (vs. married or in a civil partnership), n=563	3 [4] vs. 3 [4] U=36297 z=-0.742 r=-.03 p=.458	5 [4] vs. 5 [4] U=35318 z= -1.269 r=-.05 p=.204	6[2] vs. 6[3] U=36387 z=-0.708 r=-.03 p=.479	6[3] vs. 6[3] U=40329 z=1.466 r=-.06 p=.143	3[4] vs. 3[4] U=36036 z=-0.882 r=-.04 p=.378	3[5] vs. 2[5] U=35439 z=-1.217 r=-.05 p=.224

<sup>a</sup> Results of Mann-Whitney-U-tests presented as test statistic U, standardized test statistic z, effect size r (z/sqrt(n)), and two-tailed p-values; **bold figures** highlight effect sizes | r | ≥ 0.2

## Experiences and attitudes towards scientific research among physiotherapists in Austria: a cross-sectional online survey. Online supplementary material

<sup>b</sup> Respondents rated attitudinal statements between 1 (fully describes me) to 7 (does not describe me at all); items have been re-coded so that higher values indicate more positive attitudes towards research; of note, because of their double-barreled wording, attitudinal statements one and two do not reflect straightforward two-dimensional ratings between a positive or negative attitude, but rather identify respondents who closely identify with these specific statements

<sup>c</sup> Undergraduate physiotherapy qualification

<sup>d</sup> Cohorts graduating since 2009 are largely educated at Universities of Applied Sciences and qualify at bachelor level; cohorts before 2009 were educated at academies for physiotherapy and qualified with a diploma in physiotherapy

\* considering a Bonferroni correction for a total of 56 statistical test applied at the sample, a p-value  $\leq .0009$  is considered statistically significant

Online Supplementary Table S1. Continued

Participant characteristic	Attitudinal statement					
	I have no interest in conducting research myself, but I think it is important that physiotherapy research is undertaken	I am very interested in conducting research as a physiotherapist, but I don't know how to get the opportunity	To be honest, I don't find that research helps me in my work with patients	I find research and science rather intimidating	I plan to educate myself further about conducting research	If my organization would advertise a physiotherapy research vacancy, which would give me the same income, I would apply
Qualification <sup>c</sup> completed as first and primary (vs. second professional qualification), n=586	3 [4] vs. 3 [3] U=30096 z= -1.079 r=-.04 p=.281	5 [4] vs. 4 [4] U=29261 z=-1.557 r=-.06 p=.119	6[2] vs. 6[3] U=32994 z=0.602 r=.02 p=.547	6[3] vs. 6[3] U=33137 z=0.681 r=.03 p=.496	3[4] vs. 3[4] U=32504 z=0.306 r=.01 p=.76	3[5] vs. 3[4] U=31421 z=-0.32 r=-.01 p=.749
Qualification <sup>c</sup> completed before 2009 (vs. completed since 2009) <sup>d</sup> , n=593	3 [4] vs. 3 [3] U=30463 z= -2.569 r=-.11 p=.010	5 [4] vs. 4 [4] U=26270 z=-4.849 <b>r=-.20</b> p<.0009*	6[3] vs. 6[2] U=39425 z=2.368 r=.10 p=.018	6[3] vs. 6[4] U=31292 z=-2.156 r=-.09 p=.031	2[4] vs. 4[4] U=44194 z=4.911 <b>r=.20</b> p<.0009*	2[4] vs. 4[4] U=41957 z=3.727 r=.15 p<.0009*
Not engaged in teaching and education (vs. those who are), n=586	5 [4] vs. 3 [3] U=11439 z=-6.829 <b>r=-.28</b> p<.0009*	4 [4] vs. 5[4] U=19246 z= -1.300 r=-.05 p=.193	6[3] vs. 6.5[2] U=43983 z=3.217 r=.13 p=.0009*	6[4] vs. 6[2] U=44797 z=3.636 r=.15 p<.0009*	2.5[3] vs. 4[4] U=48664 z=5.609 <b>r=.23</b> p<.0009*	2[4] vs. 4[4] U=47351 z=4.963 <b>r=.21</b> p<.0009*
Not completed a master's or doctoral degree (vs. those who did), n=579	2 [3] vs. 5 [3] U=19457 z= -9.053 <b>r=-.37</b> p<.0009*	5 [4] vs. 4 [4] U=29767 z= -3.549 r=-.15 p<.0009*	6[3] vs. 7[1] U=46283 z=5.383 <b>r=.22</b> p<.0009*	6[4] vs. 7[2] U=46520 z=5.486 <b>r=.23</b> p<.0009*	2[3] vs. 5[3] U=51552 z=8.073 <b>r=.34</b> p<.0009*	2[4] vs. 5[5] U=48980 z=6.763 <b>r=.28</b> p<.0009*

<sup>a</sup> Results of Mann-Whitney-U-tests presented as test statistic U, standardized test statistic z, effect size r (z/sqrt(n)), and two-tailed p-values; **bold figures** highlight effect sizes  $|r| \geq 0.2$

<sup>b</sup> Respondents rated attitudinal statements between 1 (fully describes me) to 7 (does not describe me at all); items have been re-coded so that higher values indicate more positive attitudes towards research; of note, because of their double-barreled wording, attitudinal statements one and two do not reflect straightforward two-dimensional ratings between a positive or negative attitude, but rather identify respondents who closely identify with these specific statements

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