Scandinavian Journal of Occupational Therapy

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/iocc20

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To cite this article: Desirée Valera-Gran, Irene Campos-Sánchez, Daniel Prieto-Botella, Paula Fernández-Pires, Miriam Hurtado-Pomares, Iris Juárez-Leal, Paula Peral-Gómez & Eva María Navarrete-Muñoz (2024) Enhancing evidence-based practice into healthcare: Exploring the role of scientific skills in occupational therapists-, Scandinavian Journal of Occupational Therapy, 31:1, 2323205, DOI: 10.1080/11038128.2024.2323205

To link to this article: https://doi.org/10.1080/11038128.2024.2323205

Published online: 06 Mar 2024.

SCANDINAVIAN JOURNAL OF OCCUPATIONAL THERAPY
2024, VOL. 31, NO. 1, 2323205
https://doi.org/10.1080/11038128.2024.2323205

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RESEARCH ARTICLE

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Enhancing evidence-based practice into healthcare: Exploring the role of scientific skills in occupational therapists-

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ABSTRACT

Background: Research utilization and evidence-based practice (EBP) in occupational therapy rely on essential scientific skills. Despite prior research exploring factors influencing EBP, a gap remains in understanding the specific scientific competencies crucial for effective EBP application.

Objectives: To (1) describe the level of scientific skills for EBP and research application, and (2) investigate the factors influencing higher scientific competence among 1159 Spanish-speaking occupational therapists.

Material and Methods: We assessed the scientific skills using the HACTO-Screen online survey. Recruitment was conducted through a non-probability convenience sampling method between April to June 2020, using social networks and email dissemination to education and professional organizations in Spain and Spanish-speaking Latin American countries.

Results: Out of a total score of 115 points, participants showed a moderate level of scientific skills (mean: 62.7, SD: 21.6), with literature searching skills ranking the highest and scientific writing skills ranking the lowest. Associations were found between greater scientific competence and advanced degrees, ongoing research training, and on-the-job research.

Conclusions: Continuous research training, higher academic degrees, and active research engagement are essential for enhancing scientific competence among occupational therapists.

Significance: Targeted training to enhance scientific skills and promote research utilization are crucial in advancing EBP in occupational therapy.

ARTICLE HISTORY
Received 28 September 2023
Revised 17 January 2024
Accepted 21 February 2024

KEYWORDS
Evidence-informed practice; occupational therapy practice; ongoing research training; research competence; research utilization

Introduction

Evidence-based practice (EBP) has become a core competency in healthcare education programs worldwide [1], including occupational therapy education programs [2–5]. EBP provides a science-driven approach to clinical decision-making underpinned by research evidence, clinical knowledge, practice context, and patients' preferences and values [6]. Importantly, the aim of this approach is to implement the best practice in achieving optimal care delivery outcomes [4]. Currently, there is a wide variety of EBP models and frameworks [7], although all build on the five-step process created by Sackett, in which health practitioners should: (1) formulate a question from the need for specific clinical information; (2) find the best evidence to answer the question; (3) critically appraise the validity and usefulness of the evidence; (4) integrate the appraised evidence into clinical practice; and (5) evaluate the process and outcomes got from the clinical performance [8]. However, while an apparently simple process, EBP is in fact a complex and multifaceted phenomenon that depends on a wide variety of factors, including both individual and organizational characteristics [9–11].

There are several studies that have examined the factors that can act as obstacles or catalysts in

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implementing EBP in occupational therapy [9,11–21]. From an individual perspective, the practice of evidence-based methods in occupational therapy seems to rely on several personal factors, such as knowledge, attitudes, and confidence [9,11,12,15,18,22,23]. Major challenges include difficulties in critically appraising scientific literature and research analysis, a lack of confidence in translating research findings into practice, and divergent views on the relevance and applicability of scientific evidence in practical settings [11,15,20,22,24,25]. Another important barrier is that occupational therapists traditionally give preference to their own clinical expertise acquired using a trial-error approach rather than empirical healthcare evidence [11,18,20,26,27]. As for organizational factors, putting to use evidence in clinical settings can particularly be conditioned to the resources and workplace environment. Some studies have shown that support from organizational managers, recognition for applying evidence-based practices, participating in ongoing professional development activities, and access to scientific literature and research resources can enhance integrating EBP in occupational therapy practice [6,14–16,20,24,27,28]. Conversely, it was found that high patient caseload, time limitations, difficulties in finding evidence, and inadequate role models negatively affect the adoption and utilization of EBP [6,11,15,20,24,27–30]. Overall, the existing literature recognized that the varying state of EBP proficiency, as well as its implementation and sustained utilization over time, continue to pose significant challenges for occupational therapists [6,9,11,14,15,18,21,26].

In addition to the factors influencing the implementation of EBP in occupational therapy interventions, it is important to consider the development of EBP skills throughout a healthcare professional's career. The acquisition of EBP skills begins during university education, where occupational therapy education programs play a crucial role in cultivating these competencies. These programs aim to equip students with the knowledge, skills, and abilities necessary to critically evaluate and apply research evidence in clinical decision-making, aligning with the steps outlined by Sackett's EBP process [8]. Through coursework and practical training, students learn to formulate answerable clinical questions, search for and appraise relevant scientific literature, synthesize the evidence, and apply it to their practice [31]. This foundational training serves as the building blocks for future EBP proficiency in the field of occupational therapy.

Furthermore, the development of EBP skills is not limited to the undergraduate level. Continuous training and lifelong learning are recommended for healthcare graduates to support the ongoing acquisition and refinement of knowledge and skills needed to ensure effective care [7,32]. As occupational therapists progress in their careers, they have the opportunity to further enhance their EBP competencies through professional development activities, access to scientific literature and research resources, and participation in interdisciplinary collaborations. These ongoing efforts contribute to the evolution of EBP skills and the integration of best practices into occupational therapy practice.

Study aim

The present study had a twofold aim. First, we aimed to describe the level of scientific skills required for research use and implementation of EBP as reported by Spanish-speaking occupational therapists. This involved assessing their proficiency in various aspects of scientific research, including evidence-based practice, literature searching, methods and statistics, scientific writing, and scientific dissemination. Second, we aimed to investigate the factors that contributed to higher scientific competence among occupational therapists. By examining sociodemographic factors, academic and professional backgrounds, and research experience, we sought to understand the predictors of higher scientific skills.

Material and methods

Study design

The HACTO-Screen is an online survey designed to evaluate scientific skills of occupational therapists, specifically targeting Spanish-speaking participants. This survey is a part of a research training program, the HACTO (HAbilidades Científicas en Terapeutas Ocupacionales [Scientific Skills in Occupational Therapists]) project. Additional details regarding the project are available at https://hacto.umh.es. The survey, developed following the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [33], also aims to identify their self-reported gaps in research knowledge and training and development needs for research competence. Specifically, the questionnaire included 58 closed- and open-ended questions divided into four sections: personal data (i.e. sociodemographic, academic, and professional background); assessment of scientific skills; analysis of research training and development needs; experience as a researcher and/or academic. It can be completed in approximately 10–15 min.

To ensure the accuracy and validity of the questionnaire, a rigorous development process was implemented. The initial version of the questionnaire was developed by the research team and then reviewed by a panel of seven graduates in occupational therapy with research training. Their role was to detect likely grammatical and phrasing mistakes, typos, and to enhance the clarity of each item in the questionnaire. Based on their feedback, the questionnaire was further refined, resulting in a clearer organizational structure and improved understanding of the questions. The published study protocol of the HACTO-Screen [10] provides a detailed overview of the survey's design process, items, and final structure.

Participants

The recruitment of study participants was performed online through a non-probability convenience sampling method between April and June 2020. To enhance the recruitment, we started an advertising campaign to promote the study using social networks. In addition, we emailed the study information to education and professional organizations of occupational therapy from Spain and Spanish-speaking Latin American countries. Further information about the campaign and study's promotion materials were described elsewhere [10]. After checking all collected information, we excluded survey responses from participants who did not have a degree in Occupational Therapy (i.e. undergraduate students or allied healthcare professions) or if they did not provide written consent to participate. Final study sample included 1159 participants.

Assessment of scientific skills

Within the HACTO-Screen, scientific skills were assessed using a refined and extended version of the Practice-Oriented Research Training (PORT) program assessment tool created for physical and occupational therapists [34]. We designed a self-reported questionnaire comprising 23 items that evaluate different scientific/research skills [10]. Each item can be rated on a five-point scale, ranging from one (i.e. need further basic instruction) to five (i.e. able to perform independently and show improvement-seeking motivation). The individual scores for each item and the cumulative score can be computed by adding up the corresponding values assigned to each item. Higher scores involve enhanced research performance, with a maximum achievable total score of 115 points.

A face validation process was conducted by a panel of experts in research training to ensure the accuracy and validity of the questionnaire. Their expertise and input helped ensure that the questionnaire items adequately captured the intended scientific/research skills. In addition, the internal consistency of the measure was assessed by estimating Cronbach's alpha coefficient. The obtained value of Cronbach's alpha for the questionnaire was 0.955, showing strong internal consistency. This high value suggests that the items in the questionnaire were highly correlated and consistent in measuring scientific competence.

In the interest of research, we classified the items into different ad hoc categories: EBP (items 1, 3, 22, 23), literature searching (items 2, 4, 5), methods and statistics (items 6–12), scientific writing (items 14–17, 20), and scientific dissemination (items 13, 18, 19, 21). After estimating the total score and subscores for each category, we categorized the participants based on the tertiles of scientific skills for the present analysis.

Covariates

The HACTO-Screen survey also collected information about sociodemographic data, academic and professional background, and experience as a researcher and/or academic. For the analysis, we considered the following covariates: sex (woman, man), age (years), country (Spain, other), academic studies (3-year bachelor's degree, 4-year bachelor's degree, master's degree, doctoral degree), years since completing bachelor's degree (>10, 5–10, <5), working status (employed, unemployed), doing research during working hours (no, yes), and research training courses completed during the last year (0, 1–3, >3).

Statistical analysis

The statistical analysis was performed using R software version 4.2.0 (R Foundation for Statistical Computing, Vienna, Austria; http://www.R-project.org). All statistical tests were bilateral and the significance level was established at 0.05. Before conducting the analysis, we checked if the continuous variables followed a normal distribution by applying the Kolmogorov-Smirnov test.

Descriptive analysis of the study variables was conducted according to the tertiles of total scientific skills. Categorical data were presented as frequencies and percentages, while continuous variables were described by the median and interquartile range

because of their non-normal distribution. To examine the differences between covariates and tertiles of total scientific skills, we applied the Chi-square and Kruskal-Wallis tests.

Predictors of the different tertiles of scientific skills, encompassing total and category scores, were explored by estimating prevalence ratios (PR), taking the first tertile as the reference category. This analysis was conducted using Poisson multiple regression models with robust variance based on the sandwich estimation of Huber [35–37]. The models were adjusted for all the covariates considered in this study.

Results

The participants of this study had a mean total score of scientific skills of 62.7 (Standard Deviation (SD): 21.6). Figure 1 shows the mean values for the different categories of scientific skills weighting by the number of items in each category. Literature searching skills showed the highest weighted values (mean = 3.2, SD: 1.1), followed by EBP skills (mean = 3.0, SD: 1.1), scientific dissemination (mean = 2.8, SD: 1.1), methods and statistics (mean = 2.5, SD: 1.1), and scientific writing skills (mean = 2.4, SD: 1.0) with the lowest scores. The rating for all scientific skills grouped by categories is presented in Figure 2. Within scientific writing skills, the items with the lowest values were those related to writing in English results resulting from research, such as an abstract for an international congress or a paper in a high-quality journal. Regarding methods and statistics skills, participants reported having difficulties in calculating a study sample size, selecting, and performing the appropriate statistical analysis, as well as interpreting the results. As for EBP skills, formulating a PICO research question and selecting an adequate study design were the abilities worst rated. In line with the low levels of scientific writing, English skills for preparing a scientific poster was the competence in scientific dissemination with the lowest scores.

Table 1 displays a general description of the study participants by the total scores of scientific skills in tertiles. The participants were mainly women (86.1%), had a median age of 31 (IQR, 27.0–37.5), around a third (29.7%) was from a Spanish-speaking country different from Spain, 41.4% declared doing research during their working hours, and approximately 60% ($n = 668$) did not complete any research training course during the last year. Overall, differences between the study characteristics were observed according to the tertiles of total scientific skills. Compared to the participants in the second (52–73 points) and third tertile (74–115 points), we found that the participants in the first tertile (23–51 points) had a statistically significantly median age (32.0 years),

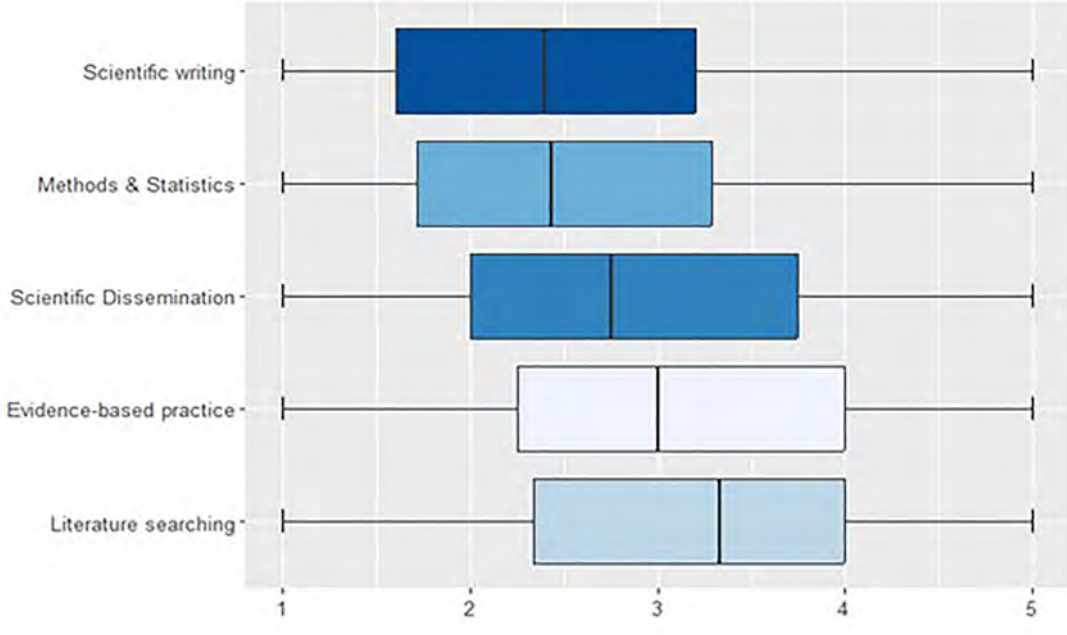

Figure 1. Weighted scores of categories of scientific skills in Spanish-speaking occupational therapists from the HACTO- Screen study. To compare the different scientific skills, mean values were calculated by weighting them according to the number of items in each category. Rating scale ranged from 1 to 5: 1 = need further basic instruction; 2 = able to perform with close supervision; 3 = able to perform with minimal supervision; 4 = able to perform independently; 5 = able to perform independently and show improvement-seeking motivation.

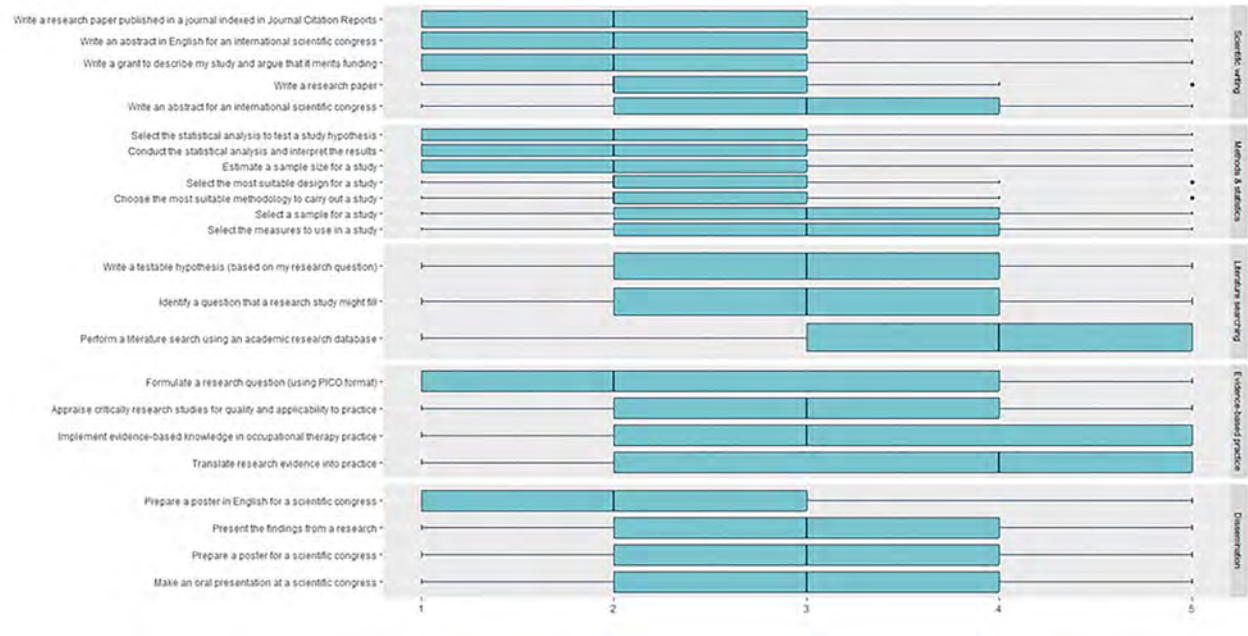

Figure 2. Rating for all scientific skills by categories in Spanish-speaking occupational therapists from the HACTO- Screen study. Rating scale ranged from 1 to 5: 1 = need further basic instruction; 2 = able to perform with close supervision; 3 = able to perform with minimal supervision; 4 = able to perform independently; 5 = able to perform independently and show improvement-seeking motivation.

Table 1. General characteristics of the Spanish-speaking occupational therapists participating in the HACTO-screen study by the total scores of scientific skills in tertiles.

		Total scores of scientific skills			
		1st tertile	2nd tertile	3rd tertile	
	Total ($n=1159$)	23–51 ($n=388$)	52–73 ($n=388$)	74–115 ($n=383$)	p*
Sex, *n* (%)					<0.001
Woman	998 (86.1)	356 (91.8)	337 (86.9)	305 (79.6)	
Man	161 (13.9)	32 (8.2)	51 (13.1)	78 (20.4)	
Age, median (IQR)	31 (27.0-37.5)	32.0 (27.0–37.0)	30.0 (26.0–35.2)	31 (26.5–40.0)	0.011
Country of origin, *n* (%)					<0.001
Spain	815 (70.3)	303 (78.1)	280 (72.2)	232 (60.6)	
Others	344 (29.7)	85 (21.9)	108 (27.8)	151 (39.4)	
Academic studies, *n* (%)					<0.001
3-year bachelor's degree	169 (14.6)	102 (26.3)	45 (11.6)	22 (5.7)	
4-year bachelor's degree	378 (32.6)	133 (34.3)	137 (35.3)	108 (28.2)	
Master's degree	498 (42.9)	152 (39.2)	181 (46.6)	108 (43.1)	
Doctoral degree	114 (9.8)	1 (0.3)	25 (6.4)	88 (23.0)	
Years since completing bachelor's degree, *n* (%)					0.004
>10	377 (32.5)	139 (35.8)	143 (26.8)	130 (35.0)	
5–10	406 (35.0)	146 (37.6)	141 (36.3)	119 (31.1)	
<5	376 (32.5)	103 (26.5)	143 (36.9)	130 (33.9)	
Working status, *n* (%)					0.268
Employed	987 (85.2)	338 (87.1)	322 (83.0)	327 (85.4)	
Unemployed	172 (14.8)	50 (12.9)	66 (17.0)	56 (14.6)	
Doing research during working hours, *n* (%)					<0.001
No	679 (58.6)	321 (82.7)	229 (59.0)	129 (33.7)	
Yes	480 (41.4)	67 (17.3)	159 (41.0)	254 (66.3)	
Research training courses completed during the last year, *n* (%)					
0	668 (57.6)	290 (74.7)	228 (58.8)	150 (39.2)	<0.001
1–3	416 (35.9)	97 (25.0)	137 (35.3)	182 (47.5)	
>3	75 (6.5)	1 (0.3)	23 (5.9)	51 (13.3)	

HACTO: Habilidades Científicas en Terapeutas Ocupacionales; IQR: interquartile range.* p-value estimated from the Chi-square test (categorical variables) and the Kruskall-Wallis test (continuous variables).

had a lower proportion of master's degree (42.9%) or doctoral degree (0.3%), had completed their bachelor's degree a longer time ago (>10 years = 35.8%, 5–10 = 37.6%), did not dedicate part of their work time to do research (82.7%), and did not complete research training courses during the last year (74.7%).

Table 2 shows the predictors of scientific skills (total and category scores in tertiles) in Spanish-speaking occupational therapists from the HACTO-Screen study. Overall, a higher academic degree, ongoing research training, and doing research during work time were predictors of a greater scientific competence, including total and each category scores. Our findings suggest that individuals with a master's or doctoral degree were more likely to score higher in the second and third tertiles of scientific skills, with a stronger association observed among those with a doctorate. Similarly, acquiring continuous research education was also associated with the second and third tertiles of scientific skills, with the estimates rising as more courses were taken and proficiency in scientific abilities was improved. The participants who conducted research while at work showed a higher level of scientific expertise, with a more robust association observed in the third tertile. The findings also revealed that, compared to Spanish occupational therapists, those from other Spanish-speaking countries were more likely to have higher competence in total scientific skills (3rd tertile: PR = 1.23, 95% CI: 1.07–1.42), literature searching (2nd tertile: PR = 1.25, 95% CI: 1.08–1.44; 3rd tertile: PR = 1.32, 95% CI: 1.10–1.58), EBP (2nd tertile: PR = 1.24, 95% CI: 1.06–1.46; 3rd tertile: PR = 1.34, 95% CI: 1.13–1.57), methods & statistics (2nd tertile: PR = 1.25, 95% CI: 1.05–1.49; 3rd tertile: PR = 1.33, 95% CI: 1.17–1.51) and scientific writing skills (3rd tertile: PR = 1.20, 95% CI: 1.03–1.39). Predictors of literature searching skills were men (2nd tertile: PR = 1.26, 95% CI: 1.10–1.43) and unemployed (2nd tertile: PR = 1.20, 95% CI: 1.02–1.41; 3rd tertile: PR = 1.21, 95% CI: 0.99–1.49). Finally, age was statistically significantly associated with higher scores of scientific writing skills (3rd tertile: PR = 1.01, 95% CI: 1.00-1.02).

Discussion

This study found that Spanish-speaking occupational therapists had a moderate level of scientific competence. Among the skills evaluated, literature searching ranked the highest, while scientific writing scored the lowest. Particularly, writing research results in English, conducting statistical analysis, and developing PICO research questions as a first step of EBP represented significant challenges for the occupational therapists from our study. The results also showed that higher academic degrees, ongoing research training, and dedicated research time were key drivers of greater scientific abilities, while certain demographics such as sex, age, country, and work status were identified as major determinants of research capacity in specific areas of scientific competence.

Although with differences, these results are comparable to previous findings suggesting that occupational therapy in terms of EBP implementation still leaves a wide room for improvement, especially when considering research-related knowledge and skills [6,9,11,14,16,24,25,38–40]. Overall, the reported scientific skills seemed modest; many median item responses were rated at a moderate level of performance. The items that elicited the lowest level of confidence were those related to research activities, such as writing for publication in high-quality journals, writing a grant for funding, performing a statistical analysis, and making an international conference poster, which fairly conforms to earlier findings [15,41–43]. Although this could be attributed to the lack of research training, it should be noted that scientific writing and dissemination skills could involve an extra challenge for non-native English speakers, since English is the international language of science [44]. An alternative explanation could be that these research activities are presumed to be closely related to occupational therapists who have embarked upon an academic trajectory, where research is deemed a pivotal element contributing to their academic advancement [45]. Approximately 20% of our participants declared working at an academic institution, which would explain that the highest number of median responses to these items fell within the lowest rates. In turn, it is plausible that this could also reflect the perennial dilemma between clinical practice and research capacity facing occupational therapy practitioners, possibly revealing shortcomings stemming from the work environment that narrowed the scope for scientific-driven practices, as shown by previous studies [4,6,9,11,14–16,18,20,26,28,29,37,38,46].

Our main findings suggest that the highest academic qualification attained was a strong predictor of higher scientific competence in occupational therapists participating in this study. These findings are consistent with several studies according to which occupational therapists with higher academic degrees seem to use more research and have a greater understanding of EBP [11,16,20,22,27,41,47]. In line with this, as one might expect, a greater number of training courses to enhance research literacy skills was also associated with higher scientific skills. To date, only one study has examined how continuing post-professional education may influence the research knowledge and skills of occupational therapists. According to the study conducted by Bennett et al.

Table 2. Factors associated with scientific skills in Spanish-speaking occupational therapists from the HACTO-screen study ($n = 1159$).

	Total scores of scientific skills						Total scores of literature searching skills					
	2nd tertile (52–73) ($n = 388$)			3rd tertile (74–115) ($n = 383$)			2nd tertile (9–12) ($n = 471$)			3rd tertile (13–15) ($n = 268$)		
	n	PR (CI 95%)	*p*	n	PR (CI 95%)	*p*	n	PR (CI 95%)	*p*	*n*	PR (CI 95%)	*p*
Sex												
Woman	337	Ref.		305			382	Ref.		226	Ref.	
Man	51	1.15 (0.96–1.39)	0.124	78	1.05 (0.93–1.19)	0.403	89	**1.26 (1.10-–1.43)**	**<0.001**	42	1.05 (0.86–1.29)	0.631
Age	388	1.00 (0.98–1.01)	0.539	383	1.01 (1.00–1.02)	0.081	471	0.99 (0.98–1.00)	0.186	268	1.01 (1.00–1.02)	0.086
Country of origin												
Spain	280	Ref.		232			323	Ref.		164	Ref.	
Others	108	1.15 (0.97–1.35)	0.106	151	**1.23 (1.07–1.42)**	**0.003**	148	**1.25 (1.08–1.44)**	**0.002**	104	**1.32 (1.10–1.58)**	**0.003**
Academic studies												
3-year bachelor's degree	45	Ref.		22			47	Ref.		17	Ref.	
4-year bachelor's degree	137	1.31 (0.97–1.77)	0.073	108	**1.80 (1.22–2.67)**	**0.003**	166	**1.32 (1.00–1.74)**	**0.046**	70	1.61 (0.98–2.66)	0.061
Master's degree	181	**1.49 (1.14–1.95)**	**0.004**	165	**2.01 (1.39–2.92)**	**<0.001**	204	**1.42 (1.10–1.84)**	**0.007**	127	**2.16 (1.37–3.42)**	**<0.001**
Doctoral degree	25	**1.93 (1.46–2.56)**	**<0.001**	88	**2.85 (1.97–4.11)**	**<0.001**	47	**1.93 (1.48–2.52)**	**<0.001**	54	**3.05 (1.93–4.82)**	**<0.001**
Years since completing bachelor's degree												
>10	104	Ref.		134	Ref.		129	Ref.		91	Ref.	
5–10	141	1.05 (0.86–1.29)	0.641	119	1.03 (0.87–1.21)	0.757	170	1.13 (0.95–1.34)	0.167	90	1.15 (0.91–1.46)	0.246
<5	143	1.14 (0.89-–1.46)	0.284	130	**1.26 (1.03–1.56)**	**0.027**	172	1.16 (0.94–1.43)	0.175	87	1.31 (0.96– 1.78)	0.087
Working status												
Employed	322	Ref.		327			396	Ref.		223		
Unemployed	66	1.14 (0.96–1.35)	0.131	56	1.15 (0.97–1.35)	0.105	75	**1.20 (1.02–1.41)**	**0.031**	45	1.21 (0.99–1.49)	0.066
Doing research during working hours												
No	229	Ref.		129			245	Ref.		104	Ref.	
Yes	159	**1.42 (1.23–1.64)**	**<0.001**	254	**1.91 (1.62–2.26)**	**<0.001**	226	**1.35 (1.18-–1.55)**	**<0.001**	164	**1.76 (1.44–2.15)**	**<0.001**
Research training courses completed during the last year												
0	228	Ref.		150	Ref.		253	Ref.		110	Ref.	
1–3	137	**1.17 (1.01–1.36)**	**0.035**	182	**1.43 (1.24–1.64)**	**<0.001**	180	1.18 (1.04–1.35)	0.011	124	**1.51 (1.25–1.83)**	**<0.001**
>3	23	**1.54 (1.28–1.85)**	**<0.001**	51	**1.79 (1.50–2.14)**	**<0.001**	38	**1.51 (1.28–1.79)**	**<0.001**	34	**2.01 (1.59–2.55)**	**<0.001**
Sex												
Woman	347	Ref.		271	Ref.		294	Ref.		276	Ref.	
Man	57	1.07 (0.89–1.28)	0.472	63	1.02 (0.87–1.20)	0.807	50	0.94 (0.76–1.17)	0.580	70	1.07 (0.40–1.22)	0.328
Age	404	0.99 (0.98–1.00)	0.103	334	1.00 (0.99–1.01)	0.792	334	1.00 (0.98–1.01)	0.465	346	1.00 (0.99–1.01)	0.826
Country of origin												
Spain	281	Ref.		205	Ref.		248	Ref.		204	Ref.	
Others	123	**1.24 (1.06–1.46)**	**0.008**	129	**1.34 (1.13–1.57)**	**<0.001**	96	**1.25 (1.05–1.49)**	**0.011**	142	**1.33 (1.17–1.51)**	**<0.001**
Academic studies												
3-year bachelor's degree	50	Ref.		19	Ref.		34	Ref.		20	Ref.	
4-year bachelor's degree	143	1.17 (0.88–1.54)	0.276	85	**1.60 (1.02–2.49)**	**0.039**	115	1.15 (0.85–1.54)	0.360	110	1.33 (0.99–1.80)	0.060
Master's degree	177	**1.32 (1.03–1.69)**	**0.028**	155	**2.10 (1.39–3.17)**	**<0.001**	173	**1.45 (1.12–1.88)**	**0.005**	141	**1.67 (1.27–2.20)**	**<0.001**
Doctoral degree	34	**1.74 (1.33–2.29)**	**<0.001**	75	**2.97 (1.96–4.49)**	**<0.001**	22	**2.01 (1.47–2.76)**	**<0.001**	75	**2.19 (1.66– 2.90)**	**<0.001**
Years since completing bachelor's degree												
>10	118	Ref.		116	Ref.		82	Ref.		111	Ref.	
5–10	134	0.93 (0.75–1.14)	0.469	114	1.02 (0.84–1.24)	0.818	124	1.06 (0.85–1.31)	0.620	115	1.05 (0.89–1.23)	0.587
<5	152	1.04 (0.80–1.34)	0.779	104	1.16 (0.89–1.50)	0.268	138	1.14 (0.87–1.49)	0.337	120	1.15 (0.94–1.40)	0.188
Working status												
Employed	340	Ref.		289	Ref.		284	Ref.		289	Ref.	
Unemployed	64	1.04 (0.87–1.25)	0.663	45	1.05 (0.85-1.29)	0.633	60	0.95 (0.77- 1.17)	0.631	57	1.08 (0.92- 1.27)	0.343
Doing research during working hours												
No	228	Ref.		117	Ref.		186	Ref.		125	Ref.	
Yes	176	**1.38 (1.19–1.60)**	**<0.001**	217	**1.87 (1.55–2.25)**	**<0.001**	158	**1.39 (1.18–1.63)**	**<0.001**	221	**1.62 (1.41–1.86)**	**<0.001**

(*Continued*)

Table 2. Continued.

	Total scores of scientific skills						Total scores of literature searching skills					
	2nd tertile (52–73) (*n* = 388)			3rd tertile (74–115) (*n* = 383)			2nd tertile (9–12) (*n* = 471)			3rd tertile (13–15) (*n* = 268)		
	n	PR (CI 95%)	*p*	n	PR (CI 95%)	*p*	n	PR (CI 95%)	*p*	*n*	PR (CI 95%)	*p*
Research training courses completed during the last year												
0	228	Ref.		136	Ref.		188	Ref.		146	Ref.	
1–3	153	**1.18 (1.02–1.37)**	**0.023**	153	**1.35 (1.15–1.59)**	**<0.001**	134	**1.19 (1.02–1.39)**	**0.030**	154	**1.27 (1.12–1.44)**	**<0.001**
>3	23	**1.34 (1.05–1.71)**	**0.018**	45	**1.67 (1.35–2.05)**	**<0.001**	22	**1.53 (1.16–2.02)**	**0.003**	46	**1.51 (1.27–1.79)**	**<0.001**
Sex												
Woman	273	Ref.		306	Ref.		323	Ref.		297	Ref.	
Man	38	1.08 (0.85–1.37)	0.534	80	1.14 (0.99–1.30)	0.064	45	1.09 (0.89–1.34)	0.406	78	1.10 (0.96–1.25)	0.185
Age	331	1.00 (0.99–1.02)	0.836	386	1.01 (1.00–1.01)	0.194	368	1.00 (0.99–1.02)	0.367	375	**1.01 (1.00–1.02)**	**0.029**
Country of origin												
Spain	213	Ref.		251	Ref.		262	Ref.		230	Ref.	
Others	98	1.11 (0.91–1.37)	0.308	135	1.11 (0.96–1.29)	0.162	106	1.07 (0.90–1.28)	0.449	145	**1.20 (1.03–1.39)**	**0.016**
Academic studies												
3-year bachelor's degree	34	Ref.		26	Ref.		46	Ref.		25	Ref.	
4-year bachelor's degree	119	**1.55 (1.07–2.23)**	**0.019**	101	**1.64 (1.12–2.40)**	**0.011**	135	**1.41 (1.05–1.89)**	**0.025**	100	**1.60 (1.09-–2.37)**	**0.017**
Master's degree	139	**1.55 (1.11–2.16)**	**0.010**	168	**1.88 (1.32–2.68)**	**<0.001**	161	**1.38 (1.05–1.81)**	**0.020**	165	**1.79 (1.24-–2.58)**	**0.002**
Doctoral degree	19	**2.08 (1.41–3.08)**	**<0.001**	91	**2.70 (1.90–3.84)**	**<0.001**	26	**1.88 (1.41–2.51)**	**<0.001**	85	**2.48 (1.73–3.56)**	**<0.001**
Years since completing bachelor's degree												
>10	86	Ref.		148	Ref.		105	Ref.		141	Ref.	
5–10	109	0.91 (0.71–1.17)	0.475	111	**0.81 (0.68–0.97)**	**0.023**	131	1.01 (0.82–1.24)	0.930	119	0.97 (0.80–1.16)	0.716
<5	116	1.01 (0.75–1.36)	0.953	127	1.13 (0.90–1.40)	0.297	132	1.04 (0.82–1.33)	0.728	115	1.11 (0.88–1.41)	0.377
Working status												
Employed	257	Ref.		333	Ref.		310	Ref.		325	Ref.	
Unemployed	54	1.10 (0.89–1.36)	0.385	53	1.05 (0.86–1.28)	0.613	58	0.96 (0.79–1.17)	0.688	50	1.04 (0.84–1.28)	0.750
Doing research during working hours												
No	174	Ref.		140	Ref.		211	Ref.		137		
Yes	137	**1.53 (1.28–1.83)**	**<0.001**	246	**1.82 (1.53–2.17)**	**<0.001**	157	**1.43 (1.22–1.68)**	**<0.001**	238	**1.81 (1.52–2.16)**	**<0.001**
Research training courses completed during the last year												
0	180	Ref.		159	Ref.		211	Ref.		161	Ref.	
1–3	106	1.14 (0.95–1.36)	0.169	185	**1.37 (1.19–1.59)**	**<0.001**	133	1.14 (0.97–1.34)	0.113	169	**1.29 (1.11–1.49)**	**<0.001**
>3	25	**1.55 (1.17–2.05)**	**0.002**	42	**1.61 (1.30–1.98)**	**<0.001**	24	**1.42 (1.10–1.83)**	**0.007**	45	**1.71 (1.39–2.10)**	**<0.001**

HACTO: Habilidades Científicas en Terapeutas Ocupacionales; PR: prevalence ratio; CI: confidence interval. All models were adjusted by all the variables included in the table.

(2003), occupational therapists trained in EBP showed higher confidence in EBP skills, including literature searching, appraising relevance of results, and methodological aspects as determining study design, which is closely aligned with our results. Presumably, one might think that most respondents who had completed research training courses worked full or part-time within an academic institution. However, we observed that over a third of these participants trained in scientific skills were occupational therapists with complete dedication to clinical practice. Interestingly, research in allied health professionals has elicited that research training programs may improve confidence, engagement, and clinical practice, as well as organizational functioning and client care [48,49], which reinforces the importance of promoting research capacity development initiatives to enhance practice context and clinical outcomes.

Our results also revealed that participation in research was a predictor of higher scientific abilities. In this case, in line with results of research training, about a third of occupational therapists were clinicians. Previous research has shown that occupational therapists who combined their clinical practice with research had a greater capacity to integrate research into practice implementing EBP [20]. Although we did not ask participants for their role in the research process, mentorship has been found as an enabler for improving research participation [13], providing an opportunity for clinicians to strengthen their research skill base [43].

Intriguingly, we observed that Latin-American occupational therapists had greater skills in total scientific competence, literature searching, EBP, methodological and statistical knowledge, and writing skills, compared to Spanish respondents. The most probable explanations could be that there were a higher number of occupational therapists from Latin-American countries with a doctoral degree (10.2% vs. 9.7%), working in an academic institution (41.0% vs. 10.0%), and doing research (54.4% vs. 36.0%). Other socio-demographic features, such as being men, unemployed, and greater age, were associated with higher scientific competence. A previous study also found that men seemed to exhibit higher skills in literature searching compared to women [26]. This finding is particularly relevant within the occupational therapy profession, which is predominantly female-skewed. Given this gender disparity, it is crucial to recognize and further explore potential gender-related factors that may influence scientific skills among occupational therapists. This exploration will contribute to a more inclusive and equitable approach to professional development and ensure that all practitioners have the necessary skills to contribute effectively to the field. The results that unemployed participants had a higher competence in literature searching could be attributed to that around half had a higher academic degree (i.e. doctoral or master's degree), and finished their bachelor's degree less than five years ago. This suggests that these unemployed individuals may be relatively younger and have little clinical experience. Furthermore, it is worth mentioning that a considerable percentage of unemployed participants (37.2%) reported their involvement in research activities. These findings may be influenced by the specific context of the labor market in the studied countries. In some cases, individuals who are unemployed or seeking employment may extend their studies or engage in research activities as a means of enhancing their qualifications and increasing their competitiveness in the job market. This could potentially contribute to the observed higher competence in literature searching among unemployed participants. Finally, the finding that older occupational therapists were more likely to have writing skills may be understandable, in that the participants with a doctoral degree and working in academic institutions were the oldest therapists (median age = 37.5 and 38.0, respectively), probably having much more experience with research writing than younger therapists.

Study limitations

This study presents some shortcomings that we should acknowledge. First, a possible misclassification cannot be ruled out since all data were self-reported by the participants. However, if it was the case, any potential bias in the reporting should be non-differential. Moreover, it should be noted that the questionnaire used to assess scientific skills was based on the Practice-Oriented Research Training (PORT) program assessment tool, which has been previously validated in occupational therapists by Murphy et al. (2010). To ensure the accuracy and clarity of the questionnaire, we took steps, including expert review, during its development process. The internal consistency of the measure was evaluated using Cronbach's alpha coefficient, which provided an indication of reliability. However, to acquire a more comprehensive understanding of the measure's psychometric properties, additional analyses, such as test-retest reliability, inter-rater reliability, and construct validity assessments, are necessary. These analyses would contribute to the overall robustness and reliability of the questionnaire in assessing scientific competence. To enhance the

credibility of this online survey and address potential biases stemming from the non-representative nature of the Internet population and self-selection of participants (volunteer effect), we employed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [33]. Additionally, we carefully determined the study sample size to maintain a reasonable level of representativeness [10]. It is crucial to acknowledge another significant limitation in our study regarding the convenience-based selection of participants through a snowball sampling method. While this approach facilitated access to a diverse range of participants, it may have introduced biases and hindered the generalisability of our findings. The snowball sampling method could have led to a higher representation of occupational therapists from academic institutions or those with stronger research backgrounds, potentially limiting the applicability of our results beyond the specific sample recruited. Therefore, caution should be exercised when interpreting and generalizing our findings to the broader population of Spanish-speaking occupational therapists. Furthermore, the reliance on Internet connection and technological devices for completing the online questionnaire introduces the possibility of digital inequalities. This could result from variations in physical Internet access and/or Internet skills, implying that the representation of occupational therapists from Spain and Spanish-speaking Latin-American countries may not be entirely accurate. Finally, we must recognize another potential limitation arising from socio-cultural differences among the occupational therapists from various Spanish-speaking countries included in our study. These factors may have impacted the results and should be considered when interpreting our findings.

Implications for occupational therapy

Our study revealed that Spanish-speaking occupational therapists exhibited a moderate level of scientific competence. While this suggests a reasonable foundation, there is room for improvement. The findings highlight the need for targeted interventions and capacity-building initiatives to enhance research skills and promote EBP among occupational therapy professionals in Spanish-speaking countries. These initiatives could include research training programs, mentorship opportunities, and the promotion of scholarly activities within academic institutions. By focusing on these areas, the occupational therapy profession in Spanish-speaking countries can establish a stronger research culture and contribute to the advancement of evidence-based care.

The results of our study also align with previous findings that show a need for improvement in EBP implementation within the occupational therapy profession. The modest scientific skills reported by participants emphasize the importance of ongoing professional development and research literacy training for occupational therapists. This is particularly crucial in the context of rapidly evolving healthcare practices and the increasing demand for evidence-based interventions. By investing in research education and training, the occupational therapy profession can enhance its scientific competence, improve clinical outcomes, and effectively contribute to the broader healthcare landscape.

Another important aspect of our findings is that higher academic degrees, ongoing research training, and dedicated research time were key drivers of greater scientific abilities among occupational therapists. This highlights the critical role of both occupational therapy educators and managers in fostering research capacity and promoting EBP among practitioners. Occupational therapy educators should incorporate research methodologies, critical appraisal skills, and scientific writing into their curricula to prepare students for the challenges of conducting research and disseminating findings, contributing to the development of a competent and research-ready workforce. Simultaneously, managers should recognize the importance of creating an environment that supports and encourages research engagement. This could involve providing opportunities for continuing education, allocating dedicated research time, and fostering a culture of research and EBP. By supporting the professional growth and development of their clinicians, both educators and managers can enhance the overall scientific competence of occupational therapists and improve the quality of care provided to patients.

Our study identified a gap in scientific competence among occupational therapists, emphasizing the importance of collaboration between clinicians, researchers, and academic mentors to bridge this gap. To address this, targeted research training programs and mentorship initiatives should be implemented to enhance occupational therapists' skills and support their research endeavours. Additionally, fostering a culture of collaboration and knowledge-sharing through conferences, workshops, and online platforms can facilitate the exchange of ideas and best practices. By emphasizing collaboration and addressing areas of improvement, we can promote EBP, strengthen the occupational therapy profession, and ultimately improve patient care.

Conclusion

This study sheds light on the scientific skills and research competencies of Spanish-speaking occupational therapists. The findings highlight the need for continuous research training and the importance of higher academic degrees in fostering greater scientific competence. Occupational therapists who actively engage in research and dedicate time to research activities showed higher skills in EBP. Furthermore, variations in scientific skills among therapists from different Spanish-speaking countries underscore the impact of cultural and organizational factors. These results provide valuable insights for enhancing occupational therapy practice and can guide future research initiatives aimed at improving evidence-based care in this field.

Ethical approval

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Research Compliance Office of the Miguel Hernández University (Protocol code Expte.2020/2618). All participants included in this study gave their informed consent before completing the survey.

Acknowledgements

The authors would like to express their gratitude to all anonymous participants who participated in the HACTO-Screen project, the Spanish Professional Colleges of Occupational Therapy, leaders of occupational therapy degree in Spain and South America, and all occupational therapists who played an active role in promoting the HACTO project and HACTO-Screen survey *via* their social media channels.

Authors' contributions

Desirée Valera-Gran and Irene Campos-Sánchez share first authorship of this article. Desirée Valera-Gran and Eva-María Navarrete-Muñoz contributed to the conception and design of the study, advised on all statistical aspects and interpreted the data. Desirée Valera-Gran performed the literature search and wrote the drafts of the manuscript. Irene Campos-Sánchez conducted the analyses. All authors critically reviewed this and previous drafts. All authors approved the final draft for submission, with final responsibility for publication. Eva-María Navarrete-Muñoz is the guarantor.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Occupational Therapy Association of Extremadura (Colegio Profesional de Terapeutas Ocupacionales de Extremadura) and the Vice-Rector for Research of Miguel Hernández University under Grant ["Ayudas de difusión de la Ciencia"] and under Grant ["Iniciación a la Investigación"].

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author, [E-MN-M]. The data are not publicly available due to ethical and legal restrictions implemented by the Ethics Committee of Miguel Hernández. University].

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