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# BMJ Open

## Twenty-five years after the introduction of evidence-based medicine: actual knowledge, use, application and perceived barriers among physiotherapists

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7 2 **knowledge, use, application and perceived barriers among physiotherapists**  
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For peer review only

1  
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4 **71 Abstract**

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7 **72 Objectives.** To explore the actual knowledge, use, application of Evidence-based  
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12 **73** Medicine, named also Evidence-based Practice (EBP), and perceived barriers to its  
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22 **74** dissemination among physiotherapists.

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**75 Design.** Cross-sectional study.

**76 Setting and participants.** Members of the Italian Association of Physiotherapists  
77 (n=2000) were invited to participate in an online national survey about EBP knowledge  
78 and use.

**79 Primary outcome measures.** The survey questionnaire comprised four sections: 1)  
80 Respondent' characteristics; 2) Knowledge of and ability to critically appraise the  
81 literature; 3) Use and perceived effectiveness of EBP; 4) Perceived barriers to  
82 implementing EBP in clinical practice.

**83 Results.** Out of 2000 physiotherapists, 1289 participated in the survey (response rate  
84 64.5%). Overall, 90% perceived EBP as useful and necessary for clinical practice. More  
85 than 85% stated that they were familiar with the principles of EBP, 75% reported that  
86 they were able to search online databases for relevant information, and 60% reported  
87 that they were able to understand statistical analyses. However, 56% believed that  
88 patient preferences and 39% that clinical expertise are not part of the EBP model. Half  
89 stated that they understood and could explain the term "meta-analysis", but only 17%  
90 knew what a forest plot is, and 20% correctly judged the finding of a given meta-analysis.  
91 Lack of time was reported as the main barrier to use EBP.

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4 92 **Conclusions.** The majority of Italian physiotherapists overrated their knowledge about  
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7 93 EBP, demonstrating that there is a gap between EBP perceived and actual knowledge in  
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9 94 this population.  
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14 96 **Key Words:** Evidence-based Practice; Cross-sectional Studies; Physiotherapy Specialty;  
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16 97 Surveys and Questionnaires.  
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21 99 **Abstract word count: 237 words.**

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24 100 **Manuscript word count: 3814 words.**  
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29 102 **Article summary**

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31 103 **Strengths and limitations of this study**

- 32  
33 104 - National web-based survey among Italian physiotherapists to explore knowledge  
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35 and perceptions on Evidence-based Medicine.  
36 105  
37  
38 106 - Relevance of the study to the current evidence based practice among Italian  
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40 physiotherapists.  
41 107  
42  
43 108 - A sample of 2000 physical therapists was recruited with a high-moderate  
44  
45 response rate of 64.5%.  
46 109  
47  
48 110 - Self-reported data and potential non response bias can affect results and  
49  
50 interpretation of this cross-sectional study.  
51 111  
52  
53 112 - Generalizability is confined to a selected population.  
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56 113  
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4 114 **Funding:** The work was supported by the Italian Ministry of Health, Linea 3  
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6  
7 115 (Consapevolezza e competenza dei principi dell'Evidence-based Medicine (EBP) in coorti  
8  
9 116 di professionisti sanitari coinvolti nell'ambito dei disordini muscoloscheletrici). The  
10  
11  
12 117 funding sources had no controlling role in the study design, data collection, analysis,  
13  
14 118 interpretation, or report writing.  
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19 120 **Competing interests:** The authors declare that they have no competing interests.  
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## 137 Introduction

138 Evidence-based medicine, also named as Evidence-based Practice (EBP) is an  
139 internationally recognized movement and it is defined as *“the conscientious, explicit,  
140 and judicious use of current best evidence in making decisions about the care of  
141 individual patients. The practice of Evidence-based Medicine means integrating  
142 individual clinical expertise with the best available external clinical evidence from  
143 systematic research.”*<sup>1</sup> The identification and application of patients’ preferences  
144 should be part of decision making.<sup>2</sup> This concept of shared decision making has gained  
145 attention in the last decade, with physical medicine and rehabilitation clinicians being  
146 more likely to involve patients in making informed decisions.<sup>1,3</sup>

147 Using the best available evidence to make healthcare decisions optimizes health  
148 outcomes. Issues in EBP have attracted growing debate and discussion<sup>2</sup>, as seen in the  
149 increase in the number of scientific articles directly relevant to physiotherapy practice:  
150 <sup>4,5</sup>: between 1995 and 2015, randomized controlled trials (RCTs) and systematic  
151 reviews (SRs) rose increased from 45.1% to 59.4%, and from 0% to 14.6%,  
152 respectively.<sup>6</sup> Taken together, RCTs and SRs accounted for 74% of physiotherapy  
153 research publications in 2015 compared to 45% two decades earlier.<sup>6</sup>

154 Keeping up with this abundance of research may be a big challenge for most clinicians.  
155 Not surprisingly, the transfer of research findings into practice is often described as  
156 slow, haphazard, and unpredictable.<sup>7</sup> While several studies have investigated the use  
157 and the perceived effectiveness of EBP among physiotherapists,<sup>8-16</sup> none to date have  
158 explored the gap between their perceived and actual knowledge. In addition, no  
159 similar research exists in the Italian context. The present study investigated the

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4 160 knowledge, use, and application of EBP among physiotherapists, and the barriers they  
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7 161 perceived to its implementation. Secondary aims were to investigate the gap between  
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9 162 perceived and actual knowledge of EBP principles among physiotherapists, and to  
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11 163 analyse the correlation between their perceived and actual knowledge and  
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14 164 demographic characteristics.  
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## 19 166 **Methods**

### 21 167 **Design**

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24 168 For this cross-sectional study we conducted an online closed survey of members of the  
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26 169 Italian Association of Physiotherapists (Associazione Italiana Fisioterapisti [AIFI]). We  
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28 170 developed a survey questionnaire and posted it on a SurveyMonkey platform<sup>17</sup> for  
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30 171 data collection. Written, informed consent was assumed if the respondents completed  
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32 172 and submitted the survey. The closed survey was available online via the Internet for a  
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34 173 period of six weeks from May to June 2018. This study followed the Guidelines for  
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36 174 Reporting Survey-Based Research.<sup>18,19</sup>  
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### 43 176 **Patient and Public Involvement**

45  
46 177 Although there was no direct involvement of patients or the public, the AIFI assisted in  
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48 178 the design and delivery of the study. They also sent the questionnaire directly to  
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50 179 participants.  
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### 54 181 **Study sample**

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4 182 Before the survey questionnaire was posted online, the AIFI sent an invitation in their  
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7 183 email newsletter to all society members explaining the aim and content of the survey.  
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9 184 The invitation explained the purpose of the survey, the time needed to complete it (10  
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11 185 minutes), and the type of questions that the participants could expect to find. The  
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14 186 survey was linked to a unique respondent that did not display the survey a second time  
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17 187 once completed. The survey questionnaire was posted on 4 May 2018. Two weeks  
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19 188 later, the AIFI sent out an e-mail reminder to members who had not yet responded.  
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21 189 Responses were treated anonymously.

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24 190 While the AIFI membership database contains more than 10,000 addresses of physical  
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26 191 therapist members, only 2000 are considered socially active by the association.  
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### 30 31 193 **Sample size calculation**

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33 194 We used the sample size calculator<sup>20</sup> offered by SurveyMonkey. The sample size is the  
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35 195 number of completed responses we expected to receive: based on a population size of  
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37 196 10,000 (which is the total number of people we intended to invite to participate in the  
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39 197 study, i.e. total number of AIFI members), a margin of error of 5% (how much survey  
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41 198 results reflect the views of the overall population) and a sampling confidence level of  
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43 199 95% (how confident we can be that the population would select an answer within a  
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45 200 certain range). The calculated sample size of completed responses was of 370  
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47 201 completed answers. Thus, we expected that sending the survey to a target sample of  
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49 202 2000 socially active members would guarantee 370 completed responses.  
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### 59 204 **Survey questionnaire**

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4 205 The questionnaire was developed based on similar questionnaires reported in the  
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6 206 literature.<sup>10,13,21</sup> Before sending the survey, we piloted the questionnaire with six  
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9 207 expert physiotherapists in EBP (four senior and two junior researchers, with an average  
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11 208 of 8 and 3 years of EBP expertise) to assess its clarity and accuracy. After revision, the  
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14 209 final questionnaire version consisted of 26 items divided into 4 sections: 1)  
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16 210 Respondents' characteristics (items 1 to 8); 2) Knowledge and ability to critically  
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18 211 appraise the literature (items 9 to 16); 3) Use and perceived effectiveness of EBP  
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20 212 (items 17 to 24); 4) Perceived barriers to the implementation of EBP in clinical practice  
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22 213 (items 25 and 26). Response to all items was mandatory. The questionnaire was  
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24 214 written in Italian to make it more suitable for this sample (**Supplementary File 1 –**  
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26 215 questionnaire, English version).  
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31 216 Section 1 covered demographic characteristics; Section 2, item 9, asked respondents to  
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33 217 indicate the origin of their knowledge about EBP basics. If they stated that they did not  
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35 218 know the EBP model, the questionnaire terminated; otherwise, for the following items,  
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37 219 the respondents were asked where they had acquired their knowledge of EBP and if  
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39 220 they were confident with it. The final questions in this section assessed the  
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41 221 respondent's actual knowledge of EBP. For instance, item 14 investigated familiarity  
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43 222 with some terms often found in the literature, item 15 asked which study design is  
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45 223 considered the most reliable, and item 16 investigated whether the respondent  
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47 224 understood the results of a meta-analysis from a given forest-plot. Most of the items in  
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49 225 Section 3 were statements to which respondents had to express their agreement on a  
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51 226 five-point-Likert scale, with "strongly agree" and "strongly disagree" as anchors, about  
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55 227 their perception and use of EBP. In Section 4, item 25, the respondents had to state  
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4 228 whether or not they felt barriers to the utilization of EBP exist. If they stated there  
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7 229 were no barriers to its utilization, the questionnaire terminated as a conditional  
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10 230 question. Otherwise, for item 26, the respondents had to express their opinion about  
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12 231 the presence of barriers to the implementation of EBP and to rank them from the most  
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14 232 to the least important.

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### 18 19 234 **Statistical analyses**

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21 235 Descriptive statistics are presented as medians and interquartile ranges (IQR) or  
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24 236 absolute values, percentages and frequencies, when appropriate. The response  
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27 237 frequencies were represented and analysed in tabular and graphic formats using  
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29 238 Microsoft Excel or Power Point 2010. An automated count of response rate was  
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31 239 acquired for each of the four sections in order to determine whether the  
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34 240 questionnaires were terminated earlier (i.e., users did not go through all four  
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37 241 questionnaire sections). We dichotomized the responses to the 5-point items as  
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39 242 “disagree” versus “agree” (“strongly disagree, disagree and neutral” versus “agree and  
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41 243 strongly agree” categories). Demographic characteristics (e.g., sex, age, and level of  
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44 244 education) were collapsed into categories. We performed logistic regression analysis  
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47 245 to examine the association between knowledge of components of the EBP model  
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49 246 (questions related to whether patient values and clinical expertise are considered in  
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51 247 the EBP model) and demographic characteristics of the respondent (age, sex, working  
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54 248 time, and level of education). Results were considered statistically significant when  $p$   
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56 249  $<0.05$ . Odds ratios and their 95% confidence intervals were determined for each level  
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59 250 of the independent variables. Odds ratios in this context describe the likelihood of  
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4 251 demonstrating a particular behaviour and use (e.g., understanding that the EBP model  
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7 252 comprises patient values) given a particular characteristic (e.g., age). One level of each  
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10 253 demographic characteristic was used as the reference group against which the odds of  
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12 254 demonstrating the behaviour and use at all other levels of the variable were measured.  
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14 255 The reference group was the last category to allow the most salient interpretation of  
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16 256 results. Confidence intervals provided information about the precision of the  
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18 257 estimates. We chose to examine univariate rather than multivariate associations for  
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20 258 presenting our data at its most simple level so as to have a foundation for future  
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22 259 hypothesis testing. Data were exported from the SurveyMonkey and analysed with  
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26 260 STATA software <sup>22</sup>.

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## 30 31 262 **Results**

### 32 33 263 **Respondents' characteristics**

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36 264 2000 physiotherapists constitute the number of the survey questionnaire respondents.  
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38 265 Considering this number, the response rate was moderate (1289/2000, 64.5%). The  
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40 266 number of respondents was far higher than our target sample (n=323). The response  
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42 267 rate decreased from section 1 to section 3 due to the presence of conditional  
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44 268 branching logic items (item 9 and item 25) in the questionnaire survey. Indeed, the  
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46 269 response rate for each completed section differed: 56% response rate for Section  
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50 270 1(demographic characteristics); 42% response for Section 2 (knowledge of EBP); and  
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52 271 41% for Section 3 (use and perceived effectiveness of EBP). The sample included in  
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56 272 each section is reported in Figure 1.

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4 274 [Figure 1]  
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7 **Figure 1.** Flow diagram of the study.  
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12 277 The median age of the respondents was 35 years (IQR 28-47), and 52% were women.

13 278 Around 60% of participants worked in a private practice (653/1113), and 27% in a

14 279 hospital (305/1113), and 87% spent most of their work time in clinical practice

15 280 (968/1113). **Table 1** presents the demographic characteristics of the sample.  
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24 282 [Table 1]  
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28 **Table 1.** Sample Characteristics.  
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### 34 **EBP Knowledge and ability to critically appraise literature**

35 285 Two respondents skipped this section. A total of 1111 respondents answered the item

36 286 investigating knowledge of EBP principles. The majority stated they knew the EBP

37 287 model (85%). The most frequent channels for learning the principles of EBP were

38 288 conferences/meetings (48%), distance and residential learning courses (35%), and

39 289 advanced continuing professional educational courses (35%). Only 23% of respondents

40 290 stated they learned about EBP during their undergraduate studies (**Supplementary file**

41 291 **2**).  
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44 292 Regarding the sources physical therapist consult to solve clinical problem, the majority

45 293 of respondents stated that their preferred information channels were discussion with

46 294 peers (80%) and literature search (86%); and the 30% stated that they relied on their  
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4 296 own experience. In addition, 78% of respondents stated they felt competent about  
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7 297 EBP, and 1.2% stated they felt completely unable. More than half (61%) were  
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9 298 confident in their ability to critically appraise quality assessments of study design and  
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11 299 statistical analysis. However, many of respondents stated they understood the  
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13 300 meaning of the terms “RCTs” (72%), “statistical significance” (65%), and “meta-  
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15 301 analysis” (52%); but, few could explain the terms “forest plot” (17%) and “confidence  
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17 302 intervals” (38%) (**Table 2**). In addition, 82% correctly identified the best study design to  
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19 303 evaluate an intervention, but only 20% was able to identify the result from the overall  
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21 304 estimate of a given meta-analysis.  
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306 [Table 2]

307 **Table 2.** Self-reported comprehension of terms (837 responded, 453 skipped).  
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### 310 **Use and perceived effectiveness of EBP**

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41 311 From questions regarding how physical therapist perceived EBP, if useful,  
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43 312 comprehensive of patient values and effective, the respondents showed an overall  
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45 313 positive attitude towards EBP and agreed that its application is both useful and  
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47 314 necessary (90%). While 90% knew that scientific literature is part of the EBP, 56% did  
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49 315 not agree that patients’ preference and 39% that clinical expertise are part of the EBP  
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51 316 process (**Figure 2**).  
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4 318 [Figure 2]  
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7 319 **Figure 2.** Perceived knowledge of EBP basic principles of patients' desire, clinical  
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9 320 expertise and scientific literature.  
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15 322 In a typical month, 59% of the respondents read between 1 and 5 articles, and only 9%  
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17 323 did not. In addition, 55% stated that they make clinical decisions based on their  
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19 324 scientific readings, 80% expressed the need to increase the use of EBP, and 69%  
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21 325 reported that it would benefit their career.  
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### 27 28 29 327 **Association between sample characteristics and EBP knowledge**

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31 328 We found a statistically significant association between questions related to how  
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33 329 physical therapist perceived EBP comprehensive of patient values and clinical expertise,  
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35 330 and sample demographics: age, sex, working time, level of education (variables entered  
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37 331 into the model) (**Table 3**). Considering the question related to patients' values as part of  
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39 332 EBP model, young physiotherapists seems to be more conscious about patient's value  
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41 333 in EBP model than adults > 49 years (OR 1.57, 95% CI 1.02 - 2.42) as well, being male  
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43 334 (0.50, 95% CI 0.38 – 0.67). Who works in patient care (OR 0.99, 95% CI 0.98 – 0.99) seems  
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45 335 to be less likely able to understand the EBP model more than who does not work in this  
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47 336 area. On the contrary, who works in research (OR 1.02, 95% CI 1.01 – 1.03) and teaching  
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49 337 (OR 1.01, 95% CI 1.002 – 1.02) is more likely able to recognize patient's value as part of  
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51 338 the EBP model. Whereas, who had a Master's of Science (IC 2.06, 95% CI 1.31 – 3.21) is  
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53 339 twice more conscious about it against who did not have the same title. The same  
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4 340 interpretation is for who had a 1st level Specialist Master's degree (OR 2.69, 95% CI 1.98  
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7 341 – 3.64) and a Doctor of philosophy (PhD) (OR 10.33, 95% CI 1.28 – 83.00).

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10 342 Regarding the question related to clinical expertise as part of the EBP model, being male  
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12 343 is more likely associated to consider expertise in EBP model (OR 0.65, 95% CI 0.49 –  
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14 344 0.86). Who works in patient care (OR 0.99, 95% CI 0.98 – 0.99) seems to be less likely  
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17 345 able to understand the EBP model more than who does not work with patient (OR 0.65,  
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19 346 95% CI 0.49 – 0.86). To have a Master's degree title (OR 2.16, 95% CI 1.31 – 3.58) and a  
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22 347 1st level Specialist Master's degree (OR 1.99, 95% CI 1.45 – 2.75) seems to be twice  
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24 348 favourable to consider clinical expertise in the model against who did not have this titles.  
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27 349 **(Table 3).**

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[Table 3]

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38 353 **Table 3.** Association between actual knowledge of EBP and selected variables.

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#### 42 43 355 **Perceived barriers to using EBP in clinical practice**

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45 356 Respondents stated that major barriers to applying EBP exist (570/815, 75%): lack of  
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48 357 time and lack of ability to critically appraise the literature were rated as the top two  
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50 358 barriers. Lack of time was ranked as the most important (Table 4).

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[Table 4]

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56 360 **Table 4.** Barriers to applying EBP in order of importance (%).

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4 361 **Discussion**

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7 362 **Main findings**

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9 363 Overall, survey questionnaire respondents stated they had a positive attitude towards  
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11 364 EBP and that their knowledge about it was extensive. The majority overrated their  
12  
13 365 knowledge, however, and demonstrated a shallow awareness of EBP, compared to the  
14  
15 366 original model described by David Sackett<sup>23</sup>. The gap between perceived and actual  
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17 367 knowledge of EBP is relevant and can result in inadequate practice, potentially  
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19 368 increasing the risk of chronic disability<sup>24</sup>.

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23 369 Our survey findings are similar to those obtained among American physiotherapists 15  
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25 370 years ago<sup>10</sup> and, more recently, among Ghanaian physiotherapists who demonstrated  
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27 371 an inadequate knowledge of EBP<sup>12</sup>. In contrast, Brazilian physiotherapists showed they  
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29 372 were better acquainted with EBP since they considered patients' preferences part of  
30  
31 373 the decision-making process<sup>13</sup>. In Europe, Swedish physiotherapists consider patients'  
32  
33 374 preferences when treating according to guidelines, thus carrying out the EBP process<sup>25</sup>.  
34  
35 375 In our sample, the younger respondents were noted to be more familiar with EBP than  
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37 376 their older colleagues with more experience. Our findings are shared by similar  
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39 377 observations that the level of EBP knowledge is influenced by the time since  
40  
41 378 graduation from school. In general, recent graduates are more likely to follow the  
42  
43 379 steps of EBP than those with more clinical experience<sup>9</sup>. We also observed that  
44  
45 380 knowledge about EBP differed depending on the respondent's level of education and  
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47 381 workplace setting.<sup>9-11</sup>. Indeed, personal and organizational characteristics can  
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49 382 significantly influence attitudes, beliefs, use of EBP, and perceived support<sup>26</sup>.  
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4 383 Of the total of respondents with a Bachelor's degree, only one fifth had received  
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6 384 education in EBP. The levels of education most closely associated with EBP knowledge  
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8 385 are the graduate and postgraduate levels. The teaching of EBP principles in  
9  
10 386 undergraduate courses remains scarce, although it is widely considered essential for  
11  
12 387 improving the quality of health care and patient outcomes. In many countries, studies  
13  
14 388 have highlighted that physiotherapists require more training in EBP in order to acquire  
15  
16 389 confidence in using it<sup>9</sup>; however, the teaching of EBP-oriented skills in undergraduate  
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18 390 physiotherapy programmes is relatively recent<sup>27-29</sup>. Over the last 20 years EBP has  
19  
20 391 been increasingly integrated into the core curriculum of undergraduate and  
21  
22 392 postgraduate health care programs and continuing professional education<sup>30-32</sup>. In Italy,  
23  
24 393 the teaching of EBP has been included as an integral part of the core curriculum of  
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26 394 physiotherapy since 2005<sup>20</sup>.

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33 395 The perceived and actual knowledge and use of evidence from the scientific literature  
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35 396 differed among respondents. While the majority felt able to conduct a literature  
36  
37 397 search and to critically appraise a statistical analysis in a scientific article, few  
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39 398 demonstrated that they understood the results of a meta-analysis from a given forest  
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41 399 plot. Nevertheless, the respondents appeared to have great confidence in the  
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43 400 authority of published scientific literature and stated that their clinical decisions rarely  
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45 401 relied on their experience alone: the attitude and the attempt to introduce findings  
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47 402 from the scientific literature in the clinical context is congruent with their positive  
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49 403 attitude towards EBP.

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55 404 The discrepancy between actual knowledge and practice of EBP could be a  
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57 405 consequence of the myriad information sources accessible in scientific databases and  
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4 406 non-scientific channels, such as Doctor Google or social networks. Health care  
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7 407 professionals, including physiotherapists, need to develop their skills to confront this  
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10 408 overabundance of information in their professional life: exercising a careful selection  
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12 409 of what to read and what not to, both in terms of quality and quantity<sup>33</sup>. Indeed, three  
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14 410 quarters of our respondents perceived barriers that limit their ability to critically  
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16 411 appraise the literature<sup>9-11,25,34,35</sup>.

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21 413 **Strengths and limitations**

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24 414 This is the first study examining knowledge and perceptions on EBP among  
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26 415 physiotherapists in Italy. Although our response rate was high-moderate (64.5%),  
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28 416 several limitations should be considered when analysing the study results. First, our  
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30 417 sample included only AIFI members, who may not be representative of the population  
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32 418 of Italian physiotherapists, as it might be that AIFI members are more likely to  
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34 419 participate in a survey about their profession. Nonetheless, before the professional  
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36 420 registry of Italian physiotherapists was established in 2018, the AIFI was the only  
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38 421 professional society for physiotherapists in Italy. Second, sending out only one  
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40 422 reminder to participate in the survey might have limited the number of potential  
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42 423 respondents. However, the final percentage of respondents did not seem to bias our  
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44 424 results, as we reached the planned sample target up to the last survey questionnaire  
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46 425 items. Third, we dichotomized the dependent variables, conflating all responses into  
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48 426 positive/negative categories. This might have resulted in a loss of some information,  
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50 427 though we replicated what previous studies of the same design have done<sup>10</sup> in order  
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4 428 to report useful findings. Finally, the accuracy of data on perceived knowledge is  
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7 429 uncertain as the data were collected via a self-reported survey.  
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### 11 431 **Implication for research, practice and education**

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14 432 We believe that research can help to increase the dissemination of knowledge about  
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16 433 and the adoption of EBP among physiotherapists. A focus for future research should be  
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19 434 to concentrate efforts in conducting high-quality research and teaching master classes  
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21 435 devoted to of EBP topics<sup>36</sup> and promoting research learning programmes as  
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24 436 knowledge translation interventions to improve the use of EBP and clinical practice  
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26 437 guidelines (CPGs) in physiotherapy<sup>37</sup>. CPGs, defined as “systematically developed  
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28 438 statements to assist practitioner and patient decisions about appropriate health care  
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31 439 for specific clinical circumstances” (definition adopted by the European Region of the  
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34 440 World Confederation for Physiotherapy), can be used to bridge the research-to  
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36 441 practice gap and promote EBP and present research findings to clinicians in a synthetic  
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39 442 format without missing any elements of the EBP model<sup>7</sup>. Indeed, CPGs based on the  
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41 443 Grades of Recommendation, Assessment, Development and Evaluation approach  
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43 444 (GRADE approach) are conducted in a standardized and transparent way: GRADE rates  
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45  
46 445 the quality of evidence and provides the strength of recommendations by considering  
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48 446 the “estimates of effect for desirable and undesirable outcomes of interest”, the  
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51 447 “confidence in the estimates of effect”, the “estimates of values and preferences” and  
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53 448 the “resource use”<sup>38</sup>. This approach helps the reader interpret a CPG and enhance  
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56 449 CPG adherence by health professionals. Some countries have laws that regulate  
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58 450 professional liability and place great importance on adherence to CPGs in clinical  
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4 451 practice, defining compliance with the CPG as an element in attributing professional  
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6 452 responsibility in case of adverse events. Furthermore, to improve physiotherapists'  
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9 453 adherence to CPGs, computerized decision support systems could provide actionable  
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11 454 recommendations or management options that are intelligently filtered or presented  
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14 455 at appropriate times to improve efficiency in health care<sup>39</sup>.  
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16 456 For these reasons, both national and international initiatives are warranted for the  
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18 457 implementation of CPGs in physiotherapy. The production of CPGs, or at least a  
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20 458 synthesis of the evidence underpinning them, could be (and is to some extent)  
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22 459 coordinated on a national level, while implementation may be more suitable for local  
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24 460 adaptation<sup>40</sup>. For instance, the recently created Italian National Guidelines System <sup>41</sup>  
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26 461 includes a list of scientific societies that can contribute to drafting CPGs (including the  
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28 462 AIFI), a process based on the GRADE method for the production, adaptation, and  
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30 463 updating of CPG. In this a database health professionals can find continuously updated  
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32 464 CPGs and good quality practices.  
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38 465 We appeal for a critical use and appraisal of EBP. EBP should be included in the  
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40 466 professional education of physical therapist, starting at the undergraduate level.  
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43 467 Investing in the training of physiotherapists is essential for growing the skills of critical  
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45 468 appraisal of evidence-based physiotherapy, and to reduce waste of obsolete, futile or  
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47 469 harmful interventions <sup>6</sup>. For instance, initiatives such as INQUIRE (INcreasing QUALity IN  
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49 470 patient-oriented academic clinical Research) has resulted in a roadmap that provides  
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51 471 guidance for academic institutions and researchers in developing quality enhancement  
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53 472 initiatives <sup>42</sup>. The PEAK (The Physical therapist-driven Education for Actionable  
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55 473 Knowledge translation) educational program was designed to promote integration of  
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4 474 physiotherapists' research evidence into clinical decision making <sup>17,43,44</sup>. Finally,  
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7 475 engaging in research can contribute to being an attractive employer and boost  
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9 476 application of EBP <sup>45</sup>.  
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9  
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15 483 **Declarations:**

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19 485 **Ethical approval:** not applicable.

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23 487 **Availability of data and material:** All data generated or analysed during this study are  
24  
25 488 available at [https://osf.io/8xb6p/?view\\_only=1c6fd76403c04a82942799b9dee952c8](https://osf.io/8xb6p/?view_only=1c6fd76403c04a82942799b9dee952c8) .

26 489

27  
28 490 **Authors' contributions:** SG and GC were primarily responsible for study conception and  
29  
30 491 design and for data analysis and interpretation. All authors had full access to all of the  
31  
32 492 data in the study and take responsibility for the integrity of the data and the accuracy of  
33  
34 493 the data analysis. DC led the writing of the first draft of the manuscript and all authors  
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36 494 contributed to drafting and revising the manuscript. SG is the guarantor. All authors read  
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38 495 and approved the final manuscript.

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664 **Table 1.** Sample Characteristics.

Characteristics *		Frequency (%)
Sex (n=1289)	Male	48
	Female	52
Age, yrs (n=1289)	<29	28
	29-38	31
	39-49	18
	>49	23
Workplace** (n=1113)	Private office	59
	Teaching Hospital	7
	Hospital	20
	Nursing home	15
	Unemployed	2
	Other	17
Working time spent in: (average) (n=1113)	Clinical practice	87
	Research	11
	Teaching	6
	Management/Leadership	2

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666 \*The absolute number of respondents varies for each variable due to missing data.

667 \*\*Percentage may exceed 100% because some items allowed more than one answer

668 **Table 2.** Self-reported comprehension of terms (837 responded, 453 skipped).

	<b>Understood and could explain No. (%)</b>	<b>Understood somewhat No. (%)</b>	<b>Did not understand No. (%)</b>	<b>Unknown No. (%)</b>
<i>Randomized- controlled trials</i>	604 (72)	192 (23)	41 (5)	0 (0)
<i>Meta-analysis</i>	439 (52)	304 (37)	86 (10)	8 (1)
<i>Relative risk</i>	250 (30)	428 (51)	135 (16)	24 (3)
<i>Statistical significance</i>	543 (65)	246 (29)	41 (5)	7 (1)
<i>Forest plot</i>	144 (17)	197 (24)	147 (17)	349 (42)
<i>Intention to treat</i>	255 (30)	223 (27)	167 (20)	192 (23)
<i>Confidence interval</i>	316 (39)	271 (32)	176 (18)	104 (11)

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670 **Table 3.** Association between actual knowledge of EBP and selected variables. References category are reported in legend.

	Characteristics		Odds ratio (95% CI)	Model P*	
In your opinion, are patients' values and preferences a part of the EBP model?	<b>Age (yrs)<sup>a</sup></b> (n=818)	<29	1.57 (1.02 - 2.42)**	0.001	
		29-38	1.03 (0.66 - 1.59)		
		39-49	0.68 (0.39 - 1.17)		
		>49	Reference		
	<b>Sex<sup>b</sup></b> (n=818)	Female	0.50 (0.38 - 0.67)**	0.000	
		Male	Reference		
	<b>Working time<sup>c</sup></b>	(n=814)	Patient care	0.99 (0.98 - 0.995)**	0.002
		(n=567)	Research	1.02 (1.01 - 1.03)**	
		(n=609)	Teaching	1.01 (1.002 - 1.02)**	
		(n=492)	Management	1.00 (0.98 - 1.02)	
	<b>Level of education<sup>c</sup></b> (n=818)		Bachelor's degree	1.04 (0.75 - 1.45)	0.81
			Master of Science degree	2.06 (1.31 - 3.21)**	
			1st level Specialist Master's degree	2.69 (1.98 - 3.64)**	
		2nd level Specialist Master's degree	0.84 (0.14 - 5.07)		
		Advanced continuing professional education	1.06 (0.80 - 1.42)		
		Doctor of philosophy (PhD)	10.33 (1.28 - 83.00)**		
		Distance and residential learning course	1.00 (0.75 - 1.34)		
	Conferences/Meetings	1.40 (1.06 - 1.85)**	0.015		
In your opinion, is clinical	<b>Age (yrs)<sup>a</sup></b> (n=818)	<29	1.43 (0.93 - 2.21)	0.11	
		29-38	1.00 (0.65 - 1.55)		

expertise a part of the EBP model?		39-49	0.97 (0.57 - 1.64)		
		>49	Reference		
	<b>Sex<sup>b</sup></b>	(n=818)	Female	0.65 (0.49 – 0.86)**	0.008
			Male	Reference	
	<b>Working time <sup>c</sup></b>	(n=814)	Patient care	0.99 (0.98 – 0.99)**	0.032
		(n=567)	Research	1.01 (0.99 – 1.02)	0.24
		(n=609)	Teaching	1.01 (0.99 – 1.02)	0.14
		(n=492)	Management	0.98 (0.97 – 1.01)	0.32
	<b>Level of education<sup>c</sup></b>	(n=818)	Bachelor's degree	1.25 (0.89 – 1.76)	0.19
			Master of Science degree	2.16 (1.31 – 3.58)**	0.002
			1st level Specialist Master's degree	1.99 (1.45 – 2.75)**	0.000
			2nd level Specialist Master's degree	0.97 (0.16 – 5.86)	0.98
			Advanced continuing professional education	0.90 (0.67 – 1.21)	0.49
			Doctor of philosophy (PhD)	0.26 (0.65 – 42.27)	0.06
			Distance and residential learning course	1.08 (0.80 – 1.45)	0.61
		Conferences/Meetings	1.20 (0.91 – 1.59)	0.20	

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672 **Legend:**

673 \* Chi-square test

674 \*\* Statistically significant ( $p < 0.05$ )

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6 675 <sup>a</sup> Odds ratio are calculated using the variable >49 years as reference.

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8 676 <sup>b</sup> Odds ratio are calculated using the variable male as reference.

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10 677 <sup>c</sup> Odds ratio are calculated as the ratio between the odds in the presence of characteristics' variable against the odds in the absence of the  
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12 same variable. (I.e., characteristic: working time; variable: patient care. The odds ratio represents the ratio between the odds of working  
13 678 in patient care against the odds of not working in patient care.)  
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688 **Table 4.** Barriers to applying EBP in order of importance (%).

Type of barrier	Order of importance from the most to the least (%)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10
Lack of interest	10,7	8,3	5,6	6,9	6,2	7,0	10,2	10,7	10,7	23,7
Applicability of EBP findings to clinical practice	11,1	12,8	9,7	8,4	13,5	9,8	9,5	8,8	7,6	8,8
Lack of time	23,0	13,2	15,1	10,0	9,0	9,0	5,8	5,5	5,8	3,7
Difficulty in searching literature in databases	9,5	11,8	14,4	15,1	13,7	14,6	10,5	7,6	0,0	0,9
Difficulty in critically appraising literature and statistical analysis	9,7	17,8	16,5	16,7	16,9	9,3	6,0	4,0	2,1	1,1
Difficulty applying literature findings to individual patients	9,5	11,4	12,7	14,1	12,7	16,9	11,3	5,6	5,5	0,5
Lack of financial and organizational support (computer, access to databases)	8,4	7,4	8,6	8,8	8,8	10,5	20,6	12,8	7,4	6,7
Workplace does not use EBP	12,0	11,3	9,7	9,8	9,8	9,5	10,0	17,8	6,0	4,2
Language of scientific publications	4,8	3,0	5,1	6,3	7,4	8,6	10,0	15,6	30,8	8,4
Unfamiliarity with using the computer/technology	1,4	3,2	2,6	3,9	2,1	4,8	6,2	11,6	22,3	42,0

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694 **Figure Legend**

695 **Figure 1.** Flow diagram of the study.

696 **Figure 2.** Perceived knowledge of EBP basic principles of patients' desire, clinical  
697 expertise and scientific literature.

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For peer review only

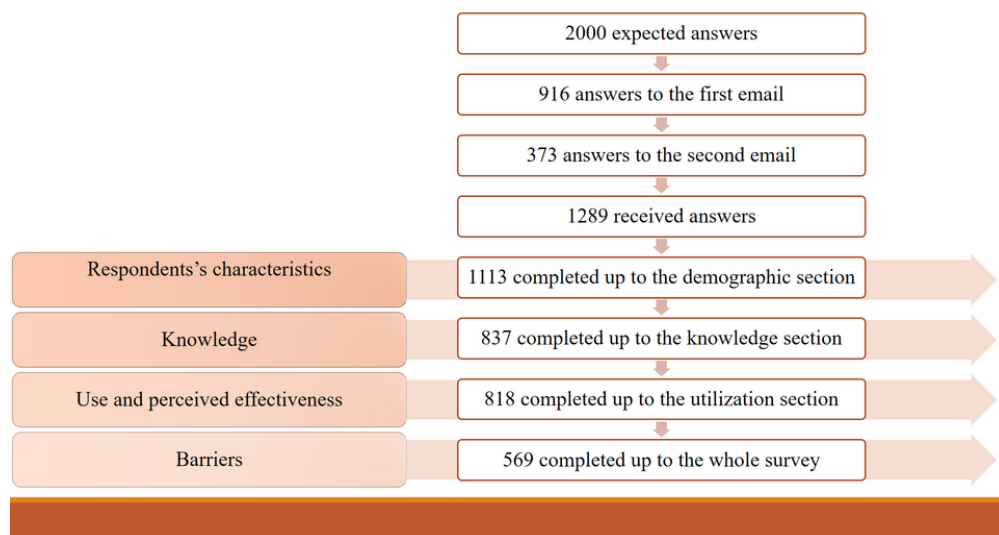


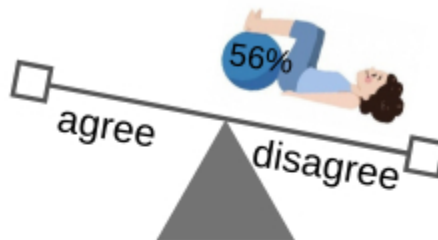
Figure 1.

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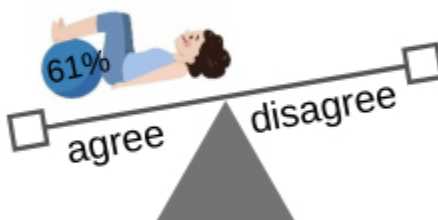


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In your opinion, the preferences of patients are included in the EBM model?(item 18)



In your opinion, the clinical experience is included in the EBM model? (item 19)



In your opinion, the scientific literature is useful in your clinical practice? (item 20)



Figure 2.

## **Evidence-Based Practice (EBP) Questionnaire<sup>a</sup>**

### **SECTION 1. General information**

*For the following items, place a mark x in the appropriate box next that indicates your response.*

1. What is your sex?

Male

Female

2. What is your age? \_\_\_\_\_

3. Where did you acquire the license to practice as Physical Therapist (PT)?

Italy

Abroad

4. In which Italian region did you acquire your physical therapist's degree (degree or equivalent title)?

\_\_\_\_\_

5. In which University (eg., Università degli Studi di Genova) or other (e.g., Scuola Dirette ai Fini Speciali/Scuole Regionali) did you acquire your PT title?

\_\_\_\_\_

6. When did you acquire your title to practice as physical therapist (e.g., 2005)

\_\_\_\_\_

7. Where did you mostly practice your profession?

Private practice

Research Hospital

Clinical Hospital

Residential and nursing home

Unemployed (e.g. student)

Others \_\_\_\_\_

8. Please indicate the percentage of your total work time that you spend in each type of activity during an average month.

a) Patient care  %

b) Research  %

c) Teaching  %

d) Management (as Director)  %

### **SECTION 2. Knowledge of EBP principles**

9. Do you know the Evidence Base Practice (EBP) model?

Yes  No

10. Where did you learn the foundations of EBP

Bachelor's degree

Master of Science degree

1st level Specialist Masters degree

2nd level Specialist Masters degree

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- Advanced continuing professional education
  - Doctor of philosophy (PhD)
  - Distance and residential learning course
  - Conferences/Meetings

8 11. When you did not know how to manage a clinical issue, how did you behave?

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- I rely on my experience
  - I discuss with colleagues
  - I consult the scientific literature
  - It has never happened

15 12. I'm able to launch search strategies for finding research relevant to my practice (e.g., Pubmed)

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- Strongly Disagree       Disagree       Neutral       Agree       Strongly Agree

19 13. I am confident in my ability to critically review the literature (quality assessment, statistical and clinical significance).

- 20  
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- Strongly Disagree       Disagree       Neutral       Agree       Strongly Agree

23 *For the following item, place a mark v in one box in the row for each term.*

24 14. My understanding of the following terms is:

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Term	Understand Completely	Understand Somewhat	Do Not Understand
29 a) Randomized controlled trial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30 b) Meta-analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31 c) Relative risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32 d) statistical significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33 e) Forest plot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34 d) Intention to treat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35 f) Confidence interval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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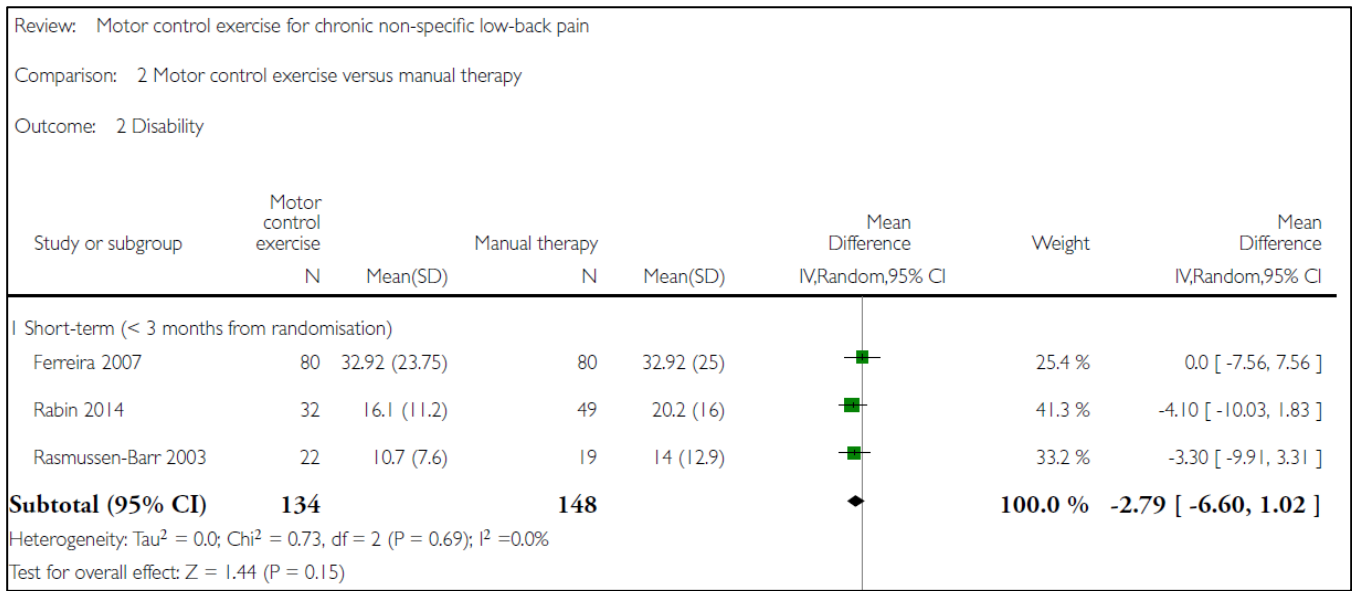
40 15. In your experience, which is the best study design to assess the efficacy of a rehabilitative intervention?

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- Case report/case series
  - Cohort observational study
  - Case – control observational study
  - Controlled clinical study
  - Randomized controlled clinical study
  - I don't know

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52 16. A systematic review, comparing exercise versus manual therapy in acute low back pain for reducing disability at 3 months of follow-up, reports the following result (please, see the figure below). What is your interpretation?

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- I don't know
  - Exercise is more efficacious than manual therapy
  - Exercise is less efficacious than manual therapy

- Both have the same efficacy



### SECTION 3: Personal attitudes toward, use of, and perceived benefits and limitations of EBP.

For the following items, place a mark x in the appropriate box that indicates your response.

- Application of EBP is necessary in the practice of physiotherapy.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- EBP takes into account the patient's preferences and values.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- EBP takes into account the clinical experience.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- Literature and research findings are useful in EBP in my daily practice.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- Read/review research/literature related to my clinical practice (a typical month).
  - Never
  - 1–5 articles
  - 6–10 articles
  - 11–15 articles
  - 16 articles
- Use literature and research findings in the process of clinical decision making (a typical month).
  - Never
  - few times
  - the majority of times
  - always
- I need to increase the use of EBP in my daily practice.
  - Strongly Disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- My career will benefit from a more uptake of EBP into my clinical practice.
  - Strongly Disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree

**SECTION 4: Barriers of EBP.**

25. Do you think there are limitations in using EBP in clinical practice?

- Yes       No       Do Not Know

*For the following items, rank from 1 to 10 by placing numbers in the appropriate boxes (1 most important).*

26. Rank from 1 (most important) to 10 (least important) the barriers to the use of EBP in your clinical practice.

- The adoption of EBP is inapplicable in physiotherapy
- Insufficient time
- Lack of instrumental resources in my facility (PCs, free scientific databases)
- Poor ability to use the computers/technology
- Poor ability to systematically search the literature
- Poor ability to critically appraise the literature
- Lack of generalizability of the literature findings to my patient population
- Lack of understanding English language
- Lack of collective support among my colleagues in my facility, lack of a stimulating environment
- Lack of interest

<sup>a</sup>The questionnaire published by Jette et al. 2003 was adapted by the authors and contains elements as reported by McColl et al.

**Supplementary file 2.** Responses to question regarding the contribution of education to learning the principles of EBP (837 answered, 453 did not).

	<b>A lot</b>	<b>A little</b>	<b>Not at all</b>	<b>Omitted</b>
	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>
<i>Bachelor's degree</i>	194 (23)	409 (49)	201 (24)	33 (4)
<i>Master's of Science degree</i>	93 (11)	61 (7)	18 (2)	665 (79)
<i>1st level Specialist Master's degree</i>	256 (31)	60 (7)	18 (2)	503 (60)
<i>2nd level Specialist Master's degree</i>	15 (1)	8 (1)	11 (1)	813 (97)
<i>Advanced continuing professional education</i>	293 (35)	187 (22)	31 (4)	326 (39)
<i>Doctor of philosophy (PhD)</i>	9 (1)	8 (1)	14 (2)	806 (96)
<i>Distance and residential learning course</i>	292 (35)	272 (32.5)	39 (4.7)	234 (28)
<i>Conferences/Meetings</i>	404 (48)	354 (42)	30 (4)	49 (6)

**Supplementary 1.** Checklist items for reporting survey research.

	<b>Section &amp; Topic</b>	<b>Reported on page #</b>
	<b>Background</b>	
1	Justification of research method	5-6
2	Background literature review	5-6
3	Explicit research question	5-6
4	Clear study objectives	5-6
	<b>Methods</b>	
5	Description of methods used for data analysis	9
6	Method of questionnaire administration	7-8
7	Location of data collection	6-7
8	Dates of data collection	6-7
9	Number and types of contact	6-7
10	Methods sufficiently described for replication	6-8
11	Evidence of reliability	7
12	Evidence of validity	7
13	Methods for verifying data entry	na
14	Use of a codebook	na
15	Sample selection	7
16	Sample size calculation	7
17	Representativeness	7
	<b>Method of sample selection</b>	
18	Description of population and sample frame	7
19	Research tool	7-8
20	Description of the research tool	7-8
21	Description - development of research tool	7-8
22	Instrument pretesting	Na
23	Instrument reliability and validity	Na
24	Scoring methods	7-8
	<b>Results</b>	
25	Results of research presented	10-14
26	Results address objectives	10-14
27	Clear description - results based on part sample	10-14
28	Generalisability	10-14
	<b>Response rates</b>	
29	Response rate stated	10
30	How response rate was calculated	10
31	Discussion of nonresponse bias	17
32	All respondents accounted for	
	<b>Interpretation and discussion</b>	
33	Interpret and discuss findings	14-17
34	Conclusions and recommendations	14-17
35	Limitations	17
	<b>Ethics and disclosure</b>	
36	Consent	6
37	Sponsorship	20
38	Research ethics approval	20
39	Evidence of ethical treatment of human subjects	Na

PLoS Med. 2010 Aug;8(8):e1001069. doi: 10.1371/journal.pmed.1001069. Epub 2011 Aug 2. Reporting guidelines for survey research: an analysis of published guidance and reporting practices. Bennett C1, Khangura S, Brehaut JC, Graham ID, Moher D, Potter BK, Grimshaw JM.

# BMJ Open

## Twenty-five years after the introduction of evidence-based medicine: knowledge, use, attitudes, and barriers among physiotherapists

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Manuscript ID	bmjopen-2020-037133.R1
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Date Submitted by the Author:	01-Apr-2020
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<b>Primary Subject Heading</b>:	Rehabilitation medicine
Secondary Subject Heading:	Epidemiology, Evidence based practice, Rehabilitation medicine, Research methods
Keywords:	MEDICAL EDUCATION & TRAINING, REHABILITATION MEDICINE, EPIDEMIOLOGY

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7 2 **knowledge, use, attitudes, and barriers among physiotherapists**  
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For peer review only

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4 **71 Abstract**

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7 **72 Objectives.** To explore the knowledge, use, attitudes towards Evidence-based Medicine,  
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**73** named also Evidence-based Practice (EBP), and perceived barriers to its dissemination  
**74** among physiotherapists.

**75 Design.** Cross-sectional study.

**76 Setting and participants.** Members of the Italian Association of Physiotherapists  
**77** (n=2000) were invited to participate in an online survey about EBP knowledge and use.

**78 Primary outcome measures.** The survey questionnaire comprised four sections: 1)  
**79** Respondent' characteristics; 2) Knowledge of EBP principles; 3) Attitude, use and  
**80** perceived effectiveness of EBP; 4) Perceived barriers to implementing EBP in clinical  
**81** practice.

**82 Results.** Out of 2000 physiotherapists, 1289 participated in the survey (response rate  
**83** 64.5%). Overall, 90% perceived EBP as useful and necessary for clinical practice. More  
**84** than 85% stated that they were familiar with the principles of EBP, 75% reported that  
**85** they were able to search online databases for relevant information, and 60% reported  
**86** that they were able to understand statistical analyses. However, 56% believed that  
**87** patient preferences and 39% that clinical expertise are not part of the EBP model. Half  
**88** stated that they understood and could explain the term "meta-analysis", but only 17%  
**89** knew what a forest plot is, and just the 20% correctly judged the finding of a given meta-  
**90** analysis. Lack of time was reported as the main barrier towards EBP.

**91 Conclusions.** The majority of Italian physiotherapists overrated their knowledge about  
**92** EBP, demonstrating that there is a gap between perceived and actual knowledge of EBP  
**93** in this population.

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7 95 **Key Words:** Evidence-based Practice; Cross-sectional Studies; Physiotherapy Specialty;  
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9 96 Surveys and Questionnaires.

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21 101 **Article summary**

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23 102 **Strengths and limitations of this study**

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25  
26 103 - National web-based survey among Italian physiotherapists to explore  
27  
28 104 knowledge, use and attitude towards Evidence-based Medicine.

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31 105 - Relevance of the study to the current evidence based practice among Italian  
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33 106 physiotherapists.

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35  
36 107 - A sample of 2000 physiotherapists was recruited with a high-moderate response  
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38 108 rate of 64.5%.

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41 109 - Self-reported data and potential non response bias can affect results and  
42  
43 110 interpretation of this cross-sectional study.

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45  
46 111 - Generalizability is confined to a selected population.

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48 112

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50  
51 113 **Funding:** The work was supported by the Italian Ministry of Health, Linea 3  
52  
53 114 (Consapevolezza e competenza dei principi dell'Evidence-based Medicine (EBP) in coorti  
54  
55 115 di professionisti sanitari coinvolti nell'ambito dei disordini muscoloscheletrici). The

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4 116 funding sources had no controlling role in the study design, data collection, analysis,  
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6  
7 117 interpretation, or report writing.  
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11 119 **Competing interests:** The authors declare that they have no competing interests.  
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30 136 **Introduction**

31 137 Evidence-based medicine, also named as Evidence-based Practice (EBP) is an

32 138 internationally recognized movement and it is defined as *“the conscientious, explicit,*  
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4 139 *and judicious use of current best evidence in making decisions about the care of*  
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7 140 *individual patients. The practice of Evidence-based Medicine means integrating*  
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9 141 *individual clinical expertise with the best available external clinical evidence from*  
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11 142 *systematic research.” (1) The identification and application of patients’ preferences*  
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14 143 *should be part of decision making.(2) This concept of shared decision making has*  
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16 144 *gained attention in the last decade, with physical medicine and rehabilitation clinicians*  
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19 145 *being more likely to involve patients in making informed decisions.(1, 3)*  
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21 146 *Using the best available evidence to make healthcare decisions optimizes health*  
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24 147 *outcomes. Issues in EBP have attracted growing debate and discussion(2, 4, 5), as seen*  
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26 148 *in the increase in the number of scientific articles directly relevant to physiotherapy*  
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29 149 *practice: (6, 7): between 1995 and 2015, randomized controlled trials (RCTs) and*  
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31 150 *systematic reviews (SRs) rose increased from 45.1% to 59.4%, and from 0% to 14.6%,*  
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34 151 *respectively.(8) Taken together, RCTs and SRs accounted for 74% of physiotherapy*  
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36 152 *research publications in 2015 compared to 45% two decades earlier.(8)*  
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39 153 *Keeping up with this abundance of research may be a big challenge for most clinicians.*  
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41 154 *Not surprisingly, the transfer of research findings into practice is often described as*  
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44 155 *slow, haphazard, and unpredictable.(9) While several studies have investigated the use*  
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46 156 *and the perceived effectiveness of EBP among physiotherapists,(10-18) none to date*  
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49 157 *have explored the gap between their perceived and actual knowledge. In addition, no*  
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51 158 *similar research exists in the Italian context which is relatively recent: university*  
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53 159 *courses for physiotherapy were established in 2006 with three-year full-time degree.*  
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56 160 *The course is an intensive mix of class time and mandatory internship right from the*  
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4 161 first year. Consequently, student can apply to the "Laurea Magistrale" (equivalent to  
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7 162 the European Master of Science) and a Doctoral Program.

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9 163 Based on this context, the present study investigated the knowledge, the use of and  
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11 164 the attitude towards EBP among Italian physiotherapists, and the barriers they  
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14 165 perceived to its implementation. Secondary aims were to investigate the gap between  
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16 166 perceived and actual knowledge of EBP principles among physiotherapists, and to  
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19 167 analyse the association between their perceived and actual knowledge and  
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21 168 demographic characteristics.

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## 25 26 170 **Methods**

### 27 28 29 171 **Design**

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31 172 For this cross-sectional study we conducted an online closed survey of members of the  
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33 173 Italian Association of Physiotherapists (Associazione Italiana Fisioterapisti [AIFI]). We  
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36 174 developed a survey questionnaire and posted it on a SurveyMonkey platform(19) for  
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39 175 data collection. Written, informed consent was assumed if the respondents completed  
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41 176 and submitted the survey. The closed survey was available online via the Internet for a  
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44 177 period of six weeks from May to June 2018. This study followed the Guidelines for  
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46 178 Reporting Survey-Based Research.(20, 21)

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### 50 51 180 **Patient and Public Involvement**

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53 181 Although there was no direct involvement of patients or the public, the AIFI assisted in  
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56 182 the design and delivery of the study. They also sent the questionnaire directly to  
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58 183 participants.



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7 **185 Study sample**  
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9 186 Before the survey questionnaire was posted online, the AIFI sent an invitation in their  
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11 187 email newsletter to all society members explaining the aim and content of the survey.  
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14 188 The invitation explained the purpose of the survey, the time needed to complete it (10  
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16 189 minutes), and the type of questions that the participants could expect to find. The time  
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19 190 of 10 minutes was a median based on a priori piloted questionnaire with six expert  
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21 191 physiotherapists in EBP. The survey was linked to a unique respondent that did not  
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24 192 display the survey a second time once completed. The survey questionnaire was  
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26 193 posted on 4 May 2018. Two weeks later, the AIFI sent out an e-mail reminder to  
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29 194 members who had not yet responded. Responses were treated anonymously.  
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31 195 AIFI membership database contains more than 10,000 addresses of physiotherapists  
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33 196 members (12,514 at the end of 2019) out of an estimate of 65,000 physiotherapists. Of  
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36 197 those, the association considers that only 2000 are . socially active members defined  
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38 198 as who, according to the secretariat of the association, received e-mails, constantly  
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41 199 exchange and share links on social website and app and are actual reader of the  
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43 200 newsletter being interactive with the AIFI channels.  
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48 **202 Sample size calculation**  
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50 203 We used the sample size calculator(22, 23) offered by SurveyMonkey. The sample size  
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52 204 is the number of completed responses we expected to receive: based on a population  
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54 205 size of 10.000 (which is the total number of people we intended to invite to participate  
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57 206 in the study, i.e. total number of AIFI members registered at the time of the survey), a  
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4 207 margin of error of 5% (how much survey results reflect the views of the overall  
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7 208 population) and a sampling confidence level of 95% (how confident we can be that the  
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10 209 population would select an answer within a certain range). The calculated sample size  
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12 210 of completed responses was of 370 completed answers. Thus, we expected that  
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14 211 sending the survey to a target sample of 2000 socially active members would  
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16 212 guarantee 370 completed responses.  
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#### 214 **Survey questionnaire**

215 The questionnaire was developed based on similar questionnaires reported in the  
216 literature.(12, 15, 24) Before sending the survey, we piloted the questionnaire with six  
217 expert physiotherapists in EBP (four senior and two junior researchers, with an average  
218 of 8 and 3 years of EBP expertise) to assess its clarity and accuracy. After revision, the  
219 final questionnaire version consisted of 26 items divided into 4 sections: 1)  
220 Respondents' characteristics (items 1 to 8); 2) Knowledge and ability to critically  
221 appraise the literature (items 9 to 16); 3) Use and perceived effectiveness of EBP  
222 (items 17 to 24); 4) Perceived barriers to the implementation of EBP in clinical practice  
223 (items 25 and 26). Response to all items was mandatory. The questionnaire was  
224 written in Italian to make it more suitable for this sample (**Supplementary File 1 –**  
225 questionnaire, English version).  
226 Section 1 covered demographic characteristics; Section 2, item 9, asked respondents to  
227 indicate the origin of their knowledge about EBP basics. If they stated that they did not  
228 know the EBP model, the questionnaire terminated; otherwise, for the following items,  
229 the respondents were asked where they had acquired their knowledge of EBP and if

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4 230 they were confident with it. The final questions in this section assessed the  
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7 231 respondent's actual knowledge of EBP. For instance, item 14 investigated familiarity  
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10 232 with some terms often found in the literature, item 15 asked which study design is  
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12 233 considered the most reliable, and item 16 investigated whether the respondent  
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14 234 understood the results of a meta-analysis from a given forest-plot. Most of the items in  
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16 235 Section 3 were statements to which respondents had to express their agreement on a  
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18 236 five-point-Likert scale, with "strongly agree" and "strongly disagree" as anchors, about  
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20 237 their perception and use of EBP. In Section 4, item 25, the respondents had to state  
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22 238 whether or not they felt barriers to the utilization of EBP exist. If they stated there  
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24 239 were no barriers to its utilization, the questionnaire terminated as a conditional  
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26 240 question. Otherwise, for item 26, the respondents had to express their opinion about  
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28 241 the presence of barriers to the implementation of EBP and to rank them from the most  
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30 242 to the least important.  
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#### 244 **Statistical analyses**

245 Descriptive statistics are presented as medians and interquartile ranges (IQR) or  
246 absolute values, percentages and frequencies, when appropriate. The response  
247 frequencies were represented and analysed in tabular and graphic formats using  
248 Microsoft Excel or Power Point 2010. An automated count of response rate was  
249 acquired for each of the four sections in order to determine whether the  
250 questionnaires were terminated earlier (i.e., users did not go through all four  
251 questionnaire sections). We dichotomized the responses to the 5-point items as  
252 "disagree" versus "agree" ("strongly disagree, disagree and neutral" versus "agree and

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4 253 strongly agree” categories). Demographic characteristics (e.g., sex, age, and level of  
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7 254 education) were collapsed into categories. We performed logistic regression analysis  
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9 255 to examine the association between knowledge of components of the EBP model  
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11 256 (questions related to whether patient values and clinical expertise are considered in  
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14 257 the EBP model) and demographic characteristics of the respondent (age, sex, working  
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16 258 time, and level of education). Results were considered statistically significant when  $p$   
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19 259  $<0.05$ . Odds ratios and their 95% confidence intervals were determined for each level  
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21 260 of the independent variables. Odds ratios in this context describe the likelihood of  
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24 261 demonstrating a particular behaviour and use (e.g., understanding that the EBP model  
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26 262 comprises patient values) given a particular characteristic (e.g., age). One level of each  
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29 263 demographic characteristic was used as the reference group against which the odds of  
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31 264 demonstrating the behaviour and use at all other levels of the variable were measured.  
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34 265 The reference group was the last category to allow the most salient interpretation of  
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36 266 results. Confidence intervals provided information about the precision of the  
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39 267 estimates. We chose to examine univariate rather than multivariate associations for  
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41 268 presenting our data at its most simple level so as to have a foundation for future  
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44 269 hypothesis testing. Data were exported from the SurveyMonkey and analysed with  
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46 270 STATA software (25).

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## 50 272 **Results**

### 51 273 **Respondents' characteristics**

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55 274 2000 physiotherapists constitute the number of the survey questionnaire respondents.  
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58 275 Considering this number, the response rate was moderate (1289/2000, 64.5%). The  
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4 276 number of respondents was far higher than our target sample (n=323). The response  
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7 277 rate decreased from section 1 to section 3 due to the presence of conditional  
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9 278 branching logic items (item 9 and item 25) in the questionnaire survey. Indeed, the  
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12 279 response rate for each completed section differed: 56% (n=1113) response rate for  
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14 280 Section 1(demographic characteristics); 42% (n=837) response for Section 2  
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16 281 (knowledge of EBP); and 41% (n=818) for Section 3 (use and perceived effectiveness of  
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19 282 EBP). The sample included in each section is reported in Figure 1.  
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24 284 [Figure 1]

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27 285 **Figure 1.** Flow diagram of the study.  
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32 287 The median age of the respondents was 35 years (IQR 28-47), and 52% were women.  
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34 288 Around 60% of participants worked in a private practice (653/1113), and 27% in a  
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37 289 hospital (305/1113), and 87% spent most of their work time in clinical practice  
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40 290 (968/1113). **Table 1** presents the demographic characteristics of the sample.  
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45 292 [Table 1]

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48 293 **Table 1.** Sample Characteristics.  
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### 52 53 295 **EBP Knowledge and ability to critically appraise literature**

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56 296 Two respondents skipped this section. A total of 1111 respondents answered the item  
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59 297 investigating knowledge of EBP principles. The majority stated they knew the EBP  
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4 298 model (85%). The most frequent channels for learning the principles of EBP were  
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7 299 conferences/meetings (48%), distance and residential learning courses (35%), and  
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10 300 advanced continuing professional educational courses (35%). Only 23% of respondents  
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12 301 stated they learned about EBP during their undergraduate studies (**Supplementary file**  
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14 302 **2**).

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16 303 Regarding the sources physiotherapists consult to solve clinical problem, the majority  
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19 304 of respondents stated that their preferred information channels were discussion with  
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22 305 peers (80%) and literature search (86%); and the 30% stated that they relied on their  
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24 306 own experience. In addition, 78% of respondents stated they felt competent about  
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26 307 EBP, and 1.2% stated they felt completely unable. More than half (61%) were  
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29 308 confident in their ability to critically appraise quality assessments of study design and  
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31 309 statistical analysis. However, many of respondents stated they understood the  
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34 310 meaning of the terms “RCTs” (72%), “statistical significance” (65%), and “meta-  
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36 311 analysis” (52%); but, few could explain the terms “forest plot” (17%) and “confidence  
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38 312 intervals” (38%) (**Table 2**). In addition, 82% correctly identified the best study design to  
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41 313 evaluate an intervention, but only 20% was able to identify the result from the overall  
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44 314 estimate of a given meta-analysis.

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48 316 [Table 2]

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50 317 **Table 2.** Self-reported comprehension of terms (837 responded, 453 skipped).

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56 320 **Use and perceived effectiveness of EBP**

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4 321 The 90% of respondents agree that EBP is useful, comprehensive of patient values and  
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6 322 effective, showing an overall positive attitude towards its use (90%). While 90% knew  
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8 323 that scientific literature is part of the EBP, 56% did not agree that patients' preference  
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10 324 and 39% that clinical expertise are part of the EBP process (**Figure 2**).

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17 326 [Figure 2]

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20 327 **Figure 2.** Perceived knowledge of EBP basic principles of patients' desire, clinical  
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22 328 expertise and scientific literature.

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28 330 In a typical month, 59% of the respondents read between 1 and 5 articles, and only 9%  
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30 331 did not. In addition, 55% stated that they make clinical decisions based on their  
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32 332 scientific readings, 80% expressed the need to increase the use of EBP, and 69%  
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34 333 reported that it would benefit their career.

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### 40 41 42 335 **Association between sample characteristics and EBP knowledge**

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44 336 We found a statistically significant association between questions related to how  
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46 337 physiotherapists perceived EBP principles (patient values and clinical expertise), and  
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48 338 sample demographic variables entered into the model (age, sex, working time, level of  
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50 339 education) (**Table 3**). Thus, Considering the question related to patients' values as part  
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52 340 of EBP model, young physiotherapists < 29 years seems to be more conscious about  
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54 341 patient's value in EBP model than adults > 49 years (OR 1.57, 95% CI 1.02 - 2.42) as well,

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4 342 being male increased the odds (0.50, 95% CI 0.38 – 0.67). Physiotherapists who work in  
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7 343 patient care (e.g. clinical practices) are less likely to report understanding the model of  
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9 344 EBP (OR 0.99, 95% CI 0.98 – 0.99) compared to who does not work in this area. On the  
10  
11 345 contrary, who works in research (OR 1.02, 95% CI 1.01 – 1.03) and teaching (OR 1.01,  
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13 346 95% CI 1.002 – 1.02) is more likely able to recognize patient's value as part of the EBP  
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15 347 model. Whereas, who had a Master's of Science (OR 2.06, 95% CI 1.31 – 3.21) is twice  
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17 348 more conscious about it against who did not have the same title. The same  
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19 349 interpretation is for who had a 1st level Specialist Master's degree (OR 2.69, 95% CI 1.98  
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21 350 – 3.64) and a Doctor of philosophy (PhD) (OR 10.33, 95% CI 1.28 – 83.00).

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27 351 Regarding the question related to clinical expertise as part of the EBP model, being male  
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29 352 is more likely associated to consider expertise in EBP model (OR 0.65, 95% CI 0.49 –  
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31 353 0.86). Who works in patient care (OR 0.99, 95% CI 0.98 – 0.99) seems to be less likely  
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33 354 able to understand the EBP model more than who does not work with patient (OR 0.65,  
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35 355 95% CI 0.49 – 0.86). To have a Master's degree title (OR 2.16, 95% CI 1.31 – 3.58) and a  
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37 356 1st level Specialist Master's degree (OR 1.99, 95% CI 1.45 – 2.75) seems to be twice  
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39 357 favourable to consider clinical expertise in the model against who did not have this titles.

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44 358 **(Table 3).**

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50 360 [Table 3]

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55 362 **Table 3.** Association between actual knowledge of EBP and selected variables.

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4 364 **Perceived barriers to using EBP in clinical practice**

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7 365 Respondents stated that major barriers to applying EBP exist (570/815, 75%): lack of  
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9 366 time and lack of ability to critically appraise the literature were rated as the top two  
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11 367 barriers. Lack of time was ranked as the most important (Table 4).

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15 368 [Table 4]

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17 369 **Table 4.** Barriers to applying EBP in order of importance (%).

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23 371 **Discussion**

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26 372 **Main findings**

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28 373 We obtained a response rate of 64.5% corresponding to a total of 1289  
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31 374 physiotherapists out of 2000 involved. This rate, being superior than the required  
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33 375 sample size of 370, can be considered representative of all physiotherapists AIFI  
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35 376 members. Overall, survey questionnaire respondents stated they had a positive  
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37 377 attitude towards EBP and that their knowledge about it was extensive. The majority  
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39 378 overrated their knowledge, however, and demonstrated a shallow awareness of EBP,  
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41 379 compared to the original model described by David Sackett (26). The gap between  
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43 380 perceived and actual knowledge of EBP is relevant and can result in inadequate  
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45 381 practice, potentially increasing the risk of chronic disability(27).

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48 382 Our survey findings are similar to those obtained among American physiotherapists 15  
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51 383 years ago (12) and, more recently, among Ghanaian physiotherapists who  
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53 384 demonstrated an inadequate knowledge of EBP (14). In contrast, Brazilian  
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55 385 physiotherapists showed they were better acquainted with EBP since they considered  
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4 386 patients' preferences part of the decision-making process (15). In Europe, Swedish  
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7 387 physiotherapists consider patients' preferences when treating according to guidelines,  
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10 388 thus carrying out the EBP process(28). However, the international context in which  
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12 389 physiotherapists act their health care assistance might be different from Italy where a  
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14 390 direct access is not still completely implemented and a lower number of years of  
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16 391 education for becoming a physiotherapist are needed compared to other countries  
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19 392 (29, 30).

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21 393 In our sample, the younger respondents were noted to be more familiar with EBP than  
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23 394 their older colleagues with more experience. Our findings are shared by similar  
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25 395 observations that the level of EBP knowledge is influenced by the time since  
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27 396 graduation from school. In general, recent graduates are more likely to follow the  
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29 397 steps of EBP than those with more clinical experience(11). We also observed that  
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31 398 knowledge about EBP differed depending on the respondent's level of education and  
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33 399 workplace setting. (11-13). Indeed, personal and organizational characteristics can  
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35 400 significantly influence attitudes, beliefs, use of EBP, and perceived support (31).

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37 401 Of the total of respondents with a Bachelor's degree, only one fifth had received  
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39 402 education in EBP. The levels of education most closely associated with EBP knowledge  
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41 403 are the graduate and postgraduate levels. The teaching of EBP principles in  
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43 404 undergraduate courses remains scarce, although it is widely considered essential for  
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45 405 improving the quality of health care and patient outcomes. In many Countries, studies  
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47 406 have highlighted that physiotherapists require more training in EBP in order to acquire  
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49 407 confidence in using it(11); however, the teaching of EBP-oriented skills in  
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51 408 undergraduate physiotherapy programmes belongs to the past two decades (32-34).  
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4 409 Since then EBP has been increasingly integrated into the core curriculum of  
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7 410 undergraduate and postgraduate health care programs and continuing professional  
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9 411 education(35-37). Italy is not an exception, the teaching of EBP has been included as  
10  
11 412 an integral part of the core curriculum of physiotherapy in 2005 (22). This statement is  
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13  
14 413 in accordance with the study's finding that Italian physiotherapists <29 years show  
15  
16 414 higher odds of better attitudes towards EBP therefore, we are positive regarding the  
17  
18 415 future generation of better adoption of EBP. Moreover, improving knowledge, use,  
19  
20 416 and attitudes towards EBP may be most strongly determined by upgrading to Master's  
21  
22 417 degrees while short continued educational courses may be of limited effectiveness.  
23  
24 418 Thus, it would be appropriate to support the access at Master's degree courses at  
25  
26 419 national level and to improve the quality of short educational courses in order to shape  
27  
28 420 them into an EBP structure.  
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31 421 The perceived and actual knowledge and use of evidence from the scientific literature  
32  
33 422 differed among respondents. While the majority felt able to conduct a literature  
34  
35 423 search and to critically appraise a statistical analysis in a scientific article, few  
36  
37 424 demonstrated that they understood the results of a meta-analysis from a given forest  
38  
39 425 plot. Nevertheless, the respondents appeared to have great confidence in the  
40  
41 426 authority of published scientific literature and stated that their clinical decisions rarely  
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43 427 relied on their experience alone: the attitude and the attempt to introduce findings  
44  
45 428 from the scientific literature in the clinical context is congruent with their positive  
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47 429 attitude towards EBP.  
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50 430 The discrepancy between actual knowledge and practice of EBP could be a  
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52 431 consequence of the myriad information sources accessible in scientific databases and  
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4 432 non-scientific channels, such as Doctor Google or social networks. Health care  
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7 433 professionals, including physiotherapists, need to develop their skills to confront this  
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10 434 overabundance of information in their professional life: exercising a careful selection  
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12 435 of what to read and what not to, both in terms of quality and quantity (38). Indeed,  
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14 436 three quarters of our respondents perceived barriers that limit their ability to critically  
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16 437 appraise the literature (11-13, 28, 39, 40).

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### 21 439 **Strengths and limitations**

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24 440 This is the first study examining perceived and actual knowledge on EBP among  
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26 441 physiotherapists in Italy. Although our response rate was high-moderate (64.5%),  
27  
28 442 several limitations should be considered when analysing the study results. First, our  
29  
30 443 sample included only AIFI members, who may not be representative of the population  
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32 444 of Italian physiotherapists, as it might be that AIFI members are more likely to  
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34 445 participate in a survey about their profession. Moreover, it is possible that  
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36 446 respondents, as members of AIFI, were those more prone towards EBP giving an  
37  
38 447 overestimated knowledge on EBP: the self-reported nature of the data might have  
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40 448 influenced the gap between perceived and actual knowledge. This gap was only a little  
41  
42 449 part of the broader scope of the study aiming to test preliminary hypothesis about the  
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44 450 gap and to report a concise snapshot view that can be better assessed in a further  
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46 451 study by validated instruments such as the Fresno Test or the Berlin Questionnaire (41,  
47  
48 452 42). Nonetheless, before the professional registry of Italian physiotherapists was  
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50 453 established in 2018, the AIFI was the only professional society for physiotherapists in  
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52 454 Italy and specifically not a scientific society. Second, sending out only one reminder to  
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4 455 participate in the survey might have limited the number of potential respondents.  
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7 456 Potential non response bias might have affected results and interpretation of this  
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9 457 cross-sectional study. Factors such as the length of the questionnaire, the term  
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11 458 'survey' in the body of the mail, and the non-inclusion of incentives might have  
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14 459 influenced the rate response: a Cochrane review showed as odds of response are  
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16 460 reduced in these situations(43).  
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19 461 However, the final percentage of respondents did not seem to bias our results, as we  
20  
21 462 reached the planned sample target up to the last survey questionnaire items. Third, we  
22  
23 463 dichotomized the dependent variables, conflating all responses into positive/negative  
24  
25 464 categories. This might have resulted in a loss of some information, though we  
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27  
28 465 replicated what previous studies of the same design have done (12) in order to report  
29  
30 466 useful findings. Finally, the accuracy of data on perceived knowledge is uncertain as  
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33 467 the data were collected via a self-reported survey.  
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### 38 469 **Implication for research, practice and education**

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41 470 We believe that research can help to increase the dissemination of knowledge about  
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43 471 and the adoption of EBP among physiotherapists. A focus for future research should be  
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45 472 to concentrate efforts in conducting high-quality research and teaching master classes  
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47 473 devoted to of EBP topics (44) and promoting research learning programmes as  
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50 474 knowledge translation interventions to improve the use of EBP and clinical practice  
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52 475 guidelines (CPGs) in physiotherapy (45). CPGs, defined as "systematically developed  
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54 476 statements to assist practitioner and patient decisions about appropriate health care  
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57 477 for specific clinical circumstances" (definition adopted by the European Region of the  
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4 478 World Confederation for Physiotherapy), can be used to bridge the research-to  
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7 479 practice gap and promote EBP and present research findings to clinicians in a synthetic  
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10 480 format without missing any elements of the EBP model (9). Indeed, CPGs based on the  
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12 481 Grades of Recommendation, Assessment, Development and Evaluation approach  
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14 482 (GRADE approach) are conducted in a standardized and transparent way: GRADE rates  
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16 483 the quality of evidence and provides the strength of recommendations by considering  
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18 484 the “estimates of effect for desirable and undesirable outcomes of interest”, the  
19  
20 485 “confidence in the estimates of effect”, the “estimates of values and preferences” and  
21  
22 486 the “resource use” (46). This approach helps the reader interpret a CPG and enhance  
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24 487 CPG adherence by health professionals. Some countries have laws that regulate  
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26 488 professional liability and place great importance on adherence to CPGs in clinical  
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28 489 practice, defining compliance with the CPG as an element in attributing professional  
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30 490 responsibility in case of adverse events. Furthermore, to improve physiotherapists’  
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32 491 adherence to CPGs, computerized decision support systems could provide actionable  
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34 492 recommendations or management options that are intelligently filtered or presented  
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36 493 at appropriate times to improve efficiency in health care(47).  
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43 494 For these reasons, both national and international initiatives are warranted for the  
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45 495 implementation of CPGs in physiotherapy. The production of CPGs, or at least a  
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47 496 synthesis of the evidence underpinning them, could be (and is to some extent)  
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49 497 coordinated on a national level, while implementation may be more suitable for local  
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51 498 adaptation(48). For instance, the recently created Italian National Guidelines System  
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53 499 (49) includes a list of scientific societies that can contribute to drafting CPGs (including  
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55 500 the AIFI), a process based on the GRADE method for the production, adaptation, and  
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4 501 updating of CPG. In this a database health professionals can find continuously updated  
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7 502 CPGs and good quality practices.  
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9 503 We appeal for a critical use and appraisal of EBP. EBP should be included in the  
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11 504 professional education of physiotherapist, starting at the undergraduate level.  
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14 505 Investing in the training of physiotherapists is essential for growing the skills of critical  
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16 506 appraisal of evidence-based physiotherapy, and to reduce waste of obsolete, futile or  
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19 507 harmful interventions (8). For instance, initiatives such as INQUIRE (INcreasing QUality  
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21 508 In patient-oriented academic clinical Research) has resulted in a roadmap that  
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23  
24 509 provides guidance for Academic institutions and researchers in developing quality  
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26 510 enhancement initiatives (50). The PEAK (The Physical therapist-driven Education for  
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28 511 Actionable Knowledge translation) educational program was designed to promote  
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30 512 integration of physiotherapists' research evidence into clinical decision making (19, 51,  
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32 513 52). Finally, engaging in research can contribute to being an attractive employer and  
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35 514 boost the application of EBP(13). Not only that, promoting education must be an  
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37 515 imperative to minimize "the mismatch between what clinical researchers do and what  
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40 516 patients need" (53).  
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9  
10 520 participating to the survey for their useful contribution.  
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15 **523 Declarations**

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19 525 **Ethical approval:** We conducted our study in compliance with the principles outlined in  
20  
21 526 the Declaration of Helsinki. The survey was filled out anonymously, and responses  
22  
23 527 could not be traced back to the respondents. Written, informed consent was assumed  
24  
25 528 if the respondents completed and submitted the survey since a statement before  
26  
27 529 starting the questionnaire informed the respondents of the purpose of the study.  
28  
29 530 Ethics approval was not necessary.

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31 531

32 532 **Availability of data and material:** All data generated or analysed during this study are  
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34 533 available at [https://osf.io/8xb6p/?view\\_only=1c6fd76403c04a82942799b9dee952c8](https://osf.io/8xb6p/?view_only=1c6fd76403c04a82942799b9dee952c8) .

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36 534

37 535 **Authors' contributions:** SG and GC were primarily responsible for study conception and  
38  
39 536 design and for data analysis and interpretation. All authors (SG, GC, DC, SC) had full  
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41 537 access to all of the data in the study and take responsibility for the integrity of the data  
42  
43 538 and the accuracy of the data analysis. DC led the writing of the first draft of the  
44  
45 539 manuscript. DC and SC authors contributed to drafting and revising the manuscript. SG  
46  
47 540 is the guarantor. All authors (SG, GC, DC, SC) read and approved the final manuscript.

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For peer review only

695

696 **Table 1.** Sample Characteristics.

Characteristics *		Frequency (%)
Sex (n=1289)	Male	48%
	Female	52%
Age, yrs (n=1289)	<29	28%
	29-38	31%
	39-49	18%
	>49	23%
Workplace** (n=1113)	Private office	59%
	Teaching Hospital	7%
	Hospital	20%
	Nursing home	15%
	Unemployed	2%
	Other	17%
Working time spent in: (average) (n=1113)	Clinical practice	87%
	Research	11%
	Teaching	6%
	Management/Leadership	2%

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698 \*The absolute number of respondents varies for each variable due to missing data.

699 \*\*Percentage may exceed 100% because some items allowed more than one answer

700 **Table 2.** Perceived knowledge of terms (837 responded, 453 skipped).

	<b>Understood and could explain No. (%)</b>	<b>Understood somewhat No. (%)</b>	<b>Did not understand No. (%)</b>	<b>Unknown No. (%)</b>
<i>Randomized- controlled trials</i>	604 (72)	192 (23)	41 (5)	0 (0)
<i>Meta-analysis</i>	439 (52)	304 (37)	86 (10)	8 (1)
<i>Relative risk</i>	250 (30)	428 (51)	135 (16)	24 (3)
<i>Statistical significance</i>	543 (65)	246 (29)	41 (5)	7 (1)
<i>Forest plot</i>	144 (17)	197 (24)	147 (17)	349 (42)
<i>Intention to treat</i>	255 (30)	223 (27)	167 (20)	192 (23)
<i>Confidence interval</i>	316 (39)	271 (32)	176 (18)	104 (11)

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702 **Table 3.** Association between actual knowledge of EBP and selected variables. References category are reported in legend.

	Characteristics		Odds ratio (95% CI)	Model P*	
In your opinion, are patients' values and preferences a part of the EBP model?	<b>Age (yrs)<sup>a</sup></b>	(n=818)	<29	1.57 (1.02 - 2.42)**	0.001
			29-38	1.03 (0.66 - 1.59)	
			39-49	0.68 (0.39 - 1.17)	
			>49	Reference	
	<b>Sex<sup>b</sup></b>	(n=818)	Female	0.50 (0.38 - 0.67)**	0.000
			Male	Reference	
	<b>Working time<sup>c</sup></b>	(n=814)	Patient care	0.99 (0.98 - 0.995)**	0.002
		(n=567)	Research	1.02 (1.01 - 1.03)**	
		(n=609)	Teaching	1.01 (1.002 - 1.02)**	
		(n=492)	Management	1.00 (0.98 - 1.02)	
	<b>Level of education<sup>c</sup></b>	(n=818)	Bachelor's degree	1.04 (0.75 - 1.45)	0.81
			Master of Science degree	2.06 (1.31 - 3.21)**	0.001
			1st level Specialist Master's degree	2.69 (1.98 - 3.64)**	0.000
2nd level Specialist Master's degree			0.84 (0.14 - 5.07)	0.85	
Advanced continuing professional education			1.06 (0.80 - 1.42)	0.67	
Doctor of philosophy (PhD)			10.33 (1.28 - 83.00)**	0.005	
Distance and residential learning course			1.00 (0.75 - 1.34)	0.99	
Conferences/Meetings			1.40 (1.06 - 1.85)**	0.015	
In your opinion, is clinical	<b>Age (yrs)<sup>a</sup></b>	(n=818)	<29	1.43 (0.93 - 2.21)	0.11
			29-38	1.00 (0.65 - 1.55)	

expertise a part of the EBP model?		39-49	0.97 (0.57 - 1.64)		
		>49	Reference		
	<b>Sex<sup>b</sup></b>	(n=818)	Female	0.65 (0.49 – 0.86)**	0.008
			Male	Reference	
	<b>Working time<sup>c</sup></b>	(n=814)	Patient care	0.99 (0.98 – 0.99)**	0.032
		(n=567)	Research	1.01 (0.99 – 1.02)	0.24
		(n=609)	Teaching	1.01 (0.99 – 1.02)	0.14
		(n=492)	Management	0.98 (0.97 – 1.01)	0.32
	<b>Level of education<sup>c</sup></b>	(n=818)	Bachelor's degree	1.25 (0.89 – 1.76)	0.19
			Master of Science degree	2.16 (1.31 – 3.58)**	0.002
			1st level Specialist Master's degree	1.99 (1.45 – 2.75)**	0.000
			2nd level Specialist Master's degree	0.97 (0.16 – 5.86)	0.98
			Advanced continuing professional education	0.90 (0.67 – 1.21)	0.49
			Doctor of philosophy (PhD)	0.26 (0.65 – 42.27)	0.06
Distance and residential learning course			1.08 (0.80 – 1.45)	0.61	
		Conferences/Meetings	1.20 (0.91 – 1.59)	0.20	

**Legend:**

\* Chi-square test

\*\* Statistically significant ( $p < 0.05$ )<sup>a</sup> Odds ratio are calculated using the variable >49 years as reference.<sup>b</sup> Odds ratio are calculated using the variable male as reference.<sup>c</sup> Odds ratio are calculated as the ratio between the odds in the presence of characteristics' variable against the odds in the absence of the same variable. (I.e., characteristic: working time; variable: patient care. The odds ratio represents the ratio between the odds of working in patient care against the odds of not working in patient care.)



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- 711 First level master degree: equivalent to post graduate diploma: program at which students with a bachelor’s degree can have the access.
- 712 Second level master degree: postgraduate level at which only student with master of science degree can have the access.
- 713 Advanced continuing professional education: post graduate certificate
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726 **Table 4.** Barriers to applying EBP in order of importance (%).

Type of barrier	Order of importance from the most to the least (%)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10
Lack of interest	10.7	8.3	5.6	6.9	6.2	7.0	10.2	10.7	10.7	23.7
Applicability of EBP findings to clinical practice	11.1	12.8	9.7	8.4	13.5	9.8	9.5	8.8	7.6	8.8
Lack of time	23.0	13.2	15.1	10.0	9.0	9.0	5.8	5.5	5.8	3.7
Difficulty in searching literature in databases	9.5	11.8	14.4	15.1	13.7	14.6	10.5	7.6	0.0	0.9
Difficulty in critically appraising literature and statistical analysis	9.7	17.8	16.5	16.7	16.9	9.3	6.0	4.0	2.1	1.1
Difficulty applying literature findings to individual patients	9.5	11.4	12.7	14.1	12.7	16.9	11.3	5.6	5.5	0.5
Lack of financial and organizational support (computer, access to databases)	8.4	7.4	8.6	8.8	8.8	10.5	20.6	12.8	7.4	6.7
Workplace does not use EBP	12.0	11.3	9.7	9.8	9.8	9.5	10.0	17.8	6.0	4.2
Language of scientific publications	4.8	3.0	5.1	6.3	7.4	8.6	10.0	15.6	30.8	8.4
Unfamiliarity with using the computer/technology	1.4	3.2	2.6	3.9	2.1	4.8	6.2	11.6	22.3	42.0

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4 732 **Figure Legend**

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6 733 **Figure 1.** Flow diagram of the study.  
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8 734 **Figure 2.** Perceived knowledge of EBP basic principles of patients' desire, clinical  
9 expertise and scientific literature.  
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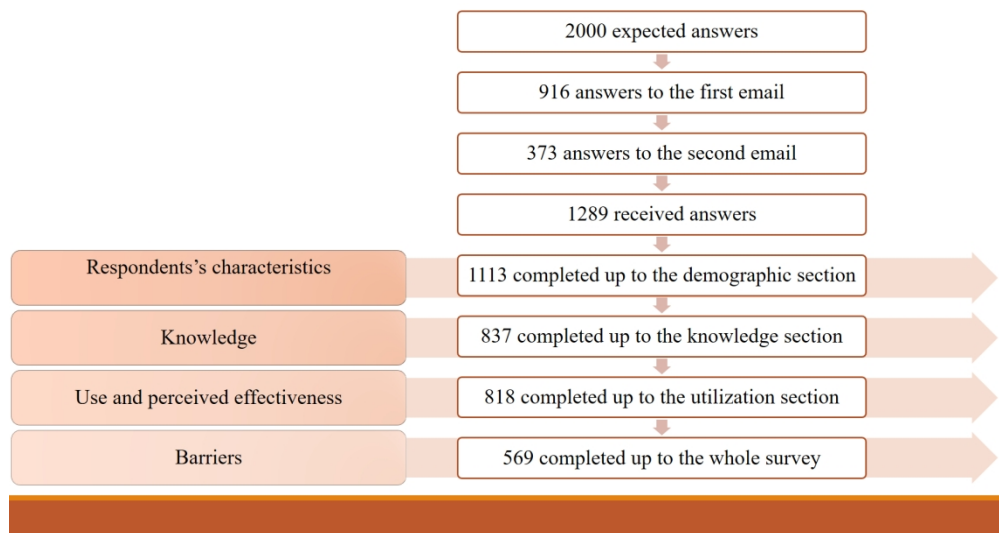
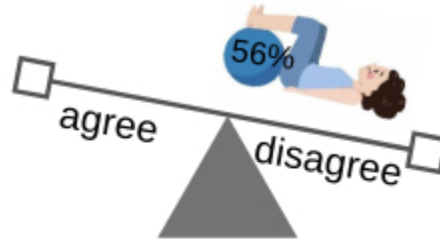


Figure 1.

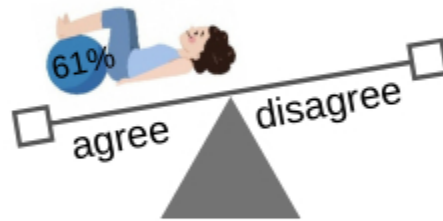
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In your opinion, the preferences of patients are included in the EBM model?(item 18)



In your opinion, the clinical experience is included in the EBM model? (item 19)



In your opinion, the scientific literature is useful in your clinical practice? (item 20)

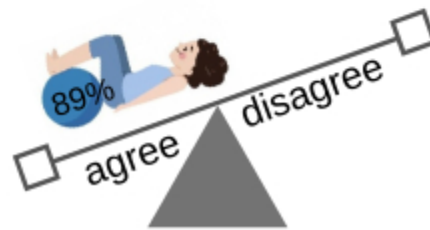


Figure 2.

## **Evidence-Based Practice (EBP) Questionnaire<sup>a</sup>**

### **SECTION 1. General information**

*For the following items, place a mark x in the appropriate box next that indicates your response.*

1. What is your sex?

Male

Female

2. What is your age? \_\_\_\_\_

3. Where did you acquire the license to practice as Physiotherapist (PT)?

Italy

Abroad

4. In which Italian region did you acquire your physiotherapist's degree (degree or equivalent title)?

\_\_\_\_\_

5. In which University (eg., Università degli Studi di Genova) o other (e.g., Scuola Dirette ai Fini Speciali/Scuole Regionali) did you acquire your PT title?

\_\_\_\_\_

6. When did you acquire your title to practice as physiotherapist (e.g., 2005)

\_\_\_\_\_

7. Where did you mostly practice your profession?

Private practice

Research Hospital

Clinical Hospital

Residential and nursing home

Unemployed (e.g. student)

Others \_\_\_\_\_

8. Please indicate the percentage of your total work time that you spend in each type of activity during an average month.

a) Patient care  %

b) Research  %

c) Teaching  %

d) Management (as Director)  %

### **SECTION 2. Knowledge of EBP principles**

9. Do you know the Evidence Base Practice (EBP) model?

Yes  No

10. Where did you learn the foundations of EBP

Bachelor's degree

Master of Science degree

1st level Specialist Masters degree

2nd level Specialist Masters degree

- 1  
2  
3     ○ Advanced continuing professional education  
4     ○ Doctor of philosophy (PhD)  
5     ○ Distance and residential learning course  
6     ○ Conferences/Meetings  
7

8 11. When you did not know how to manage a clinical issue, how did you behave?

- 9  
10     ○ I rely on my experience  
11     ○ I discuss with colleagues  
12     ○ I consult the scientific literature  
13     ○ It has never happened  
14

15 12. I'm able to launch search strategies for finding research relevant to my practice (e.g., Pubmed)

- 16              Strongly Disagree              Disagree              Neutral              Agree              Strongly Agree  
17

18 13. I am confident in my ability to critically review the literature (quality assessment, statistical and clinical significance).

- 19              Strongly Disagree              Disagree              Neutral              Agree              Strongly Agree  
20  
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23 *For the following item, place a mark v in one box in the row for each term.*

24 14. My understanding of the following terms is:

25	26	27	28
Term	Understand Completely	Understand Somewhat	Do Not Understand
29 a) Randomized controlled trial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30 b) Meta-analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31 c) Relative risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32 d) statistical significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33 e) Forest plot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34 d) Intention to treat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35 f) Confidence interval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

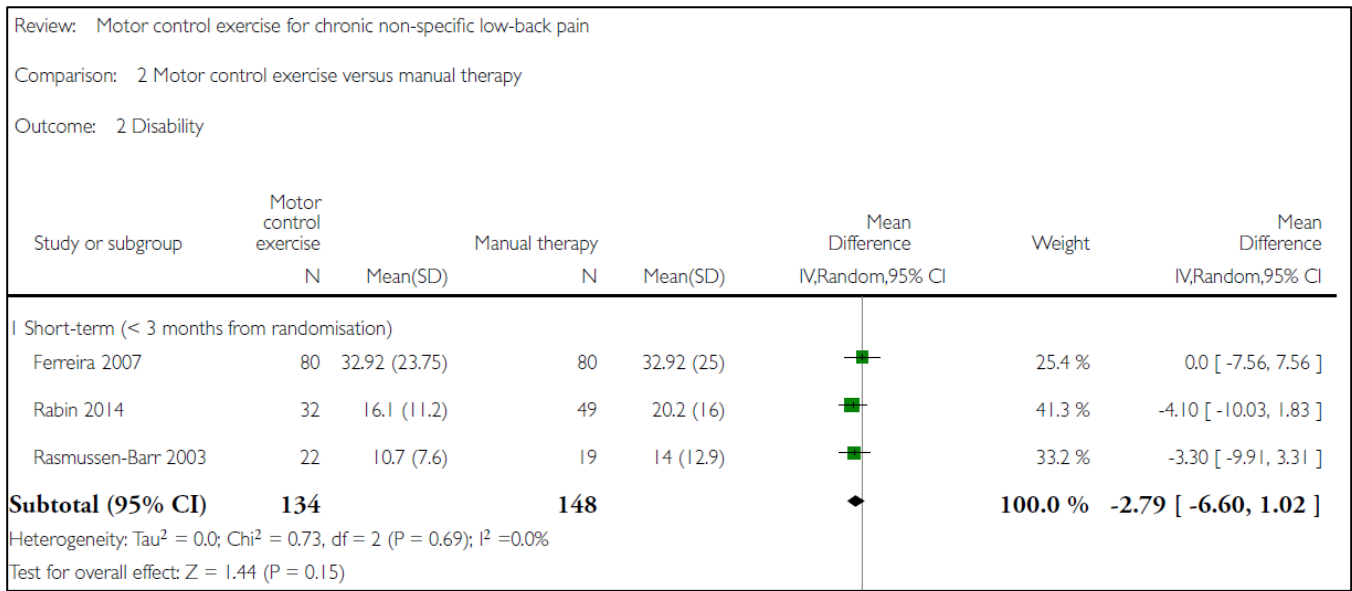
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40 15. In your experience, which is the best study design to assess the efficacy of a rehabilitative intervention?

- 41     ○ Case report/case series  
42     ○ Cohort observational study  
43     ○ Case – control observational study  
44     ○ Controlled clinical study  
45     ○ Randomized controlled clinical study  
46     ○ I don't know  
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50  
51 16. A systematic review, comparing exercise versus manual therapy in acute low back pain for reducing disability at 3 months of follow-up, reports the following result (please, see the figure below). What is your interpretation?

- 52  
53     ○ I don't know  
54     ○ Exercise is more efficacious than manual therapy  
55     ○ Exercise is less efficacious than manual therapy  
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- Both have the same efficacy



### SECTION 3: Personal attitudes toward, use of, and perceived benefits and limitations of EBP.

For the following items, place a mark x in the appropriate box that indicates your response.

- Application of EBP is necessary in the practice of physiotherapy.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- EBP takes into account the patient's preferences and values.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- EBP takes into account the clinical experience.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- Literature and research findings are useful in EBP in my daily practice.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- Read/review research/literature related to my clinical practice (a typical month).
  - Never
  - 1–5 articles
  - 6–10 articles
  - 11–15 articles
  - 16 articles
- Use literature and research findings in the process of clinical decision making (a typical month).
  - Never
  - few times
  - the majority of times
  - always
- I need to increase the use of EBP in my daily practice.
  - Strongly Disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- My career will benefit from a more uptake of EBP into my clinical practice.
  - Strongly Disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree



**SECTION 4: Barriers of EBP.**

25. Do you think there are limitations in using EBP in clinical practice?

- Yes       No       Do Not Know

*For the following items, rank from 1 to 10 by placing numbers in the appropriate boxes (1 most important).*

26. Rank from 1 (most important) to 10 (least important) the barriers to the use of EBP in your clinical practice.

- The adoption of EBP is inapplicable in physiotherapy
- Insufficient time
- Lack of instrumental resources in my facility (PCs, free scientific databases)
- Poor ability to use the computers/techonology
- Poor ability to systematically search the literature
- Poor ability to critically appraise the literature
- Lack of generalizability of the literature findings to my patient population
- Lack of understanding English language
- Lack of collective support among my colleagues in my facility, lack of a stimulating environment
- Lack of interest

<sup>a</sup> The questionnaire published by Jette et al. 2003 was adapted by the authors and contains elements as reported by McColl et al.

**Supplementary file 2.** Responses to question regarding the contribution of education to learning the principles of EBP (837 answered, 453 did not).

	<b>A lot</b>	<b>A little</b>	<b>Not at all</b>	<b>Omitted</b>
	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>
<i>Bachelor's degree</i>	194 (23)	409 (49)	201 (24)	33 (4)
<i>Master's of Science degree</i>	93 (11)	61 (7)	18 (2)	665 (79)
<i>1st level Specialist Master's degree</i>	256 (31)	60 (7)	18 (2)	503 (60)
<i>2nd level Specialist Master's degree</i>	(1)5	8 (1)	11 (1)	813 (97)
<i>Advanced continuing professional education</i>	293 (35)	187 (22)	31 (4)	326 (39)
<i>Doctor of philosophy (PhD)</i>	9 (1)	8 (1)	14 (2)	806 (96)
<i>Distance and residential learning course</i>	292 (35)	272 (32.5)	39 (4.7)	234 (28)
<i>Conferences/Meetings</i>	404 (48)	354 (42)	30 (4)	49 (6)

**Supplementary 1.** Checklist items for reporting survey research.

	<b>Section &amp; Topic</b>	<b>Reported on page #</b>
	<b>Background</b>	
1	Justification of research method	5-6
2	Background literature review	5-6
3	Explicit research question	5-6
4	Clear study objectives	5-6
	<b>Methods</b>	
5	Description of methods used for data analysis	9
6	Method of questionnaire administration	7-8
7	Location of data collection	6-7
8	Dates of data collection	6-7
9	Number and types of contact	6-7
10	Methods sufficiently described for replication	6-8
11	Evidence of reliability	7
12	Evidence of validity	7
13	Methods for verifying data entry	na
14	Use of a codebook	na
15	Sample selection	7
16	Sample size calculation	7
17	Representativeness	7
	<b>Method of sample selection</b>	
18	Description of population and sample frame	7
19	Research tool	7-8
20	Description of the research tool	7-8
21	Description - development of research tool	7-8
22	Instrument pretesting	Na
23	Instrument reliability and validity	Na
24	Scoring methods	7-8
	<b>Results</b>	
25	Results of research presented	10-14
26	Results address objectives	10-14
27	Clear description - results based on part sample	10-14
28	Generalisability	10-14
	<b>Response rates</b>	
29	Response rate stated	10
30	How response rate was calculated	10
31	Discussion of nonresponse bias	17
32	All respondents accounted for	
	<b>Interpretation and discussion</b>	
33	Interpret and discuss findings	14-17
34	Conclusions and recommendations	14-17
35	Limitations	17
	<b>Ethics and disclosure</b>	
36	Consent	6
37	Sponsorship	20
38	Research ethics approval	20
39	Evidence of ethical treatment of human subjects	Na

PLoS Med. 2010 Aug;8(8):e1001069. doi: 10.1371/journal.pmed.1001069. Epub 2011 Aug 2. Reporting guidelines for survey research: an analysis of published guidance and reporting practices. Bennett C1, Khangura S, Brehaut JC, Graham ID, Moher D, Potter BK, Grimshaw JM.

# BMJ Open

## Twenty-five years after the introduction of Evidence-based Medicine: knowledge, use, attitudes, and barriers among physiotherapists in Italy. A cross-sectional study.

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-037133.R2
Article Type:	Original research
Date Submitted by the Author:	16-Apr-2020
Complete List of Authors:	Castellini, Greta; IRCCS Istituto Ortopedico Galeazzi, Clinical Epidemiology Unit Corbetta, Davide; Ospedale San Raffaele, Rehabilitation and Functional Recovery; Vita-Salute San Raffaele University, Physiotherapy Degree Course Cecchetto, Simone; Azienda Provinciale per i Servizi Sanitari APSS Trento, Italy; University of Verona Gianola, Silvia; IRCCS Istituto Ortopedico Galeazzi, Clinical Epidemiology Unit
<b>Primary Subject Heading</b>:	Rehabilitation medicine
Secondary Subject Heading:	Epidemiology, Evidence based practice, Rehabilitation medicine, Research methods
Keywords:	MEDICAL EDUCATION & TRAINING, REHABILITATION MEDICINE, EPIDEMIOLOGY

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5 **and barriers among physiotherapists in Italy. A cross-sectional study.**  
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4 335 34 **Abstract**

7 35 **Objectives.** To explore the knowledge, use, attitudes towards Evidence-based Medicine, also known as  
8 36 Evidence-based Practice (EBP), and perceived barriers to its dissemination among physiotherapists.

10 37 **Design.** Cross-sectional study.

11 38 **Setting and participants.** Members of the Italian Association of Physiotherapists (n=2000) were invited  
12 39 to participate in an online survey about EBP knowledge and use.

14 40 **Primary outcome measures.** The survey questionnaire comprised four sections: 1) Respondent  
15 41 characteristics; 2) Knowledge of EBP principles; 3) Attitude, use, and perceived effectiveness of EBP; 4)  
16 42 Perceived barriers to implementing EBP in clinical practice.

19 43 **Results.** Out of 2000 physiotherapists, 1289 participated in the survey (64.5% response rate). Overall,  
20 44 90% perceived EBP as useful and necessary for their clinical practice. More than 85% stated that they  
21 45 were familiar with the principles of EBP, 75% reported that they were able to search online databases  
22 46 for relevant information, and 60% reported that they were able to understand statistical analyses.  
23 47 However, 56% believed that patient preferences and 39% that clinical expertise are not part of the EBP  
24 48 model. Half stated that they understood and could explain the term “meta-analysis” but only 17% knew  
25 49 what a forest plot is and just 20% correctly judged the finding of a given meta-analysis. Lack of time was  
26 50 reported as the main barrier to EBP.

31 51 **Conclusions.** The majority of Italian physiotherapists overrated their knowledge about EBP,  
32 52 demonstrating a gap between perceived and actual knowledge of EBP in this population.

33 53

34 54 **Key Words:** Evidence-based Practice; Cross-sectional Studies; Physiotherapy Specialty; Surveys and  
35 55 Questionnaires.

36 56

37 57 **Abstract word count: 231 words.**

38 58 **Manuscript word count: 3814 words.**

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4 70 **Article summary**

5  
6 71 **Strengths and limitations of this study**

- 7 72 - A national web-based survey within a cross-sectional study of Italian physiotherapists was  
8 73 performed.  
9  
10 74 - The survey response rate was 64.5% (high-moderate) in this sample of 2000 physiotherapists.  
11  
12 75 - Self-reported data and potential non response bias may affect the results and interpretation of  
13 76 this cross-sectional study.  
14  
15 77 - Generalizability is limited to a selected population.  
16  
17 78

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19 80 competenza dei principi dell'Evidence-based Medicine (EBP) in coorti di professionisti sanitari coinvolti  
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21 82 design, data collection, analysis, interpretation or report writing.  
22  
23 83

24  
25 84 **Competing interests:** The authors declare that they have no competing interests.  
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**87 Introduction**

88 Evidence-based medicine, also known as Evidence-based practice (EBP), is an internationally  
89 recognized movement defined as *"the conscientious, explicit, and judicious use of current best evidence*  
90 *in making decisions about the care of individual patients. The practice of Evidence-based Medicine*  
91 *means integrating individual clinical expertise with the best available external clinical evidence from*  
92 *systematic research."* (1) The identification and application of patient preferences should be part of  
93 decision making. (2) This concept of shared decision making has gained attention in the last decade,  
94 with physical medicine and rehabilitation clinicians being more likely to involve patients in making  
95 informed decisions. (1, 3)

96 Using the best available evidence to make healthcare decisions optimizes health outcomes. Issues in EBP  
97 have attracted growing debate and discussion, (2, 4, 5) as seen in the increase in the number of  
98 scientific articles directly relevant to physiotherapy practice: (6, 7): between 1995 and 2015, randomized  
99 controlled trials (RCTs) and systematic reviews (SRs) rose from 45.1% to 59.4%, and from 0% to 14.6%,  
100 respectively.(8) Taken together, RCTs and SRs accounted for 74% of physiotherapy research publications  
101 in 2015 compared to 45% two decades earlier. (8)

102 Keeping up with this abundance of research poses a challenge for most clinicians. Not surprisingly, the  
103 transfer of research findings into practice is often described as slow, haphazard, and unpredictable. (9)  
104 Several studies have explored the perceived knowledge, use, attitudes, and barriers to EBM among  
105 physiotherapists, (10-18) however, no similar research exists in the relatively recent Italian context:  
106 three-year, full-time university degree courses in physiotherapy were established in 2006. The courses  
107 are a mix of academic studies and mandatory internship starting from the first year. Completion of the  
108 bachelor's degree is prerequisite to admission to the "Laurea Magistrale" (equivalent to the European  
109 Master of Science) and a Doctoral Program.

110 In addition, no studies to date have investigated the strength of the link between perceived and actual  
111 knowledge or highlighted the possible gap that may explain the difficulty physiotherapists have in  
112 applying the principles of EBM in clinical practice.

113 With these points in mind, we investigated the knowledge, the use of, and the attitude towards EBP  
114 among Italian physiotherapists and the barriers they perceived to adopting its implementation.  
115 Secondary aims were to investigate the gap between perceived and actual knowledge of EBP principles  
116 among physiotherapists and to analyse the association between their perceived and actual knowledge  
117 and demographic characteristics.

118

**119 Methods****120 Design**

121 For this cross-sectional study we conducted an online closed survey of members of the Italian  
122 Association of Physiotherapists (Associazione Italiana Fisioterapisti [AIFI]). We developed a survey

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4 123 questionnaire and posted it on a SurveyMonkey platform(19) for data collection. The study was  
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6 124 conducted in compliance with the principles outlined in the Declaration of Helsinki. The survey was  
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8 125 anonymous and responses could not be traced back to respondents. Written, informed consent was  
9  
10 126 assumed if the respondents completed and submitted the survey questionnaire after having read the  
11  
12 127 purpose statement. Ethics approval was not necessary. The survey was e-mailed directly to AIFI  
13  
14 128 members and made available for a period of six weeks from May to June 2018. The study followed the  
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16 129 Guidelines for Reporting Survey-Based Research. (20, 21)

17 130

### 18 131 **Patient and Public Involvement**

19 132 Although there was no direct involvement of patients or the public, the AIFI assisted in the design and  
20 133 delivery of the study. They also sent the questionnaire directly to participants.

21 134

### 22 135 **Study sample**

23 136 Before the survey questionnaire was posted online, the AIFI sent an invitation in their e-mail newsletter  
24 137 to all AIFI members explaining the aim and content of the survey. The invitation explained the purpose  
25 138 of the survey, the time needed to complete it (10 minutes), and the type of questions that participants  
26 139 could expect to find. The time estimation was a median based on a questionnaire piloted with six expert  
27 140 physiotherapists in EBP. The survey was linked to a unique respondent that did not display the survey a  
28 141 second time once completed. The survey questionnaire was posted on 4 May 2018. Two weeks later,  
29 142 the AIFI sent out an e-mail reminder to AIFI members who had not yet responded. Responses were  
30 143 treated anonymously.

31 144 The AIFI membership database contains more than 10,000 addresses of physiotherapist members  
32 145 (12,514 as of the end of 2019) out of an estimate of 65,000 physiotherapists. Only 2000 are considered  
33 146 active members, which the AIFI secretariat defines as members who received e-mails, exchange and  
34 147 share links on the AIFI website and app, read the AIFI newsletter, and interact with the AIFI channels.

35 148

### 36 149 **Sample size calculation**

37 150 We used the sample size calculator (22, 23) provided by SurveyMonkey. The sample size is the number  
38 151 of completed responses we expected to receive: based on a population size of 10,000 (the total number  
39 152 of people we intended to invite to participate in the study, i.e. total number of AIFI members registered  
40 153 at the time of the survey), a 5% margin of error (how accurately the survey results reflect the views of  
41 154 the overall population) and a sampling confidence level of 95% (how confident we can be that the  
42 155 population would select an answer within a certain range). The calculated sample size of completed  
43 156 responses was 370 completed answers. We expected that sending the survey to a target sample of 2000  
44 157 active members would guarantee 370 completed responses.

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### 46 159 **Survey questionnaire**

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4 160 The questionnaire was developed based on similar questionnaires reported in the literature. (12, 15, 24)  
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6 161 Since the aim was to investigate several contents (perceived and real knowledge, use attitude and  
7 162 barriers), we adapted the existing instruments to create an ad hoc survey that would reflect the above  
8  
9 163 contents. Before sending out the survey, we piloted the questionnaire with six expert physiotherapists  
10 164 in EBP (four senior and two junior researchers, with an average of 8 and 3 years of EBP expertise,  
11 165 respectively) to assess its clarity and accuracy. After revision, the final questionnaire version consisted of  
12 166 26 items divided into 4 sections: 1) Respondent characteristics (items 1 to 8); 2) Knowledge and ability  
13 167 to critically appraise the literature (items 9 to 16); 3) Use and perceived effectiveness of EBP (items 17 to  
14 168 24); 4) Perceived barriers to the implementation of EBP in clinical practice (items 25 and 26). Response  
15 169 to all items was mandatory. The questionnaire was written in Italian to make it more suitable for this  
16 170 sample (**Supplementary File 1** – questionnaire, English version).  
17  
18 171 Section 1 covered demographic characteristics; Section 2, item 9, asked respondents to indicate the  
19 172 origin of their knowledge about EBP basics. If they stated that they did not know the EBP model, the  
20 173 questionnaire terminated; otherwise, for the following items, the respondents were asked where they  
21 174 had acquired their knowledge of EBP and if they were confident with it. The final questions in this  
22 175 section assessed the respondent's actual knowledge of EBP. For instance, item 14 investigated  
23 176 familiarity with some terms often found in the literature, item 15 asked which study design is  
24 177 considered the most reliable and item 16 investigated whether the respondent understood the results  
25 178 of a meta-analysis from a given forest plot. Most of the items in Section 3 were statements to which  
26 179 respondents had to express their agreement on a five-point-Likert scale, with "strongly agree" and  
27 180 "strongly disagree" as anchors, about their perception and use of EBP. In Section 4, item 25, the  
28 181 respondents had to state whether or not they felt barriers to the utilization of EBP exist. If they stated  
29 182 there were no barriers to its utilization, the questionnaire terminated as a conditional question.  
30 183 Otherwise, for item 26, the respondents had to express their opinion about the presence of barriers to  
31 184 the implementation of EBP and to rank them from the most to the least important.

185

### 186 **Statistical analyses**

187 Descriptive statistics are presented as medians and interquartile ranges (IQR) or absolute values,  
188 percentages and frequencies, when appropriate. The response frequencies were represented and  
189 analysed in tabular and graphic formats using Microsoft Excel or Power Point 2010. An automated count  
190 of response rate was acquired for each of the four sections in order to determine whether the  
191 questionnaires were terminated earlier (i.e., users did not go through all four questionnaire sections).  
192 We dichotomized the responses to the 5-point items as "disagree" versus "agree" ("strongly disagree,  
193 disagree and neutral" versus "agree and strongly agree" categories). Demographic characteristics (e.g.,  
194 sex, age, and level of education) were collapsed into categories. We performed logistic regression  
195 analysis to examine the association between knowledge of components of the EBP model (questions  
196 related to whether patient values and clinical expertise are considered in the EBP model) and

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4 197 demographic characteristics of the respondent (age, sex, working time, and level of education). Results  
5 198 were considered statistically significant when  $p < 0.05$ . Odds ratios and their 95% confidence intervals  
6 199 were determined for each level of the independent variables. Odds ratios in this context describe the  
7 200 likelihood of demonstrating a particular behaviour and use (e.g., understanding that the EBP model  
8 201 comprises patient values) given a particular characteristic (e.g., age). One level of each demographic  
9 202 characteristic was used as the reference group against which the odds of demonstrating the behaviour  
10 203 and use at all other levels of the variable were measured. The reference group was the last category to  
11 204 allow the most salient interpretation of results. Confidence intervals provided information about the  
12 205 precision of the estimates. We chose to examine univariate rather than multivariate associations for  
13 206 presenting our data at its most simple level so as to have a foundation for future hypothesis testing.  
14 207 Data were exported from the SurveyMonkey and analysed with STATA software (25).  
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## 209 **Results**

### 210 **Respondent characteristics**

211 A total of 2000 physiotherapists constituted the number of potential survey questionnaire respondents.  
212 Based on this number, the response rate was moderate (1289/2000, 64.5%). The number of  
213 respondents was far higher than our target sample (n=323). The response rate decreased from Section 1  
214 to Section 3 due to the presence of conditional branching logic items (item 9 and item 25) in the survey  
215 questionnaire. The response rate for each completed section differed: 56% (n=1113) response rate for  
216 Section 1 (demographics); 42% (n=837) for Section 2 (knowledge of EBP); and 41% (n=818) for Section 3  
217 (use and perceived effectiveness of EBP). The sample included in each section is reported in Figure 1.  
218

219 [Figure 1]

220 **Figure 1.** Flow diagram of the study.

221  
222 The median age of the respondents was 35 years (IQR 28-47), and 52% were women. Around 60% of  
223 respondents worked in a private practice (653/1113) and 27% in a hospital (305/1113); 87% spent most  
224 of their work time in clinical practice (968/1113). **Table 1** presents the demographic characteristics of  
225 the sample.  
226

227 [Table 1]

228 **Table 1.** Sample Characteristics.

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### 230 **EBP Knowledge and ability to critically appraise literature**

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4 231 Two respondents skipped this section. A total of 1111 respondents answered the item investigating  
5 232 knowledge of EBP principles. The majority (85%) stated that they knew the EBP model. The most  
6 233 frequent channels for learning the principles of EBP were conferences/meetings (48%), distance and  
7 234 residential learning courses (35%), and advanced continuing professional educational courses (35%).  
8  
9 235 Only 23% of respondents stated they learned about EBP during their undergraduate studies  
10  
11 236 **(Supplementary file 2).**

12  
13 237 Regarding the sources physiotherapists consult to solve clinical problems, the majority of respondents  
14 238 stated that their preferred information channels were discussion with peers (80%) and literature search  
15 239 (86%); 30% stated that they relied on their own experience. In addition, 78% stated they felt competent  
16 240 about applying EBP, whereas 1.2% stated they felt completely unable to apply EBP. More than half  
17 241 (61%) were confident in their ability to critically appraise quality assessments of study design and  
18 242 statistical analysis. Many stated they understood the meaning of the terms “RCTs” (72%), “statistical  
19 243 significance” (65%), and “meta-analysis” (52%), but few could explain the terms “forest plot” (17%) and  
20 244 “confidence intervals” (38%) **(Table 2)**. In addition, while 82% correctly identified the best study design  
21 245 to evaluate an intervention only 20% were able to identify the result from the overall estimate of a given  
22 246 meta-analysis.

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31 248 [Table 2]

32 249 **Table 2.** Self-reported comprehension of terms (837 responded, 453 skipped).

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35 251 **Use and perceived effectiveness of EBP**

36 252 An overwhelming 90% of respondents agreed that EBP is useful, comprehensive of patient values, and  
37 253 effective, which demonstrated an overall positive attitude towards its use (90%). But while 90% knew  
38 254 that the scientific literature makes up part of the EBP, many respondents failed to consider the role of  
39 255 patients’ desire (56%) and clinical expertise (39%) as part of the EBP process (Figure 2).

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43 256  
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45 257 [Figure 2]

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47 258 **Figure 2.** Perceived knowledge of basic principles of EBP: patients’ desire, clinical expertise, and  
48 259 scientific literature.

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52 261 In a typical month, 59% of the respondents stated they read between 1 and 5 articles and only 9% said  
53 262 they did not. In addition, 55% stated that they make clinical decisions based on their scientific readings,  
54 263 80% expressed a need to increase their use of EBP, and 69% reported that it would benefit their career.  
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### 265 **Association between sample characteristics and EBP knowledge**

266 We found a statistically significant association between items related to how physiotherapists perceived  
267 EBP principles (patient values and clinical expertise) and sample demographic variables entered into the  
268 model (age, sex, working time, level of education) (**Table 3**). With regard to the questionnaire item on  
269 patients' values as part of the EBP model, young physiotherapists (age < 29 years) seemed to be more  
270 aware of patient's value in the EBP model than their older counterparts (age > 49 years) (odds ratio [OR]  
271 1.57, 95% confidence interval [CI] 1.02 - 2.42); being male increased the odds as well (OR 0.50, 95% CI  
272 0.38 – 0.67). Physiotherapists who work in patient care (e.g., clinical practices) were less likely to report  
273 they understood the EBP model (OR 0.99, 95% CI 0.98 – 0.99) than those who work in another setting.  
274 In contrast, respondents working in research (OR 1.02, 95% CI 1.01 – 1.03) and teaching (OR 1.01, 95%  
275 CI 1.002 – 1.02) were more likely to recognize patient's value as part of the EBP model, and respondents  
276 with a MSc degree (OR 2.06, 95% CI 1.31 – 3.21) were twice more likely than those without a MSc  
277 degree to recognize it. The same difference was observed for respondents with a higher academic  
278 degree (1st level Specialist Master's degree, OR 2.69, 95% CI 1.98 – 3.64; Doctor of philosophy, OR  
279 10.33, 95% CI 1.28 – 83.00).

280 Regarding the questionnaire item on clinical expertise as part of the EBP model, male respondents were  
281 more likely to include expertise in the EBP model (OR 0.65, 95% CI 0.49 – 0.86). Respondents working in  
282 patient care (OR 0.99, 95% CI 0.98 – 0.99) seemed less likely to understand the EBP model than  
283 respondents not working with patients (OR 0.65, 95% CI 0.49 – 0.86). Finally, having a higher academic  
284 degree (MSc, OR 2.16, 95% CI 1.31 – 3.58; 1st level Specialist MSc, OR 1.99, 95% CI 1.45 – 2.75) was  
285 associated with twice the likelihood of including clinical expertise in the EBP model (**Table 3**).

286

287 [Table 3]

288

289 **Table 3.** Association between actual knowledge of EBP and selected variables.

290

### 291 **Perceived barriers to using EBP in clinical practice**

292 Respondents stated that major barriers to applying EBP exist (570/815, 75%): lack of time and lack of  
293 ability to critically appraise the literature were rated as the top two barriers. Lack of time was ranked as  
294 the most important (Table 4).

295 [Table 4]

296 **Table 4.** Barriers to applying EBP in order of importance (%).

297

### 298 **Discussion**

**299 Main findings**

300 The questionnaire response rate of 64.5% (1289 physiotherapists out of 2000 invited) was higher than  
301 the required sample size of 370, and so can be considered representative of physiotherapists belonging  
302 to the AIFI. Overall, the respondents stated they held a positive attitude towards EBP and that their  
303 knowledge about it was extensive. The majority overrated their knowledge, however, and demonstrated  
304 a shallow awareness of EBP compared to the original model described by David Sackett. (26) The gap  
305 between perceived and actual knowledge of EBP is relevant and can result in inadequate practice,  
306 potentially increasing the risk “to over-egg the pudding”, which indicates the need to achieve the right  
307 balance in health care. (27)

308 Our survey findings are similar to those obtained from American physiotherapists 15 years ago (12) and,  
309 more recently, from Ghanaian physiotherapists who demonstrated an inadequate knowledge of EBP  
310 (14). In contrast, Brazilian physiotherapists showed that they were better acquainted with EBP since  
311 they included patient preferences as part of the decision-making process (15). In Europe, Swedish  
312 physiotherapists consider patient preferences when treating according to guidelines, and so adhere to  
313 the EBP process(28). However, the international context in which physiotherapists deliver health care  
314 might differ from the scenario in Italy, where direct access is not yet completely implemented and fewer  
315 years of study than in other countries are required for qualifying as a physiotherapist. (29, 30)

316 In our sample, younger respondents were noted to be more familiar with EBP than their older, more  
317 experienced colleagues. Our findings are shared by similar observations that the level of EBP knowledge  
318 is influenced by the time since school graduation. In general, recent graduates are more likely to follow  
319 EBP than physiotherapists with more clinical experience. (11) We also observed that EBP knowledge  
320 differed depending on the respondent’s level of education and workplace setting. (11-13) Indeed,  
321 personal and organizational characteristics can significantly influence attitudes, beliefs, use of EBP, and  
322 perceived support. (31)

323 Of the total of respondents with a Bachelor’s degree, only one fifth had received education in EBP. The  
324 levels of education most closely associated with greater EBP knowledge are the graduate and  
325 postgraduate levels. The teaching of EBP principles in undergraduate courses remains scarce, although it  
326 is widely considered essential for improving the quality of health care and patient outcomes. In many  
327 countries, studies have highlighted that physiotherapists require more training in EBP in order to acquire  
328 confidence in using it; (11) however, the teaching of EBP-oriented skills in undergraduate physiotherapy  
329 programmes began only two decades ago. (32-34) Since then, EBP has been increasingly integrated into  
330 the core curriculum of undergraduate and postgraduate health care programs and continuing  
331 professional education. (35-37) Italy is no exception: the teaching of EBP became an integral part of the  
332 core curriculum of physiotherapy in 2005. (22) This statement is consistent with our study’s finding that  
333 younger Italian physiotherapists (age <29 years) are more likely to hold positive attitudes towards EBP,  
334 which indicates that EBP will be more widely adopted by future generations of physiotherapists.



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4 335 Moreover, better informed knowledge, use, and attitudes towards EBP may be most strongly associated  
5 336 with completion of a Master's degree program, whereas short, continuing professional educational  
6 337 courses have limited effectiveness. Accordingly, it might be appropriate to support access to Master's  
7 338 degree courses at the national level and to improve the quality of short training courses and structure  
8 339 them on EBP principles.

10 340 The perceived and actual knowledge and the use of evidence from the scientific literature differed  
11 341 among respondents. While the majority felt able to conduct a literature search and to critically appraise  
12 342 the statistical analysis in a scientific article, few demonstrated that they understood the results of a  
13 343 meta-analysis from a given forest plot. Nevertheless, the respondents appeared to have great  
14 344 confidence in the authority of published scientific literature and stated that their clinical decisions rarely  
15 345 relied on their experience alone: the attitude and the attempt to introduce findings from the scientific  
16 346 literature in the clinical context is congruent with their positive attitude towards EBP.

17 347 The discrepancy between actual knowledge and practice of EBP could be a consequence of the myriad  
18 348 information sources accessible in scientific databases and non-scientific channels, such as Doctor Google  
19 349 or social networks. Health care professionals, including physiotherapists, need to develop their  
20 350 analytical skills to confront this overabundance of information in their professional life: exercise a  
21 351 careful selection of what to read and what not to for both quality and quantity. (38) Indeed, three  
22 352 quarters of our respondents perceived barriers that limit their ability to critically appraise the literature.  
23 353 (11-13, 28, 39, 40)

24 354

### 25 355 **Strengths and limitations**

26 356 This is the first study to examine perceived and actual knowledge of EBP among physiotherapists in Italy.  
27 357 Although the response rate was high-moderate (64.5%), the study has several limitations that need to  
28 358 be considered when analysing the results. First, our sample included only AIFI members who may not be  
29 359 representative of the entire population of Italian physiotherapists, as it might be that AIFI members are  
30 360 more likely to participate in a survey about their profession. Moreover, respondents, as AIFI members,  
31 361 were perhaps more open towards EBP but overestimated their knowledge: the self-reported nature of  
32 362 the data might have influenced the gap between perceived and actual knowledge. This gap constituted  
33 363 a small part of the broader scope of the study, the aim of which is to test our preliminary hypothesis  
34 364 about the gap and to provide a concise snapshot view that can be better assessed by validated  
35 365 instruments, such as the Fresno Test or the Berlin Questionnaire, in a future study,. (41, 42)

36 366 Nonetheless, before the professional registry of Italian physiotherapists was established in 2018, the  
37 367 AIFI was the only professional society for physiotherapists in Italy and was not constituted as a scientific  
38 368 society. Second, sending out only one reminder to participate in the survey might have limited the  
39 369 number of potential respondents. A potential non response bias might have affected the results and  
40 370 interpretation of this cross-sectional study. Factors such as questionnaire length, the term "survey" in



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4 371 the text of the e-mail, and the non-inclusion of incentives might have influenced the rate response: a  
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6 372 Cochrane review showed a lower odds of response in such situations. (43)  
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8 373 That said, the final percentage of respondents did not seem to bias our results, as we reached the  
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10 374 planned sample target down to the final survey questionnaire items. Third, we dichotomized the  
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12 375 dependent variables, conflating all responses into positive/negative categories. This might have resulted  
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14 376 in a loss of some information, though we replicated what previous studies of the same design have done  
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16 377 (12) in order to report useful findings. Finally, the accuracy of data on perceived knowledge is uncertain  
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18 378 as the data were collected via a self-reported survey.

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### 380 **Implication for research, practice and education**

381 We believe that research can help to increase the dissemination of knowledge about and the adoption  
382 of EBP among physiotherapists. A focus for future research should be to concentrate efforts in  
383 conducting high-quality research and teaching master classes devoted to EBP topics (44) and promoting  
384 research learning programmes as knowledge translation interventions to improve the use of EBP and  
385 clinical practice guidelines (CPGs) in physiotherapy. (45) CPGs, defined as “systematically developed  
386 statements to assist practitioner and patient decisions about appropriate health care for specific clinical  
387 circumstances” (definition adopted by the European Region of the World Confederation for  
388 Physiotherapy), can be used to bridge the research-to practice gap and promote EBP and present  
389 research findings to clinicians in a synthetic format without missing any elements of the EBP model. (9)  
390 CPGs based on the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE)  
391 approach are conducted in a standardized and transparent manner: GRADE rates the quality of evidence  
392 and provides the strength of recommendations by considering the “estimates of effect for desirable and  
393 undesirable outcomes of interest”, the “confidence in the estimates of effect”, the “estimates of values  
394 and preferences”, and the “resource use”. (46) This approach helps readers interpret a CPG and  
395 enhances CPG adherence by health professionals. In some countries, professional liability is legally  
396 regulated and great importance placed on adherence to CPGs in clinical practice; compliance with CPGs  
397 is an element in attributing professional responsibility in adverse events. Furthermore, to improve  
398 physiotherapist adherence to CPGs, computerized decision support systems could provide actionable  
399 recommendations or management options that are intelligently filtered or presented at appropriate  
400 times to improve efficiency in health care. (47)

401 For these reasons, both national and international initiatives are warranted for the implementation of  
402 CPGs in physiotherapy. The production of CPGs, or at least a synthesis of the evidence underpinning  
403 them, could be (and is to some extent) coordinated on a national level, while implementation may be  
404 more suitable for local adaptation. (48) For instance, the recently created Italian National Guidelines  
405 System (49) includes a list of scientific societies that can contribute to drafting CPGs (including the AIFI),  
406 a process based on the GRADE method for the production, adaptation, and updating of CPG. By

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4 407 searching this database, health care professionals can find continuously updated CPGs and good quality  
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6 408 practices.  
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8 409 We appeal for a critical use and appraisal of EBP. EBP should be included in the professional education  
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10 410 of physiotherapists and introduced at the undergraduate curriculum. Investing in the training of  
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12 411 physiotherapists is essential for growing the skills of critical appraisal of evidence-based physiotherapy  
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14 412 and a key means to reduce the waste created by obsolete, futile or harmful interventions. (8) For  
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16 413 instance, initiatives such as INQUIRE (INcreasing QUality In patient-oriented academic clinical Research)  
17  
18 414 have designed a roadmap that provides guidance for academics and researchers in developing quality  
19  
20 415 enhancement initiatives. (50) The PEAK (The Physical therapist-driven Education for Actionable  
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22 416 Knowledge translation) educational program was designed to promote the integration of research  
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24 417 evidence from physiotherapy into clinical decision making. (19, 51, 52) Finally, engaging in research can  
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26 418 contribute to being an attractive employer and boost the application of EBP. (13) Promoting  
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28 419 professional education is key to minimize “the mismatch between what clinical researchers do and what  
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30 420 patients need”. (53)  
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7  
8 423 Negri for assisting in data collection, the physiotherapists who participated in the  
9  
10 424 survey.

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15 427 **Declarations**

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19 429 **Ethical approval:** We conducted this study in compliance with the principles outlined  
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21 430 in the Declaration of Helsinki. The survey questionnaire was filled out anonymously,  
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23 431 and responses could not be traced back to respondents. Written, informed consent  
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25 432 was assumed if the respondents completed and submitted the survey after reading the  
26  
27 433 purpose statement of the study. Ethics approval was not required.

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30 435 **Availability of data and material:** All data generated or analysed during this study are  
31  
32 436 available at [https://osf.io/8xb6p/?view\\_only=1c6fd76403c04a82942799b9dee952c8](https://osf.io/8xb6p/?view_only=1c6fd76403c04a82942799b9dee952c8) .

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34  
35 438 **Authors' contributions:** SG and GC were primarily responsible for study conception  
36  
37 439 and design and for data analysis and interpretation. All authors (SG, GC, DC, SC) had  
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39 440 full access to all of the data in the study and take responsibility for the integrity of the  
40  
41 441 data and the accuracy of the data analysis. DC led the writing of the first draft of the  
42  
43 442 manuscript. DC and SC authors contributed to drafting and revising the manuscript. SG  
44  
45 443 is the guarantor. All authors (SG, GC, DC, SC) read and approved the final manuscript.

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594 **Table 1.** Sample Characteristics.

Characteristic*		Frequency (%)
Sex (n=1289)	Male	48
	Female	52
Age, yrs (n=1289)	<29	28
	29-38	31
	39-49	18
	>49	23
Workplace** (n=1113)	Private office	59
	Teaching hospital	7
	Hospital	20
	Nursing home	15
	Unemployed	2
	Other	17
Working time spent in: (average) (n=1113)	Clinical practice	87
	Research	11
	Teaching	6
	Management/Leadership	2

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596 \*The absolute number of respondents varies for each variable due to missing data.

597 \*\*Percentage may exceed 100% because some items allowed more than one answer



598 **Table 2.** Perceived knowledge of terms (837 responded, 453 skipped).

	<b>Understood and could explain No. (%)</b>	<b>Understood somewhat No. (%)</b>	<b>Did not understand No. (%)</b>	<b>Unknown No. (%)</b>
<i>Randomized- controlled trials</i>	604 (72)	192 (23)	41 (5)	0 (0)
<i>Meta-analysis</i>	439 (52)	304 (37)	86 (10)	8 (1)
<i>Relative risk</i>	250 (30)	428 (51)	135 (16)	24 (3)
<i>Statistical significance</i>	543 (65)	246 (29)	41 (5)	7 (1)
<i>Forest plot</i>	144 (17)	197 (24)	147 (17)	349 (42)
<i>Intention to treat</i>	255 (30)	223 (27)	167 (20)	192 (23)
<i>Confidence interval</i>	316 (39)	271 (32)	176 (18)	104 (11)

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600 **Table 3.** Association between actual knowledge of EBP and selected variables. References categories are reported in legend.

	Characteristics		Odds ratio (95% CI)	Model P*	
In your opinion, are patients' values and preferences a part of the EBP model?	<b>Age (yrs)<sup>a</sup></b> (n=818)	<29	1.57 (1.02 - 2.42)**	0.001	
		29-38	1.03 (0.66 - 1.59)		
		39-49	0.68 (0.39 - 1.17)		
		>49	Reference		
	<b>Sex<sup>b</sup></b> (n=818)	Female	0.50 (0.38 - 0.67)**	0.000	
		Male	Reference		
	<b>Working time<sup>c</sup></b>	(n=814)	Patient care	0.99 (0.98 - 0.995)**	0.002
		(n=567)	Research	1.02 (1.01 - 1.03)**	0.001
		(n=609)	Teaching	1.01 (1.002 - 1.02)**	0.015
		(n=492)	Management	1.00 (0.98 - 1.02)	0.62
	<b>Level of education<sup>c</sup></b>	(n=818)	Bachelor's degree	1.04 (0.75 - 1.45)	0.81
			Master of Science degree	2.06 (1.31 - 3.21)**	0.001
			1st level Specialist Master's degree	2.69 (1.98 - 3.64)**	0.000
2nd level Specialist Master's degree			0.84 (0.14 - 5.07)	0.85	
Advanced continuing professional education			1.06 (0.80 - 1.42)	0.67	
Doctor of philosophy (PhD)			10.33 (1.28 - 83.00)**	0.005	
Distance and residential learning course			1.00 (0.75 - 1.34)	0.99	
Conferences/Meetings	1.40 (1.06 - 1.85)**	0.015			
In your opinion, is clinical	<b>Age (yrs)<sup>a</sup></b> (n=818)	<29	1.43 (0.93 - 2.21)	0.11	
		29-38	1.00 (0.65 - 1.55)		

expertise a part of the EBP model?		39-49	0.97 (0.57 - 1.64)			
		>49	Reference			
	<b>Sex<sup>b</sup></b>	(n=818)	Female	0.65 (0.49 – 0.86)**	0.008	
			Male	Reference		
	<b>Working time<sup>c</sup></b>	(n=814)	Patient care	0.99 (0.98 – 0.99)**	0.032	
			(n=567)	Research	1.01 (0.99 – 1.02)	0.24
			(n=609)	Teaching	1.01 (0.99 – 1.02)	0.14
			(n=492)	Management	0.98 (0.97 – 1.01)	0.32
	<b>Level of education<sup>c</sup></b>	(n=818)	Bachelor's degree	1.25 (0.89 – 1.76)	0.19	
			Master of Science degree	2.16 (1.31 – 3.58)**	0.002	
			1st level Specialist Master's degree	1.99 (1.45 – 2.75)**	0.000	
			2nd level Specialist Master's degree	0.97 (0.16 – 5.86)	0.98	
			Advanced continuing professional education	0.90 (0.67 – 1.21)	0.49	
Doctor of philosophy (PhD)			0.26 (0.65 – 42.27)	0.06		
Distance and residential learning course			1.08 (0.80 – 1.45)	0.61		
		Conferences/Meetings	1.20 (0.91 – 1.59)	0.20		

601 **Legend:**

602 \* Chi-square test

603 \*\* Statistically significant ( $p < 0.05$ )

604 <sup>a</sup> Odds ratio calculated using the variable >49 years as reference.

605 <sup>b</sup> Odds ratio calculated using the variable male as reference.

606 <sup>c</sup> Odds ratio calculated as the ratio between the odds in the presence of characteristics variable against the odds in the absence of the variable. (i.e., characteristic: working time; variable: patient care. The odds ratio is the ratio between the odds of working in patient care against the odds of not working in patient care).

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- 609 First level master's degree: equivalent to postgraduate diploma: program for which a bachelor's degree is a prerequisite.
- 610 Second level master degree: postgraduate level for which a master of science degree is a prerequisite.
- 611 Advanced continuing professional education: postgraduate certification
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For peer review only

624 **Table 4.** Barriers to applying EBP in order of importance (%).

Type of barrier	Order of importance from the most to the least (%)									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10
Lack of interest	10.7	8.3	5.6	6.9	6.2	7.0	10.2	10.7	10.7	23.7
Applicability of EBP findings to clinical practice	11.1	12.8	9.7	8.4	13.5	9.8	9.5	8.8	7.6	8.8
Lack of time	23.0	13.2	15.1	10.0	9.0	9.0	5.8	5.5	5.8	3.7
Difficulty in searching literature in databases	9.5	11.8	14.4	15.1	13.7	14.6	10.5	7.6	0.0	0.9
Difficulty in critically appraising literature and statistical analysis	9.7	17.8	16.5	16.7	16.9	9.3	6.0	4.0	2.1	1.1
Difficulty applying literature findings to individual patients	9.5	11.4	12.7	14.1	12.7	16.9	11.3	5.6	5.5	0.5
Lack of financial and organizational support (computer, access to databases)	8.4	7.4	8.6	8.8	8.8	10.5	20.6	12.8	7.4	6.7
Workplace does not use EBP	12.0	11.3	9.7	9.8	9.8	9.5	10.0	17.8	6.0	4.2
Language of scientific publications	4.8	3.0	5.1	6.3	7.4	8.6	10.0	15.6	30.8	8.4
Unfamiliarity with using the computer/technology	1.4	3.2	2.6	3.9	2.1	4.8	6.2	11.6	22.3	42.0

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630 **Figure Legend**

631 **Figure 1.** Flow diagram of the study.

632 **Figure 2.** Perceived knowledge of the basic principles EBP: patients' values, clinical  
633 expertise, and scientific literature.

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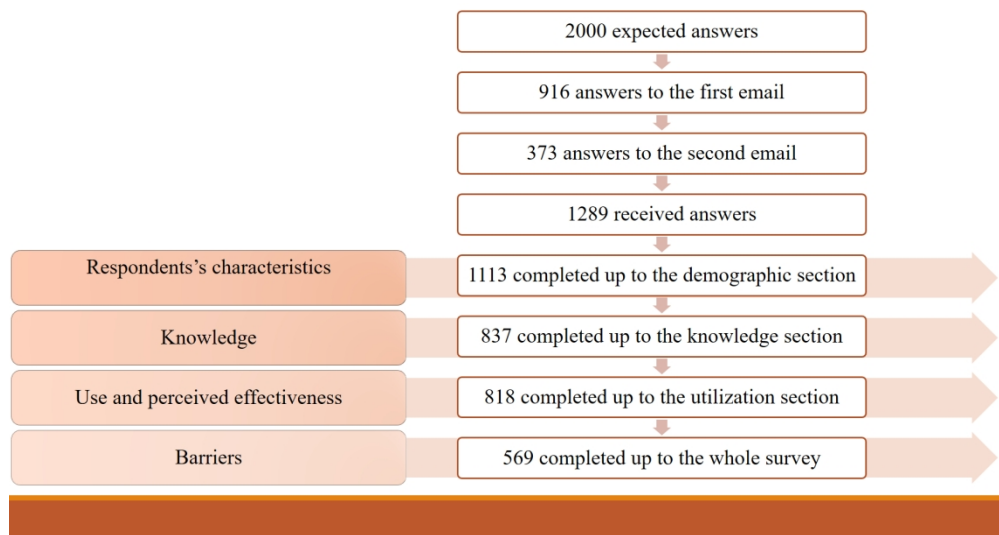
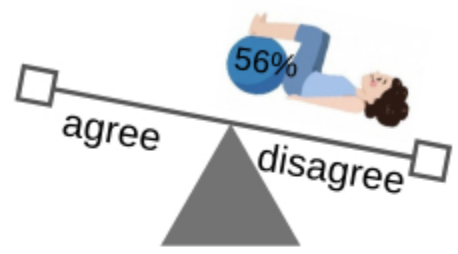


Figure 1.

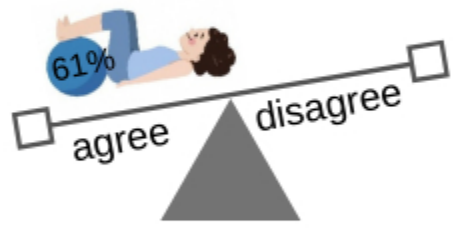
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In your opinion, the preferences of patients are included in the EBM model?(item 18)



In your opinion, the clinical experience is included in the EBM model? (item 19)



In your opinion, the scientific literature is useful in your clinical practice? (item 20)

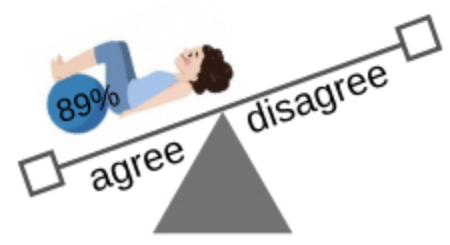


Figure 2.

## **Evidence-Based Practice (EBP) Questionnaire<sup>a</sup>**

### **SECTION 1. General information**

*For the following items, place a mark x in the appropriate box next that indicates your response.*

1. What is your sex?

Male

Female

2. What is your age? \_\_\_\_\_

3. Where did you acquire the license to practice as Physiotherapist (PT)?

Italy

Abroad

4. In which Italian region did you acquire your physiotherapist's degree (degree or equivalent title)?

\_\_\_\_\_

5. In which University (eg., Università degli Studi di Genova) o other (e.g., Scuola Dirette ai Fini Speciali/Scuole Regionali) did you acquire your PT title?

\_\_\_\_\_

6. When did you acquire your title to practice as physiotherapist (e.g., 2005)

\_\_\_\_\_

7. Where did you mostly practice your profession?

Private practice

Research Hospital

Clinical Hospital

Residential and nursing home

Unemployed (e.g. student)

Others \_\_\_\_\_

8. Please indicate the percentage of your total work time that you spend in each type of activity during an average month.

a) Patient care  %

b) Research  %

c) Teaching  %

d) Management (as Director)  %

### **SECTION 2. Knowledge of EBP principles**

9. Do you know the Evidence Base Practice (EBP) model?

Yes  No

10. Where did you learn the foundations of EBP

Bachelor's degree

Master of Science degree

1st level Specialist Masters degree

2nd level Specialist Masters degree



- 1  
2  
3     ○ Advanced continuing professional education  
4     ○ Doctor of philosophy (PhD)  
5     ○ Distance and residential learning course  
6     ○ Conferences/Meetings  
7

8 11. When you did not know how to manage a clinical issue, how did you behave?

- 9  
10     ○ I rely on my experience  
11     ○ I discuss with colleagues  
12     ○ I consult the scientific literature  
13     ○ It has never happened  
14

15 12. I'm able to launch search strategies for finding research relevant to my practice (e.g., Pubmed)

- 16              Strongly Disagree              Disagree              Neutral              Agree              Strongly Agree  
17

18 13. I am confident in my ability to critically review the literature (quality assessment, statistical and clinical significance).

- 19              Strongly Disagree              Disagree              Neutral              Agree              Strongly Agree  
20  
21  
22

23 *For the following item, place a mark v in one box in the row for each term.*

24 14. My understanding of the following terms is:

25	26	27	28
Term	Understand Completely	Understand Somewhat	Do Not Understand
29 a) Randomized controlled trial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30 b) Meta-analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31 c) Relative risk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32 d) statistical significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33 e) Forest plot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34 d) Intention to treat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35 f) Confidence interval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

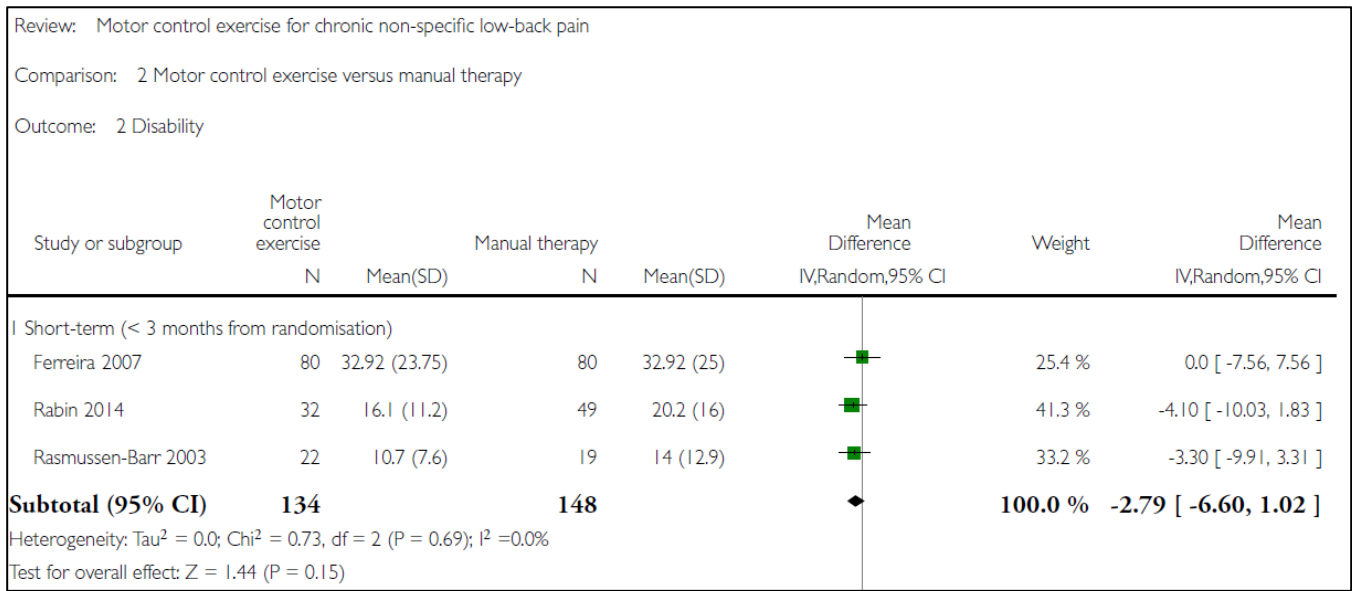
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40 15. In your experience, which is the best study design to assess the efficacy of a rehabilitative intervention?

- 41     ○ Case report/case series  
42     ○ Cohort observational study  
43     ○ Case – control observational study  
44     ○ Controlled clinical study  
45     ○ Randomized controlled clinical study  
46     ○ I don't know  
47  
48  
49

50  
51 16. A systematic review, comparing exercise versus manual therapy in acute low back pain for reducing disability at 3 months of follow-up, reports the following result (please, see the figure below). What is your interpretation?

- 52  
53     ○ I don't know  
54     ○ Exercise is more efficacious than manual therapy  
55     ○ Exercise is less efficacious than manual therapy  
56  
57  
58

- Both have the same efficacy



### SECTION 3: Personal attitudes toward, use of, and perceived benefits and limitations of EBP.

For the following items, place a mark x in the appropriate box that indicates your response.

- Application of EBP is necessary in the practice of physiotherapy.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- EBP takes into account the patient's preferences and values.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- EBP takes into account the clinical experience.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- Literature and research findings are useful in EBP in my daily practice.
  - Strongly disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- Read/review research/literature related to my clinical practice (a typical month).
  - Never
  - 1–5 articles
  - 6–10 articles
  - 11–15 articles
  - 16 articles
- Use literature and research findings in the process of clinical decision making (a typical month).
  - Never
  - few times
  - the majority of times
  - always
- I need to increase the use of EBP in my daily practice.
  - Strongly Disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree
- My career will benefit from a more uptake of EBP into my clinical practice.
  - Strongly Disagree
  - Disagree
  - Neutral
  - Agree
  - Strongly Agree

**SECTION 4: Barriers of EBP.**

25. Do you think there are limitations in using EBP in clinical practice?

- Yes       No       Do Not Know

*For the following items, rank from 1 to 10 by placing numbers in the appropriate boxes (1 most important).*

26. Rank from 1 (most important) to 10 (least important) the barriers to the use of EBP in your clinical practice.

- The adoption of EBP is inapplicable in physiotherapy
- Insufficient time
- Lack of instrumental resources in my facility (PCs, free scientific databases)
- Poor ability to use the computers/techonology
- Poor ability to systematically search the literature
- Poor ability to critically appraise the literature
- Lack of generalizability of the literature findings to my patient population
- Lack of understanding English language
- Lack of collective support among my colleagues in my facility, lack of a stimulating environment
- Lack of interest

<sup>a</sup> The questionnaire published by Jette et al. 2003 was adapted by the authors and contains elements as reported by McColl et al.

**Supplementary file 2.** Responses to question regarding the contribution of education to learning the principles of EBP (837 answered, 453 did not).

	<b>A lot</b>	<b>A little</b>	<b>Not at all</b>	<b>Omitted</b>
	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>
<i>Bachelor's degree</i>	194 (23)	409 (49)	201 (24)	33 (4)
<i>Master's of Science degree</i>	93 (11)	61 (7)	18 (2)	665 (79)
<i>1st level Specialist Master's degree</i>	256 (31)	60 (7)	18 (2)	503 (60)
<i>2nd level Specialist Master's degree</i>	(1)5	8 (1)	11 (1)	813 (97)
<i>Advanced continuing professional education</i>	293 (35)	187 (22)	31 (4)	326 (39)
<i>Doctor of philosophy (PhD)</i>	9 (1)	8 (1)	14 (2)	806 (96)
<i>Distance and residential learning course</i>	292 (35)	272 (32.5)	39 (4.7)	234 (28)
<i>Conferences/Meetings</i>	404 (48)	354 (42)	30 (4)	49 (6)

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## Checklist items for reporting survey research.

	<b>Section &amp; Topic</b>	<b>Reported on page #</b>
	<b>Background</b>	
1	Justification of research method	5-6
2	Background literature review	5-6
3	Explicit research question	5-6
4	Clear study objectives	5-6
	<b>Methods</b>	
5	Description of methods used for data analysis	9
6	Method of questionnaire administration	7-8
7	Location of data collection	6-7
8	Dates of data collection	6-7
9	Number and types of contact	6-7
10	Methods sufficiently described for replication	6-8
11	Evidence of reliability	7
12	Evidence of validity	7
13	Methods for verifying data entry	na
14	Use of a codebook	na
15	Sample selection	7
16	Sample size calculation	7
17	Representativeness	7
	<b>Method of sample selection</b>	
18	Description of population and sample frame	7
19	Research tool	7-8
20	Description of the research tool	7-8
21	Description - development of research tool	7-8
22	Instrument pretesting	Na
23	Instrument reliability and validity	Na
24	Scoring methods	7-8
	<b>Results</b>	
25	Results of research presented	10-14
26	Results address objectives	10-14
27	Clear description - results based on part sample	10-14
28	Generalisability	10-14
	<b>Response rates</b>	
29	Response rate stated	10
30	How response rate was calculated	10
31	Discussion of nonresponse bias	17
32	All respondents accounted for	
	<b>Interpretation and discussion</b>	
33	Interpret and discuss findings	14-17
34	Conclusions and recommendations	14-17
35	Limitations	17
	<b>Ethics and disclosure</b>	
36	Consent	6
37	Sponsorship	20
38	Research ethics approval	20
39	Evidence of ethical treatment of human subjects	Na

PLoS Med. 2010 Aug;8(8):e1001069. doi: 10.1371/journal.pmed.1001069. Epub 2011 Aug 2. Reporting guidelines for survey research: an analysis of published guidance and reporting practices. Bennett C1, Khangura S, Brehaut JC, Graham ID, Moher D, Potter BK, Grimshaw JM.