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Review Article

Are the physical activity habits of healthcare professionals associated with their physical activity promotion and counselling?: A systematic review

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ABSTRACT

Objective: Healthcare professionals (HCPs) play an important role in conducting brief physical activity counselling during consultations, representing one of the population's most cost-effective interventions for its promotion. Despite this, their clinical practice often falls short in addressing physical activity with the necessary depth and frequency. This study aimed to synthesise the literature concerning the association between the physical activity habits of HCPs and their attitudes toward physical activity promotion and counselling.

Methods: The systematic review followed PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Its protocol was registered in PROSPERO under ID: CRD42023408302. In March 2023, a comprehensive search was conducted using key terms related to physical activity levels and HCPs counselling practices across the Web of Science, Scopus, PubMed, SPORTDiscus, APA PsycInfo, and CINAHL databases. Registered HCPs classified under the International Standard Classification of Occupations (ISCO) were included. The Newcastle-Ottawa Scale was used for assessing articles quality.

Results: The search yielded 6618 articles, with 51 meeting the inclusion criteria after filtering and cross-referencing. Predominantly cross-sectional studies were included, mainly involving HCPs responding to questionnaires regarding their physical activity habits and promotion and counselling practices. Heterogeneous results were found.

Conclusion: High-quality studies mainly concluded that higher physical activity levels among HCPs were associated with more physical activity promotion and counselling practices. These findings are an important contribution to the relevance of the physical activity practice by HCPs and highlighting the importance of promoting its counselling in clinical practice.

1. Introduction

Despite the well-established benefits of regular physical activity (U. S. Department of Health and Human Services, 2018), at least one in four adults fails to engage in sufficient physical activity to enhance their health (Guthold et al., 2018). Consequently, physical inactivity is estimated to be the fourth leading risk factor for overall morbidity and mortality worldwide, incurring substantial costs (Ding et al., 2016).

Healthcare professionals (HCPs), who relate to diverse population segments and have esteemed professional knowledge stand ideally positioned to promote physical activity among the population. Integrated into routine consultation, brief counselling emerges as one of the most cost-effective strategies for population-wide physical activity promotion, considering that one additional sedentary adult achieves recommended physical activity levels at 12 months for every 12 individuals subjected to a physical activity promotion intervention (Thornton et al., 2016).

However, physical activity promotion currently assumes a lower

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priority in the daily clinical practice of HCPs when compared to other health-related components such as smoking, alcohol consumption, and diet. Many physicians refrain from regular physical activity assessment or prescription and, when addressed, seldom provide specific recommendations (Short et al., 2016; Rethorn et al., 2021). Consequently, the deficiency in physical activity promotion by HCPs poses a behavioural challenge that warrants attention. The targeted behaviour is for all HCPs across diverse healthcare contexts to initiate person-centred conversations on physical activity at every suitable opportunity during routine care (Reid et al., 2022).

The promotion and counselling of physical activity (PA) by HCPs is a behaviour that should be ingrained in their clinical practice. It is important to consider models aimed at behavioural change when considering HCPs practices. Considering the behavioural change model, HCPs must perceive they have the ´capability´, ´opportunity´, and ´motivation´ (COM-B model) (Willmott et al., 2021) to engage in person-centred physical activity conversations more frequently and effectively than other potential recommendations (Michie et al., 2014). The COM-B model advocates that enhancing HCPs' physical activity habits can empower them to promote physical activity to their patients (Reid et al., 2022).

Grounded on the importance of self-behaviour, this study aims to review existing literature on the relationship between HCPs' physical activity habits and their attitudes toward physical activity promotion and counselling. A prior review by Fie et al. (Fie et al., 2013) addressed a similar research question. Still, it was limited to physicians and nurses, with only 13 articles meeting the inclusion criteria, the latest dating back to 2010. The authors expressed surprise at the scarcity of studies investigating the relationship between personal physical activity among physicians and nurses and their practices in promoting physical activity, despite the increasing global health concerns related to sedentary lifestyles at that time. They emphasised the need for well-designed large studies incorporating multivariate analyses to determine how much personal physical activity levels influence physical activity promotion practices.

Given the conclusions drawn by Fie et al., the substantial increase in studies published since their review, and the emergence of international physical activity recommendations and governmental policies, an updated investigation on this topic is deemed essential. Considering the COM-B model in this study, it is possible to systematically examine how HCPs´ capability, opportunity, and motivation influence their effectiveness in promoting physical activity among patients. This approach enables a deeper analysis of the factors that drive or enhance HCPs´ engagement in physical activity promotion and counselling. Moreover, the COM-B model establishes a robust theoretical foundation for understanding the behavioural complexities of implementing public health policies related to physical activity. It serves as a guiding framework for policies and practices that empower HCPs to take a more proactive role in enhancing population-wide physical activity levels, thereby making significant contributions to public health and overall well-being.

2. Methods

2.1. Registration

The systematic review protocol was prospectively registered in the International Prospective Register of Ongoing Systematic Reviews (PROSPERO) under the ID CRD42023408302. The developed protocol adhered to PRISMA guidelines (Page et al., 2021).

2.2. Eligibility criteria

The review followed the PICOS framework to establish eligibility criteria (Tacconelli, 2010). The inclusion criteria encompassed studies analysing the relationship between HCPs' physical activity levels and their physical activity promotion and counselling practices.

2.2.1. Population

The *population* included registered HCPs classified under the International Standard Classification of Occupations (ISCO) (International Labour Office, 2012), involved in the provision of human health services, with an occupation in which physical activity promotion and counselling seems reasonable: (U.S. Department of Health and Human Services, 2018) Medical Doctors – both generalist and specialist practitioners, including public health doctors (ISCO-08 minor group 221); (Guthold et al., 2018) nursing professionals, including public health nurses (ISCO-08 minor group 222, unit 2221); (Ding et al., 2016) psychologists (ISCO-08 minor group 263, unit group 2634); and (Thornton et al., 2016) other health professionals, including environmental and occupational health and hygiene professionals, physiotherapists, dieticians and nutritionists, audiologists and speech therapists, and health professionals not classified elsewhere (ISCO-08 minor group 226, units 2263, 2264, 2265, 2266 and 2269, respectively). Non-registered HCPs or subjects from other ISCO groups were excluded.

2.2.2. Exposure (Intervention)

The exposure, or intervention, considered all measurements of physical activity, whether subjective or objective, to gauge HCPs' physical activity levels. Studies focusing on community/home-based physical activity promotion interventions not delivered by HCPs or multi-component interventions involving non-physical activity components, such as knowledge or training concerning physical activity promotion, were excluded unless physical activity could be analysed separately.

2.2.3. Comparison

Due to the systematic review's aim, a comparator or control group was not obligatory for inclusion.

2.2.4. Outcome

The outcome of interest was HCPs' physical activity promotion and counselling practices.

2.2.5. Study design

Studies had to be either observational or experimental to be included in the review. Grey literature was excluded. No further restrictions on study design were imposed.

2.3. Search strategy

The authors searched articles published until March 22, 2023, using six databases, including PubMed, Web of Science, CINAHL, SPORTDiscus, APA PsycInfo and Scopus. The search incorporated three keyword blocks, focusing on HCPs (block 1), physical activity promotion (block 2) and physical activity behaviour (block 3; detailed in supplementary material I).

2.4. Search selection

After searching each database, all studies were imported into Endnote 20, and duplicate records were eliminated. Two authors (MDB and TDR) independently assessed titles and abstracts, selecting articles for potential inclusion. The same authors fully read all included articles. The consensus was reached through mutual agreement, with disagreements resolved through analysis between two additional authors (MP and AM), moderated by a third author (BRG). Selected articles needed to be published in scientific journals written in English, French, Portuguese or Spanish. Grey literature was excluded. A cross-referencing search was also performed in the full-text read of potentially included articles.

Regarding ethical procedures, authorisation from an ethics committee was not required as no primary data was collected. Still, ethical guidelines were followed under the principles of the Declaration of Helsinki.

Once articles were identified for inclusion, the software MAXQDA 2022 was used for data extraction. Extracted data was then transposed into an Excel form.

2.5. Methodological quality assessment

Two researchers (MDB and TDR) independently assessed the methodological quality of the listed studies using the modified Newcastle-Ottawa Scale (Wells et al., 2014). Scores were assigned based on the selection of the study groups, comparability among groups, ascertainment of the outcome, and statistical analyses. Inconsistencies were resolved through discussion, with a third researcher (MP) consulted if needed. Quality scores ranged from unsatisfactory (below 4) to very good (). Cohen's kappa determined the strength of agreement between reviewers (Cohen, 1960), with interpretation following Landis and Koch's scale (Cohen, 1960). The Cohen's kappa was 89%, confirming the higher inter-code agreement between the two researchers.

3. Results

The search strategy initially identified 6618 records (see Fig. 1). Following removing duplicates and screening titles and abstracts, the full text of 86 records was thoroughly assessed for eligibility. Subsequent screening, along with the inclusion of cross-references, culminated in a total of 51 articles.

All the studies included in this review were published from 1991 onward, demonstrating a relatively constant number of studies conducted over the years. Notably, there has been an increase since 2013, with peak publication years in 2015, 2020 and 2022.

Of the included studies, 49 were cross-sectional, and 2 adopted a mixed-methods approach. In the mixed-method studies, Frantz and Ngambare (Frantz and Ngambare, 2013) utilised a cross-sectional questionnaire survey and a focus group discussion, and Puig Ribera, McKenna (Puig Ribera et al., 2005) incorporated a cross-sectional questionnaire survey, focus groups and interviews. Geographically, most of the studies were conducted in North America. The representation spanned across all continents is explored in Supplementary material II.

The samples in these studies consisted of 34 with physicians, 14 with nurses, 9 with physiotherapists and 1 with psychologists. Six studies included physicians and nurses (Puig Ribera et al., 2005; Bhandari et al., 2023; Dauenhauer and Podgorski, 2002; Haussmann et al., 2020; Hurkmans et al., 2011; McKenna et al., 1998) and 1 study encompassed physicians, nurses and physiotherapists (Hurkmans et al., 2011).

The cross-sectional samples across the included studies varied widely, ranging from 34 to 3213 participants. Further details on each study's characteristics, instruments, main results, and quality assessment are detailed in supplementary material III.

The data gathered in the studies encompassed various demographic factors, professional characteristics, and other physical activity promotion-related factors. Table 1 presents data on HCPs´ and potential confounding factors reported by the included studies, highlighting their influence on physical activity promotion.

The studies included in this review employed various methodologies to assess levels of HCPs physical activity and its promotion (see supplementary material IV). Therefore, measures of each study were analysed and included in Table 2, including the characteristics of each study's sample.

4. Discussion

This systematic review included a global and comprehensive investigation exploring the relationship between HCPs' physical activity habits and their health-enhancing physical activity promotion practices. Encompassing several studies, it focuses on the most representative groups of HCPs, across the entire spectrum of healthcare provision, including primary, secondary and tertiary care.

The findings of this review indicate an empirical relationship between HCPs' physical activity habits and their disposition to address physical activity health issues with patients. Regarding the physical

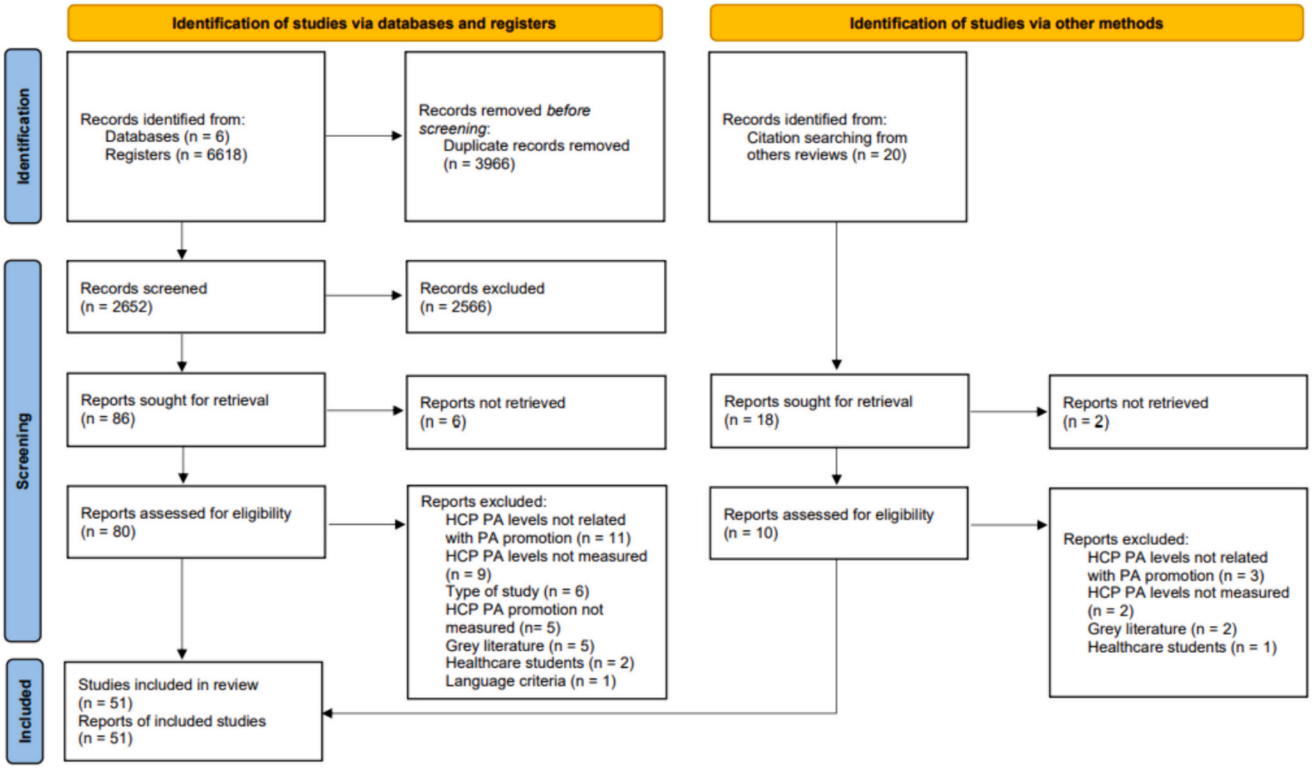

Fig. 1. PRISMA flow diagram of the study selection process.

Table 1
Healthcare professionals' data and potential confounding factors reported by the included studies.

Healthcare professionals'	Study
Age	(Abramson et al., 2000; Agadayi et al., 2020; Alahmed and Lobelo, 2019; Bakhshi et al., 2015; Kunstler et al., 2019; Lynn and Huang, 2020; Reed et al., 1991; Selvaraj and Abdullah, 2022; Silva et al., 2022)
Younger (+)	(Frantz and Ngambare, 2013; Abramson et al., 2000; Alahmed and Lobelo, 2019)
Older (+)	(Cangussu et al., 2022; Frank et al., 2010; Walsh et al., 1999)
Gender	(Abramson et al., 2000; Agadayi et al., 2020; Alahmed and Lobelo, 2019; Bakhshi et al., 2015; Kunstler et al., 2019; Lynn and Huang, 2020; Selvaraj and Abdullah, 2022; Silva et al., 2022)
Female (+)	(Alahmed and Lobelo, 2019; Frank et al., 2010; Galaviz et al., 2015; Livaudais et al., 2005)
Male (+)	(Frantz and Ngambare, 2013)
Ethnicity	(Bakhshi et al., 2015)
Height, weight, body mass index	(Selvaraj and Abdullah, 2022)
Presence of chronic medical illnesses	(Selvaraj and Abdullah, 2022)
Professional group	
Nurses (+)	(Puig Ribera et al., 2005; McKenna et al., 1998)
Physicians (+)	(Bhandari et al., 2023; Haussmann et al., 2020)
No difference between nurses and physicians	(Dauenhauer and Podgorski, 2002)
Physiotherapists (+)	(Hurkmans et al., 2011)
Number of years in practice	(Abramson et al., 2000; Agadayi et al., 2020; Bakhshi et al., 2015; Kunstler et al., 2019; Reed et al., 1991; Selvaraj and Abdullah, 2022)
More experience (+)	(Haussmann et al., 2020)
Less experience (+)	(Abramson et al., 2000)
Career position	(Agadayi et al., 2020; Bakhshi et al., 2015; Silva et al., 2022; Howe et al., 2010; O'Brien et al., 2019)
Level of education or qualification	(Bakhshi et al., 2015; Lynn and Huang, 2020; Selvaraj and Abdullah, 2022)
Speciality	(Abramson et al., 2000; Alahmed and Lobelo, 2019; Bakhshi et al., 2015; Selvaraj and Abdullah, 2022; Silva et al., 2022; Howe et al., 2010)
Primary care (+)	(Bhandari et al., 2023; Silva et al., 2022)
Family medicine (+)	(Abramson et al., 2000; Alahmed and Lobelo, 2019; Silva et al., 2022; Walsh et al., 1999; Livaudais et al., 2005; Yonis et al., 2020)
Internists (+)	(Abramson et al., 2000; Morishita et al., 2014a)
General practitioners (+)	(Haussmann et al., 2020; Morishita et al., 2014a)
Number of HCPs working in the healthcare setting	(Alahmed and Lobelo, 2019; McDowell, 1997)
Total number of patients	(McDowell, 1997)
Location of the healthcare setting	(Lynn and Huang, 2020)
Clinical practice setting	(Abramson et al., 2000; Kunstler et al., 2019; Silva et al., 2022; Stanford et al., 2014)
Knowledge about PA	
Awareness of PA recommendation guidelines	(Abramson et al., 2000; Agadayi et al., 2020; Alahmed and Lobelo, 2019; Reed et al., 1991; Silva et al., 2022; Walsh et al., 1999; Galaviz et al., 2015; O'Brien et al., 2019; Aweto et al., 2013; Burton et al., 2011; Jadhav et al., 2021; Lowe et al., 2017; Malatskey et al., 2020; Patra et al., 2015; Tuna et al., 2022)
Previous training or education about PA	(Rethorn et al., 2021; Dauenhauer and Podgorski, 2002; Agadayi et al., 2020; Alahmed and Lobelo, 2019; Reed et al., 1991; Silva et al., 2022; Galaviz et al., 2015; Howe et al., 2010; O'Brien et al., 2019; Burton et al., 2011; Malatskey et al., 2020; Patra et al., 2015; Burns et al., 2000; Rogers et al., 2006)
Available consultation time	
Average number of patients seen	(Alahmed and Lobelo, 2019; Kunstler et al., 2019; Selvaraj and Abdullah, 2022; Aweto et al., 2013)
Average consultation time	(Kunstler et al., 2019)
Barriers to PA promotion	
Lack of time	(Frantz and Ngambare, 2013; McKenna et al., 1998; Abramson et al., 2000; Alahmed and Lobelo, 2019; Silva et al., 2022; Walsh et al., 1999; Galaviz et al., 2015; Yonis et al., 2020; McDowell, 1997; Aweto et al., 2013; Jadhav et al., 2021; Patra et al., 2015; Tuna et al., 2022; Burns et al., 2000; Boka et al., 2021; Lamarche and Vallance, 2013; Morishita et al., 2014b)
Lack of knowledge	(Abramson et al., 2000; Kunstler et al., 2019; Silva et al., 2022; Yonis et al., 2020; Boka et al., 2021; Lamarche and Vallance, 2013; Morishita et al., 2014b)
Fear of risks	(Silva et al., 2022; Morishita et al., 2014b)
Doubt about the benefit for the patient	(Aweto et al., 2013; Jadhav et al., 2021; Tuna et al., 2022)
Belief that other patients' problems are more important	(Kunstler et al., 2019; Burns et al., 2000)
Skepticism about behaviour change	(Aweto et al., 2013; Tuna et al., 2022)
Lack of policy from healthcare systems and government	(Frantz and Ngambare, 2013)
Lack of incentives	(Frantz and Ngambare, 2013; Hurkmans et al., 2011; McDowell, 1997; Aweto et al., 2013; Tuna et al., 2022; Burns et al., 2000)
Inadequate referral services for PA	(Alahmed and Lobelo, 2019)
Incompatibility of PA promotion with the clinical environment	(Kunstler et al., 2019)
Lack of resources or protocols	(O'Brien et al., 2019; Yonis et al., 2020; McDowell, 1997; Jadhav et al., 2021)
Lack of evidence or specific guidelines	(Yonis et al., 2020)
Lack of perceived interest by patients	(Abramson et al., 2000; Silva et al., 2022; O'Brien et al., 2019)
Patients' preference for drugs	(Agadayi et al., 2020; O'Brien et al., 2019; Yonis et al., 2020)
Lack of patients motivation or compliance	(Abramson et al., 2000; Galaviz et al., 2015; Yonis et al., 2020; Jadhav et al., 2021; Burns et al., 2000; Boka et al., 2021; Lamarche and Vallance, 2013)
Fear of offending patients	(Lamarche and Vallance, 2013)
Lack of interest in PA promotion	(Tuna et al., 2022; Morishita et al., 2014b)
Perceived frequency of patients requesting advice on PA	(Silva et al., 2022)
Relevance attributed to PA promotion in healthcare	(Silva et al., 2022)
Self-efficacy in altering patients PA habits	(O'Brien et al., 2019)
Feeling successful in changing patient behaviour	(McKenna et al., 1998; Walsh et al., 1999; McDowell, 1997)

Abbreviations: HCPs, healthcare professionals; PA, physical activity; (+) positive influence on PA promotion.

activity level assessment, using self-reported non-validated measurements weakens the conclusions' validity. Moreover, the heterogeneity of such measurements poses a challenge in examining the overall physical activity level of HCPs, considering diverse aspects, such as comparing physical activity levels to the motivational stage for practising physical

Table 2
Physical activity promotion practices of healthcare professionals.

Physical activity promotion practice	Study
Types of interventions	
Verbal discussion	(Frantz and Ngambare, 2013; Dauenhauer and Podgorski, 2002; Abramson et al., 2000; Alahmed and Lobelo, 2019; McDowell, 1997; Burns et al., 2000; Boka et al., 2021; Mouton et al., 2014; Stanton et al., 2015)
Provide PA written materials	(Frantz and Ngambare, 2013; Dauenhauer and Podgorski, 2002; Abramson et al., 2000; Agadayi et al., 2020; Alahmed and Lobelo, 2019; Burns et al., 2000; Boka et al., 2021)
Brief counselling	(Jadhav et al., 2021; Tuna et al., 2022)
Exercise prescription	(Frantz and Ngambare, 2013; Agadayi et al., 2020; Silva et al., 2022; Walsh et al., 1999)
PA assessment	(Rethorn et al., 2021; Galaviz et al., 2015; Stanford et al., 2014; Jadhav et al., 2021; Lowe et al., 2017)
Referral to a health or exercise professional	(Abramson et al., 2000; Alahmed and Lobelo, 2019; Silva et al., 2022; Walsh et al., 1999; Burns et al., 2000; Mouton et al., 2014; Stanton et al., 2015)
Ressource distribution	(Frantz and Ngambare, 2013; McDowell, 1997; Tuna et al., 2022; Stanton et al., 2015)
Demonstration of exercises	(Dauenhauer and Podgorski, 2002; Abramson et al., 2000; Jadhav et al., 2021)
Follow-up of PA progress	(Alahmed and Lobelo, 2019; McDowell, 1997; Mouton et al., 2014)
Request of diagnostic tests	(Silva et al., 2022)
Counselling strategies related to PA / active living	(Silva et al., 2022)
Type of exercise counselling	(Dauenhauer and Podgorski, 2002; Abramson et al., 2000; Tuna et al., 2022)
Multiple strategies	(Dauenhauer and Podgorski, 2002; Abramson et al., 2000)
Target population	
Healthy patients	(Abramson et al., 2000; Galaviz et al., 2015; Boka et al., 2021)
Chronic non-communicable diseases	(Galaviz et al., 2015; Malatskey et al., 2020; Patra et al., 2015; Helal and El-Awady, 2022)
Cardiovascular disease	(Abramson et al., 2000; Agadayi et al., 2020; Selvaraj and Abdullah, 2022; Morishita et al., 2014a; McDowell, 1997; Patra et al., 2015; Boka et al., 2021; Lamarche and Vallance, 2013; Morishita et al., 2014b; Hung et al., 2013)
Endocrinologic disease	(Abramson et al., 2000; Agadayi et al., 2020; Boka et al., 2021; Lamarche and Vallance, 2013)
Musculoskeletal or rheumatic disease	(Hurkmans et al., 2011; Abramson et al., 2000; Agadayi et al., 2020; Kunstler et al., 2019; Selvaraj and Abdullah, 2022; McDowell, 1997)
Respiratory disease	(Agadayi et al., 2020; Selvaraj and Abdullah, 2022; Patra et al., 2015)
Psychiatric disease	(Abramson et al., 2000; Agadayi et al., 2020; McDowell, 1997; Patra et al., 2015)
Oncologic disease	(Haussmann et al., 2020; Karvinen et al., 2015; Abramson et al., 2000; Cangussu et al., 2022; Livaudais et al., 2005; Patra et al., 2015)
Neurologic disease	(Agadayi et al., 2020)
Age groups	
Adults	(Abramson et al., 2000; Alahmed and Lobelo, 2019)
Children	(Abramson et al., 2000; Alahmed and Lobelo, 2019)
Pregnant women	(Alahmed and Lobelo, 2019)
Older adults	(Dauenhauer and Podgorski, 2002)
New or established patient	(McDowell, 1997)

Abbreviations: PA, physical activity.

activity, potential confusion between physical activity and exercise definitions, various periods (e.g., last 7 days, last month, last 12 months), global locations and individual characteristics of HCPs. If we categorise HCPs based on their regular physical activity levels, with more than 75% of those engaging in regular physical activity classified as having a high physical activity level, over 50% participating in regular physical activity are considered to have a moderate physical activity level, and less than half practising regular physical activity falling into the low physical activity level, it becomes evident that there is a need for HCPs to enhance their physical activity levels (see supplementary material V). This analysis reinforces the conclusion when considering only studies that used validated questionnaires to assess physical activity levels.

When addressing HCPs' physical activity promotion practices, there was not a validated tool that could be used to study the outcome appropriately. The heterogeneity of measurements once again posed a challenge to the study of the overall physical activity promotion level of HCPs. If we classify HCPs based on their regular promotion of physical activity, we may conclude that there is room for improvement in HCP's physical activity promotion practice (see supplementary material V). Bearing in mind the several types of interventions for physical activity promotion, verbal brief counselling was the preferred way of physical activity promotion in the included studies. Given the barriers to physical activity promotion, more complex and time-consuming interventions may be challenging to apply in routine clinical practice (Silva et al., 2023). Although not frequently reported in the included studies, HCPs are advised to screen patients' physical activity levels at every consultation as the first step for physical activity promotion (Silva et al., 2023). Most studies in this review focused on physical activity promotion to chronic non-communicable diseases, reflecting evidence that HCPs most frequently ask about physical activity when seeing patients with symptoms of conditions that could benefit from exercise, rather than asking all patients, new patients or patients previously seen (Bull et al., 1995). However, it is crucial to reinforce that physical activity has the potential to be an important therapeutic agent for all ages in primary, secondary and tertiary prevention of chronic diseases (Thornton et al., 2016).

Several factors related to HCPs, such as demographics and professional characteristics, should be considered as potential mediators to reflect the potential diversity of health-promotion practices. In this review, female physicians were identified as more likely to promote physical activity when compared to male physicians, aligning with previous literature stating that the female gender is an independent factor related to counselling practice (Fie et al., 2013). Regarding age and professional experience, conflicting conclusions were drawn regarding which HCPs promote physical activity the most. However, there is evidence that older physicians (Sherman and Hershman, 1993) and those in practice longer are more likely to provide counselling (Karvinen et al., 2015). Previous literature reported that more nurses promoted physical activity with their patients than physicians (Fie et al., 2013). However, the results of this review could not support that a professional group promotes physical activity more than the others, highlighting the importance of a broad range of HCPs contributing to physical activity promotion in clinical practice (Crisford et al., 2018). Regarding medical speciality, in this review, primary care physicians were identified as the ones who promoted physical activity the most, echoing the importance and effectiveness of their physical activity advice and counselling (Shuval et al., 2017).

The four components of the COM-B model (Michie et al., 2014) were used as a framework for discussion, as we understand the challenge of changing behaviours in this complex perspective (Skivington et al., 2021). As a parallelism to our review, behaviour occurrence would be predicted by HCPs' capability to perform the behaviour, opportunity to implement it and motivation (see Fig. 2). Studies need to consider all these factors when concluding the impact of 'physical capability' (HCPs' physical activity habits) on physical activity promotion. Doing so makes

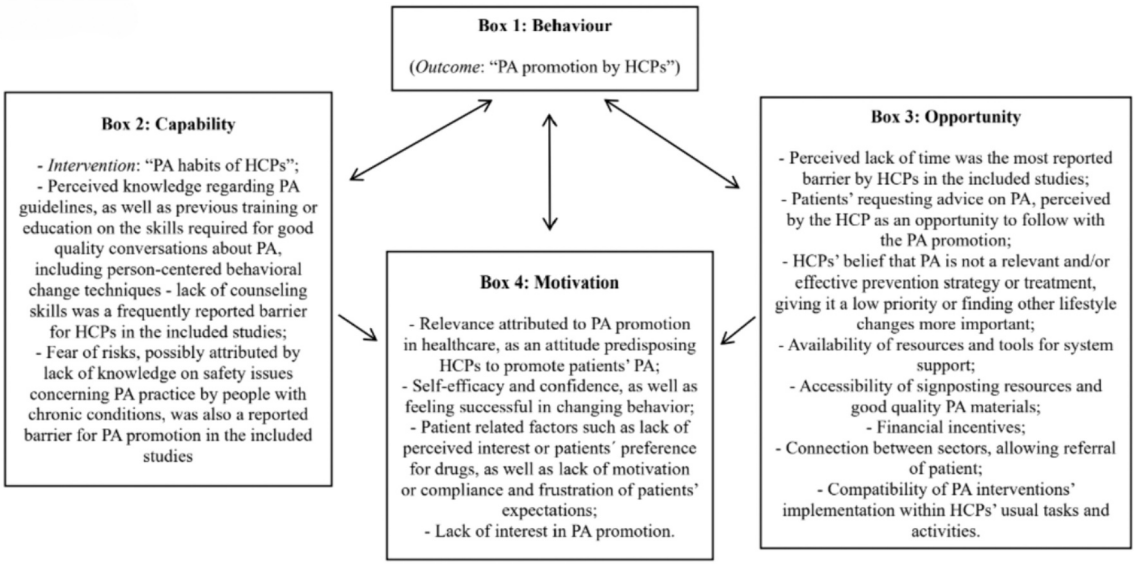

Fig. 2. Framing the results under the COM-B model.

it possible to address potential confounding factors that need to be adjusted to consider the conclusions.

Regarding the quality of the studies included, several limitations turned into challenges that must be addressed. Firstly, using a cross-sectional questionnaire survey with voluntary participation as a study method implied a selection bias, since those who are more physically active or more aware of the importance of regular physical activity are more likely to participate in the studies. Additionally, studies relied on self-reports, so results may be subject to different biases, such as recall bias or a social desirability bias (considering that recommendations from HCPs to promote physical activity are expected in current clinical practice). Additionally, none of the studies used patients as a source to assess the physical activity promotion practice of HCPs, in a way of confronting if the self-reported practice of HCPs is indeed what is being described. The included studies have weaknesses and strengths (detailed in supplementary material IV) regarding NOS criteria. On the downside, sample size, representativeness, and response rate were poor. Also, most of the studies used non-validated physical activity level assessment tools, and the outcome was self-reported. On the positive side, most of the studies had in mind potential confounding factors and described clearly the statistical methods used.

Addressing the research question of this review, a prevailing perspective suggests a positive correlation between HCPs personal physical activity habits and their engagement in physical activity promotion. This viewpoint is substantiated by a substantial number of studies supporting this connection (detailed in supplementary material V). Notably, this association persisted prominently in good and very good quality studies. Moreover, a quasi-experimental study implementing a fitness program for resident physicians found significant improvements in physicians´ counselling confidence and perceived success with the exercise program (Rogers et al., 2005). Conversely, six good-quality studies found no relationship between personal physical activity habits and physical activity counselling. In line with this, a randomised controlled trial failed to establish a significant correlation between physicians' physical activity (mean daily steps recorded by a pedometer) and their intention to promote physical activity (James et al., 2009). Furthermore, a study highlighted that patients recalled very low levels of lifestyle counselling advice delivered by nurses, despite nurses holding very positive views about health promotion in general (Duaso and Cheung, 2002).

Acknowledging potential biases in the conclusions due to the above factors is essential. However, the limited number of well-designed studies prevents us from refuting the overwhelming evidence supporting the theoretical positive relationship between HCPs personal physical activity and their physical activity promotion practices.

4.1. Limitations

Our search identified 19 good or very good-quality studies distributed across continents: North America, South America, Europe, Africa and Asia. This diverse geographical spread enhances our confidence in the generalizability of our results. Moreover, we managed to include all HCPs groups relevant to promoting physical activity in clinical practice, with the only exception being nutritionists, thereby supporting the representativeness of our findings. Additionally, our review explored physical activity promotion comprehensively without restricting it to a specific intervention or target group, making our results applicable to a broad range of physical activity interventions. However, it's important to note some limitations in our study. Given the variations in physical activity levels and physical activity promotion measurements, conducting a meta-analysis to quantify each study's impact on addressing the research question could be interesting. However, due to the broadness of the concepts (e.g., physical activity versus exercise), the diversity of HCPs groups (some with limited related studies), varied healthcare settings and numerous measurement methods which assess different types of physical activity, it would not be sensible to compare studies addressing different issues. Nevertheless, we believe that our review effectively addressed the research question.

4.2. Future research

There is a need for well-designed prospective studies to deepen our understanding of how personal physical activity levels influence HCPs´ physical activity promotion practices, emphasising the importance of exercise as a regulated physical activity practice aimed at improving physical capacities. These studies should include which types and levels of physical activity practised by HCPs are more effective in fostering this relationship. Methodological improvements should include objective measures that do not rely on self-reports for assessing physical activity and related health promotion activities, along with measures that can be cross-validated with patient feedback. Physical activity promotion scales should undergo formal testing for reliability and validity, and additional potential confounding factors should be explored as mediators. There is also a pressing need for studies involving other HCPs

groups, such as nutritionists, and higher-quality studies focusing on psychologists.

5. Conclusions

The comprehensive nature of our review contributes to the understanding that improving physical activity levels among HCPs can enhance their ability to promote and counsel physical activity in clinical practice. Therefore, interventions to empower HCPs in promoting and counselling physical activity should include strategies to boost their physical activity levels. Higher levels of physical activity among HCPs are likely to be associated with increased promotion and counselling of physical activity among their patients, which is a matter of public health awareness.

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CRediT authorship contribution statement

Margarida D. Borges: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. **Tiago D. Ribeiro**: Data curation, Formal analysis, Investigation, Methodology, Writing – original draft. **Miguel Peralta**: Data curation, Investigation, Validation, Visualization, Writing – review & editing. **Bruna R. Gouveia**: Resources, Supervision, Visualization, Writing – review & editing. **Adilson Marques**: Conceptualization, Methodology, Resources, Supervision, Validation, Writing – review & editing.

Declaration of competing interest

The authors declare no conflicts of interest.

Data availability

The datasets of the study are available from the corresponding author on reasonable request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ypmed.2024.108069.

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