

Review article

**Medical knowledge on physical activity counseling and prescription:
a scoping review***Conhecimento médico sobre aconselhamento e prescrição de atividade física:
uma revisão de escopo***Debora Borowiak Reiss¹, Diego Augusto Nunes Rezende², Bruno Gualano³**

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ABSTRACT: It is well established in the medical literature that the practice of physical activity (PA) is beneficial to health, being able to prevent and treat chronic diseases, in addition to promoting health and quality of life. However, the prevalence of physical inactivity in the population has increased in recent years, especially in the context of the Covid-19 pandemic. A scoping narrative review was carried out with the objective of synthesizing data on the level of knowledge and medical prescription of PA. Pubmed and Lilacs were used to identify relevant articles between 1990 and 2022 on the central topic. Of the 1558 references searched, 319 were considered eligible, of which 60 are included in the present review, selected by relevance to the proposed theme. Medical guidelines on a healthy lifestyle are well accepted by the population, characterizing the bond of trust in the doctor-patient relationship. However, few professionals put into practice the assessment of PA levels of their patients. Those who do are usually active and adopt healthy lifestyle habits. Among the barriers described, the lack of time and specific knowledge were the most significant. In practice, few universities offer specific training or disciplines on PA counseling and prescription in undergraduate courses and residency programs. Thus, for the regular practice of PA to be integrated into the health system, it is imperative to include theoretical and practical training on PA at all levels of medical training.

KEYWORDS: Physical activity; Exercise; Medical education.

RESUMO: É bem estabelecido na literatura que a prática de atividade física (AF) é benéfica à saúde, sendo capaz de prevenir e tratar doenças crônicas, além de promover saúde e qualidade de vida. No entanto, a parcela da população insuficientemente ativa vem aumentando nos últimos anos, especialmente no contexto da pandemia de Covid-19. Uma revisão de escopo foi realizada com objetivo de sintetizar dados sobre o nível de conhecimento e da conduta médica em relação à prescrição de AF. Esta revisão utilizou as bases de dados PubMed e LILACS para as buscas, delimitando as publicações entre 1990 e 2022. Das 1558 referências pesquisadas, 319 foram consideradas elegíveis, das quais 60 foram selecionadas para a presente revisão. Orientações médicas sobre estilo de vida saudável são bem aceitas pela população, caracterizando o laço de confiança na relação médico-paciente. Porém, poucos profissionais avaliam a prática de AF de seus pacientes. Aqueles que avaliam a AF geralmente são ativos e adotam hábitos saudáveis de vida. Dentre as barreiras descritas a falta de tempo e de conhecimento específico foram as mais significativas. Poucas universidades oferecem treinamentos ou disciplinas específicas sobre aconselhamento e prescrição de AF nos cursos de graduação e nos programas de residência médica. Desse modo, para que a prática regular de AF seja integrada ao sistema de saúde, é imperativo incluir treinamento teórico e prático sobre AF em todos os níveis de treinamento médico.

PALAVRAS-CHAVE: Atividade física; Exercício; Educação médica.

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INTRODUCTION

The practice of physical activity (PA) has been associated with a reduction in the risk of developing several chronic diseases^{1,2,3}, as well as an improvement in quality of life and a reduction in mortality^{4,5}. In this context, several world-renowned institutions have published reports and guidelines on the regular practice of PA^{3,6,7} and the recommendation of PA is included in at least 39 international guidelines as a form of treatment for chronic diseases, according to the review carried out by Weiler et al.⁸.

In addition to the effects of PA on morbidity and mortality, there are clear economic reasons for trying to increase PA levels in the population, since compared to active patients, inactive patients cost more than US\$1,500 per year⁹. However, despite all the constituted and solidified knowledge about the benefits of PA for health, physical inactivity, in addition to being a high cost for public system, is also considered one of the most important problems related to health in the 21st century.

The current scenario of increased prevalence of physical inactivity, added to the serious health, economic and social crisis resulting from the Covid-19 pandemic¹⁰, highlights the urgency of defining effective strategies to increase the level of PA in the population¹¹, including medical advice. In this context, it is the physician's role to promote PA and educate patients about health, however several barriers are described to explain why counseling and prescription of PA is not put into practice by most professionals. The main obstacle to this paradigm shift seems to reside in lack of knowledge, since physicians do not have specific training regarding PA, since this topic is not addressed in the undergraduate curricula of the main public colleges in the country just as it is non-existent in the practical learning of medical residency. Given the scarcity of Brazilian studies related to medical knowledge and practice on PA counseling, the need for a detailed assessment of the national context is evident.

OBJECTIVE

This scope review aims to summarize data about the knowledge and behavior of physicians in relation to the prescription of physical activity.

METHODS

The present study consists of a

scope review that was designed to address the following questions: “Do doctors know about the benefits of physical activity for their patients? Do physicians know how to assess and prescribe physical activity in a structured way?”. Thus, the search for studies was carried out, following the protocol proposed by Peters *et al*¹², based on the PICo strategy (Population, Interest, Context) and the search for the following isolated and combined keywords selected from the available DeCS/MESH tool in the virtual health library, in association with Boolean operators: medical education, counseling and exercise. The selection of descriptors is in accordance with a survey of the most frequent keywords found in 42 relevant articles on the subject that served as initial reading for the development of this review. The search databases were Pubmed and LILACS. When available, the following filters were selected: clinical trial, guideline, meta-analysis, multicenter study, observational study, randomized controlled trial, review, systematic review, humans. In addition, the analysis period was limited between 01/01/1990 to 12/08/2022.

All titles and abstracts were reviewed by two authors in order to identify relevant articles. In the first stage of the search, duplicate articles were removed, then the full texts were systematically analyzed. In addition, the search protocol was completed by selecting articles identified as relevant in the reference list. Differences related to the screening of articles were discussed between the two authors and resolved by consensus. Figure 1 summarizes the research process.

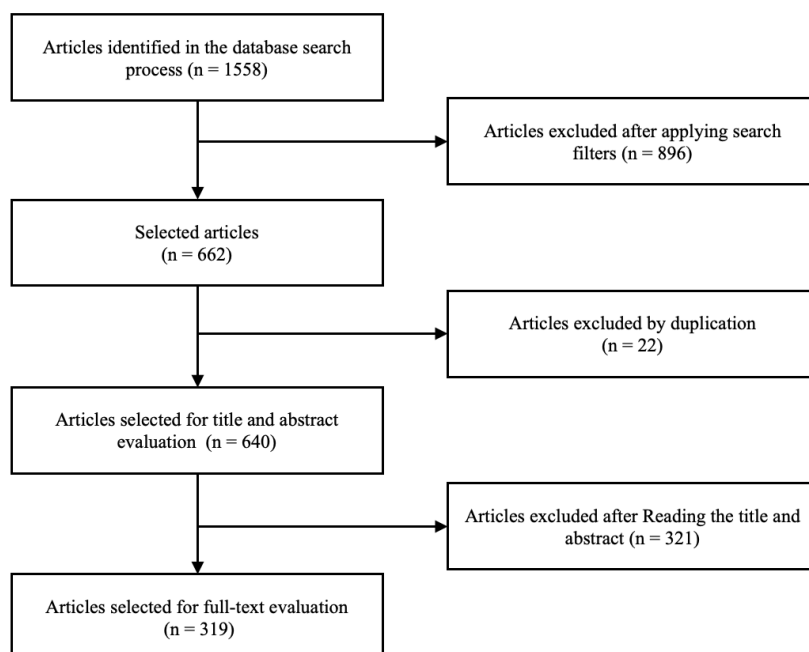


Figure 1 - Data search and collection process

RESULTS

Of the 1558 references searched, 319 were considered eligible, of which 60 are included in this review, selected for their relevance to the proposed theme (Table

1). Considering the articles included, the publication dates ranged from 1975 to 2021, the studies were carried out mainly in the USA (30 studies) and England (10), with 8 Brazilian publications and the synthesis of the findings are described in the summary table.

Table 1 - Studies included in this review

YEAR	TITLE	1st AUTHOR
1975	Will physicians of the future be able to prescribe exercise?	Burke EJ
1983	Exercise medicine': the knowledge and beliefs of final-year medical students in the United Kingdom	Young A
1985	Preventive care attitudes of medical students	Scott CS
1988	A cost-effectiveness analysis of exercise as a health promotion activity	Hatziaandreu EI
1992	A survey of physicians' attitudes and practices related to exercise promotion	Williford HN
1998	Barriers to physical activity promotion by general practitioners and practice nurses	McKenna J
1999	Exercise counseling by primary care physicians in the era of managed care	Walsh JME
2000	Correlates of physicians' prevention-related practices	Frank E
2001	Exercise behavior among female occupational health nurses: influence of self efficacy, perceived health control, and age	Piazza J
2001	Graduating medical students' exercise prescription competence as perceived by Deans and Directors of Medical Education in the United States: implications for Healthy People 2010	Connaughton AV
2002	An obligation for primary care physicians to prescribe physical activity to sedentary patients to reduce the risk of chronic health conditions	Chakravarthy MV
2002	Physical activity curricula in medical schools.	Garry JP
2004	Cardiovascular disease prevention counseling in residency: resident and attending physician attitudes and practices	Tsui JI
2004	Impact of a preventive medicine and nutrition curriculum for medical students	Conroy MB
2005	Health care charges associated with physical inactivity, overweight, and obesity	Anderson LH
2005	Physical activity counseling in the adult primary care setting: position statement of the American College of Preventive Medicine	Jacobson DM
2005	Medical students' self-reported typical counseling practices are similar to those assessed with standardized patients	Frank E
2006	Translating effective clinic-based physical activity interventions into practice	Estabrooks PA
2006	Dissemination of physical activity evidence, programs, policies, and surveillance in the international public health arena	Bauman AE
2007	Ageing and physical activity: evidence to develop exercise recommendations for older adults	Paterson DH
2007	Physical activity counseling and prescription among Canadian primary care physicians	Petrella RoJ
2008	Physical activity levels and counseling practices of U.S. medical students	Frank E
2009	Physical activity habits of doctors and medical students influence their counselling practices	Lobelo F
2009	ELSA Brasil: maior estudo epidemiológico da América Latina	MS
2009	General practitioners' perceptions and practices of physical activity counselling: changes over the past 10 years	Buffart L
2010	Atividade física e redução de custos por doenças crônicas ao Sistema Único de Saúde	Bielemann RM
2011	Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise	Garber CE
2011	Are physical activity interventions in primary care and the community cost-effective?	Garrett S
2011	Physical activity in U.S. adults: compliance with the physical activity guidelines for Americans	Tucker JM

continue

continuation

YEAR	TITLE	1st AUTHOR
2012	Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review	Hébert ET
2012	Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials	Orrow G
2012	Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy	Lee IM
2012	Physical activity education in the undergraduate curricula of all UK medical schools: are tomorrow's doctors equipped to follow clinical guidelines?	Weiler R
2012	Healthy People Final Review 2010	NCHS
2012	Medicolegal neglect? The case for physical activity promotion and Exercise Medicine	Weiler R
2013	Physical activity counselling in sports medicine: a call to action	Joy E
2013	Brief health professional-provided interventions may lead to small improvements in physical activity	Hillsdon M
2013	Major limitations in knowledge of physical activity guidelines among UK medical students revealed: Implications for the undergraduate medical curriculum	Dunlop M
2014	Factors that influence physicians' and medical students' confidence in counseling patients about physical activity	Stanford FC
2014	Prática de atividade física, adiposidade corporal e hipertensão em usuários do Sistema Único de Saúde	Turi BC
2015	Effectiveness of physical activity promotion interventions in primary care: a review of reviews	Sanchez A
2015	Effect of physical inactivity on major noncommunicable diseases and life expectancy in Brazil	de Rezende LFM
2015	Factors influencing primary health care professionals' physical activity promotion behaviors: a systematic review	Huijg JM
2015	Burden of physical inactivity and hospitalization costs due to chronic diseases	Bielemann RM
2015	Training tomorrow's doctors, in exercise medicine, for tomorrow's patients	Gates AB
2016	Lifestyle medicine curriculum for a preventive medicine residency program: implementation and outcomes	Nawaz H
2016	Are we adequately preparing the next generation of physicians to prescribe exercise as prevention and treatment? Residents express the desire for more training in exercise prescription	Solmundson K
2017	Trends and disparities in the prevalence of physicians' counseling on exercise among the U.S. adult population, 2000–2010	Ahmed NU
2017	Primary care resident training for obesity, nutrition, and physical activity counseling: a mixed-methods study	Antognoli EL
2018	Physical Activity Guidelines for Americans	USDHHS
2018	Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants	Guthold R
2018	Exercise is Medicine Canada physical activity counselling and exercise prescription training improves counselling, prescription, and referral practices among physicians across Canada	Fowles JR
2018	Medical school Graduation Questionnaire 2018 All Schools Summary Report	AAMC
2018	Embedding sports and exercise medicine into the medical curriculum; a call for inclusion	Pandya T
2019	Noncommunicable diseases and mental health Reducing risk factors: physical inactivity	WHO
2019	As 15 melhores faculdades de medicina do Brasil em 2018	Gasparini C
2020	WHO guidelines on physical activity and sedentary behaviour	WHO
2020	Social isolation during the COVID-19 pandemic can increase physical inactivity and the global burden of cardiovascular disease	Peçanha T
2021	Impact of sedentarism due to the COVID-19 home confinement on neuromuscular, cardiovascular and metabolic health: Physiological and pathophysiological implications and recommendations for physical and nutritional countermeasures	Narici M
2021	Gaps on rheumatologists' knowledge of physical activity	Astley C

Note - MS: Brazilian Ministry of Health; NCHS: National Center for Health Statistics; USDHHS: U.S. Department of Health and Human Services; AAMC: Association of American Medical Colleges; WHO: World Health Organization.

SUMMARY BOX**What we know**

- Counseling and prescription of physical activity are effective and cost-effective strategies in promoting a healthy lifestyle.
- It is possible to generate savings for the public system and improve the redirection of funds from the adherence to physical activity by the population.
- Active physicians are more likely to adopt healthy lifestyle habits, to have a more positive attitude towards physical activity counseling.
- Lack of knowledge or training in counseling and prescription of physical activity are the most common barriers described by physicians who do not assess and guide their patients about physical activity.
- Few medical schools around the world offer a specific discipline on physical activity in their curricula.
- Improvements in medical training in physical activity counseling and prescription should be encouraged in order to increase the physically active portion of the population.

What we still don't know:

- Prevalence of Brazilian physicians who assess their patients' physical activity levels and routinely recommend or prescribe physical activity.
- Prevalence of physical inactivity in the Brazilian medical population.
- Impact of formal training of physicians for the prescription of physical activity on the levels of physical activity in the Brazilian population.

Summary box. Evidence summary.

DISCUSSION**Prevalence of insufficient PA practice in the population**

Even before the Covid-19 pandemic, the World Health Organization (WHO) already assessed physical inactivity as the fourth leading risk factor for global mortality¹³. It is also estimated that it represents about 6% of the global mortality rate² and that it is responsible for 6 to 10% of the main non-communicable diseases in the world⁵. A review from 2012⁵ estimates that there are 5.3 million deaths/year due to physical inactivity and that if the prevalence of inactivity were reduced by 25%, 1.3 million deaths/year could be avoided. However, this situation may be even more serious, since the real impact of global social isolation related to the Covid-19 pandemic has not yet been properly defined. A projection carried out by Peçanha et al.¹⁴ estimates that the number of deaths from all causes could increase from 535,000 to 2.7 million, considering a hypothetical increase in physical inactivity of 10 to 50% during the Covid-19 pandemic.

Many highly prevalent chronic non-communicable diseases in both developed and developing countries are associated with physical inactivity. A 2018 study estimates that more than a quarter (27.5%) of the world's adult population is physically inactive and the distribution of this percentage is variable¹⁵. The highest levels of prevalence of physical inactivity were found in women from Latin America and the Caribbean (43.7%), in addition to Asia (43%), while the lowest levels refer to men from Oceania (12.3%), from southwest Asia (17.6) and sub-Saharan Africa (17.9%)¹⁵. In general, developed countries have a larger portion of the physically inactive population (36.8%) when compared to underdeveloped countries (16.2%)¹⁵.

In Brazil, 47% of the adult population is considered insufficiently active¹⁵. A research carried out by Bielemann et al.¹⁶ identified a higher prevalence of physical inactivity in the North and Northeast regions, and the lowest was

found in the South region, for both sexes. In the city of São Paulo, it is estimated that approximately 64.2% of the adult population is insufficiently active¹⁷. A Brazilian study¹⁸ evaluated the impact of physical inactivity on morbidity and mortality rates for four chronic diseases (cardiovascular diseases, type 2 diabetes, breast cancer, colon cancer) and found that physical inactivity represented 3 to 5% of the incidence rates of these diseases and 5.3% of all-cause mortality rates. Such results reinforce the role of physical inactivity as an important risk factor, causing a significant impact on the burden of chronic diseases in the Brazilian population¹⁸.

As physical activity is considered by the United Nations as a milestone in the fight against non-communicable chronic diseases¹⁹, in addition to being one of the main modifiable risk factors for chronic diseases, the current scenario of prevalence of physical inactivity highlights the importance of defining effective strategies to increase the PA level of the population. Paterson et al.⁴ proposed that increasing PA levels is the most important intervention to improve health in populations, since, based on existing evidence, increasing PA levels is a first-line intervention with a good relationship cost-effective way to prevent and treat many chronic diseases.

Physical activity as a basis for cost reduction in the public health system

Thousands of lives and substantial health care costs can be saved by adopting increasing levels of PA across the population. Several studies have been carried out in the US in recent years to assess the impact of physical inactivity on public system. Recent data demonstrate that if all inactive Americans started exercising regularly, more than 10% of all US deaths could be prevented or delayed⁵ and annual health care costs could be reduced by US\$107.7 billion²⁰. In Brazil, a study carried out in 2007 shows that about 70% of deaths were linked to chronic non-communicable diseases, considering the most

prevalent causes of morbidity in the country¹⁶. According to data from the Ministry of Health, among expenses with Hospital Admission Authorizations (except birth rates), 58% of them were related to chronic diseases²¹. Of the total hospital admissions in the Brazilian public system in 2013, 15% were linked to physical inactivity, which led to a total estimated cost of R\$275.650.000 (US\$732.500.000)¹⁶.

Studies on the influence of PA on the costs of the public health system are scarce. Bielemann et al.²² estimated that costs could be reduced if patients with cardiovascular diseases and diabetes were encouraged to practice PA. The economic impact would be 50% reduction in hospitalization costs for cardiovascular diseases and 13% reduction in hospital admission costs related to diabetes, if the entire population became physically active²². In a more realistic scenario, a reduction of just 10% in the prevalence of physical inactivity in the Brazilian population would generate savings of approximately R\$24 million (US\$64 million) in hospital admissions due to chronic diseases¹⁶.

Physician's role in prescribing physical activity

In order to break the existing paradigm between the benefits of PA for health and the prevention of chronic diseases and the growing prevalence of physical inactivity in the world population, it is necessary that PA be integrated into the health system¹⁹. In this sense, PA counseling and prescription have proven to be powerful^{6,7,11,23,24} and cost-effective^{25,26} strategies, being considered the first step to raise the level of PA in patients²⁷. Both physician-provided PA-related counseling and PA prescription have been shown to increase not only patients' PA levels but also quality of life^{24,28}.

Thus, it is the physician's task to promote PA and advise on a healthy lifestyle, in addition to educating patients about health-related risk factors²⁸. Such a mission is considered a professional responsibility by the doctors themselves and also expected by patients who consider doctors as a reliable source of information^{8,28}. In this way, medical advice is seen as an especially conducive mode of communication, recommended by the American College of Sports Medicine⁷ and the US Department of Health and Human Services and the Center for Disease Control and Prevention (CDC)³.

In this context, some facilitating factors were identified in relation to counseling patients about PA. Different studies have concluded that physicians' physical activity levels are related to the likelihood that they advise patients about PA^{24,29,30,31}. Hillsdon³² reported that physically active physicians were three times more likely to regularly promote PA in their patients. Indeed, according to the CDC physicians should exercise not only to benefit their own health, but also to endorse an active lifestyle more credibly³³, since if physicians convey their personal positive PA habits, patients will find the advice of more

plausible and motivating PA. The literature also points out that female doctors are more likely to advise on PA than males doctors³⁰.

However, many physicians do not assess their patients' PA levels^{1,6,34} and indeed, only a small percentage of patients are counseled about PA³⁵. In general, 43% of new patients and more than half of patients already treated are not asked about PA³⁶. An American study identified that only 28% of patients reported receiving advice from their doctors about PA, while only a third of them received advice on how to formulate a specific activity plan³⁷. In order to corroborate these data, in Canada, only 16% of physicians provide written PA prescription to their patients³⁸. Taken together, these findings indicate substantial neglect of PA despite growing evidence of its importance in health promotion and treatment of chronic diseases⁸.

In view of this contrast, several studies have focused on identifying the barriers related to the low frequency of PA recommendation, including among the main ones cited, the demand for time, lack of training and experience in behavioral change, lack of confidence (or low self-efficacy), low motivation, lack of tools or resources and perception of patients desinterest^{1,7,31,39,40,41,42}.

Medical lack of knowledge regarding the recommendation and prescription of PA

Physicians report that lack education not only about benefits of PA, but also specific knowledge about how to write an effective exercise prescription, as well as counseling strategies that promote real changes in behaviour⁴⁰. Indeed, a systematic review of 19 studies, conducted with primary care physicians from the US, Canada, Europe and Australia, indicated that "lack of time" was the most cited barrier to PA counseling (14 of 19 studies). The second most common barrier was "lack of knowledge or training in PA counseling" (8 of 19 studies)⁴¹. This finding was consistent with a recent systematic review that demonstrated that lack of adequate education about PA was the most important barrier to promoting PA⁴³. Therefore, structured medical education in PA and counseling training are essential.

According to the Association of American Medical Colleges (AAMC)⁴⁴, nearly half of physicians reported receiving inadequate medical education in risk assessment and counseling skills. Separate data from two American medical schools indicated that students recognize the importance of regular PA practice, but few feel prepared to advise patients regarding physical activity^{23,45}. According to the *2000 Medical Graduation Questionnaire*, over 90% of graduates believed that physicians can be more influential in areas of disease prevention and health promotion, yet nearly half reported receiving inadequate medical education in risk assessment and PA counseling skills⁴⁶. A study carried out by Young et al.³⁹ revealed that only 3% of physicians had

taken a university-level course related to forms of exercise prescriptions. Sixty-three per cent of UK medical students reported that they received too little instructions about the medical aspects of exercise and another 37% felt they were unduly ignorant of the medical aspects of exercise³⁹.

Even in the training of specialists in primary care, this learning deficit was identified. Insufficient educational opportunities have been cited as a major contributor to not prescribing physical activity⁴⁷, with most Family medicine residents wanting more PA prescribing training, citing their training as being inadequate⁴⁸.

In 2007 in Australia, less than half of physicians reported attending continuing education courses (CEC) and this proportion is considerably lower compared to previous years⁴⁹. As physicians who participated in the CEC were more likely to advise on PA, the frequency of CEC should be encouraged among physicians, and appropriate CEC opportunities should be created⁴⁹. However, CEC alone seems to be insufficient, considering the small changes in physician's counseling behavior, despite contributing, for example, to increased self-efficacy and frequency of PA prescription^{1,8}. Consequently, it is important to move beyond "information-only" strategies to structural changes, including policies, environmental supports, and learning systems that will support the adoption of evidence-based PA programs into clinical practice^{36,49}.

Medical curriculum does not include PA prescription

The current burden of chronic diseases for public health services, the finding that the majority of the adult population does not participate in any regular PA, and the relatively small percentage of physicians who advise patients about physical activity, indicate the need for an assessment to that PA and health education be included in medical school curricula^{6,29,45}, as graduation may be an appropriate time to provide this type of education and skill development for future physicians.

The US Association of Teacher of Preventive Medicine developed a medical curriculum guide for disease prevention and health promotion, according to which PA education would be appropriate⁵⁰. And a proposal so that curricula can transmit knowledge and skills of clinical prevention in medical education³⁰ is contained in this guide. More specifically, this proposal was interpreted to include not only knowledge of risk factors, but also their modification and skills to assist patients in the behavioral change process. In addition, the recent consensus of medical school deans was that health promotion, disease prevention and the doctor-patient relationship are the most important curricular topics to ensure the success of future physicians⁵¹. This argument is reinforced by the fact that 78% of the physicians studied stated that there was a need for a course related to PA in medical school⁵². Likewise, there are reports of medical students who feel that they are

unprepared to advise patients on diet and PA and pessimistic about their ability to learn these skills⁴⁵.

From current data, it appears that medical schools have placed little emphasis on training physicians to prescribe PA^{46,52,53}. In 2010, 10% of US medical school deans said they believed graduates could provide a PA prescription for their patients, yet only 6% had a core curriculum in the PA guidelines⁵¹. Studies of medical schools in the US and UK rated PA as "sparse or non-existent" content and recommended, over 10 years ago, that urgent changes should be made to the curriculum to equip clinicians with the knowledge and skills needed to effectively promote PA^{46,53}. The curriculum can and should be integrated into several courses including physiology, musculoskeletal system, cardiology, pneumology, endocrinology, primary care, pediatrics, internal medicine and public health²⁸. Schools that incorporate PA into the curriculum provide knowledge and skills that students can incorporate and practice throughout their course and career.

Despite general data on health promotion and disease prevention curricula, there is little information that specifically assesses whether medical schools are providing instructions on PA or exercise, as this data does not exist in Brazil, as far as we know. More than four decades ago Burke e Hultgren⁵⁴ reported that 12 US medical schools offered a course addressing PA as preventive medicine⁵⁴. A study carried out by Frank²⁹ showed that only 13 of the 102 participating schools (12.7%) provided instructions to medical students about the benefits of PA for health, and only six of them (46%) required this topic in the curriculum. The remaining 89 medical schools (87%) did not offer such a curriculum and, in addition, 76% noted that their schools had no plans to introduce this type of topic into the formal content of the medical curriculum. It was also described that while the majority of respondents (61%) believed that it was the responsibility of medical schools to educate students about PA, only 24% of respondents felt that their graduates were well prepared to advise patients on the benefits of PA for health^{29,46}.

In Brazil, the main medical schools do not offer a discipline related to PA and health promotion and treatment of chronic diseases. Even the best medical school in the country⁵⁵ only offers one PA-related course that still only relates to the basic sciences of the curriculum. The subject "Exercise Physiology Applied to Clinical Medicine" is offered as an elective option and has a workload of only 15 hours/class and offers 1 credit in the student's training.

The regulatory deficit on the teaching of PA counseling during graduation also causes damage to medical residency training, characterizing another challenge⁵⁶. In general, physicians training regarding the role of PA in health promotion and the prevention and treatment of chronic diseases seems to be put into practice only in areas related to primary care such as Family Medicine and Sports Medicine^{1,57}.

Perspectives and recommendations for inclusion of PA in the medical curriculum

Health promotion, disease prevention and cost reduction in health care are vital issues today, and they will continue to be present in the face of the current demographic transition and the growing inactive portion of the population, resulting from the Covid-19 pandemic^{4,14}. Providing our future physicians with the knowledge and skills to ask about PA, assess past and current activity patterns, and advise patients on implementing or maintaining physical activity patterns is considered since 2008 to be one of the most significant changes we can make in medical education in these first decades of the 21st century²⁹.

Almost 40 years ago, it was recognized that PA education in medical schools was necessary to support growing evidence that the promotion of PA was important in the management, treatment and prevention of diseases and also in health promotion^{3,39}. When Harvard Medical School introduced a course in preventive medicine, medical students learned to use PA for health promotion and prescribing PA was improved⁵⁸. However, only 13% of US medical schools have PA education in their curriculum⁴⁶.

For Pandya e Marino⁵⁹, medical schools in the United Kingdom need to better educate their students about how PA is essential for the health of their patients and how to develop the necessary skills and knowledge to promote them to patients. According to Gates⁶⁰, some medical schools in the United Kingdom have started to successfully integrate exercise medicine topics into their curriculum in a pioneering way. However, currently, most colleges incorporate optional modules into their curricula, instead of mandatory teaching for all medical students⁵⁹. A 2010 study of 33 UK medical schools reported that the average time spent teaching Science and promoting PA across the undergraduate curriculum was minimal (4.2 hours). Consequently, a large proportion of senior medical students have limited knowledge of the risks of physical inactivity, the benefits of PA recommendations, and confidence in patient counseling about PA⁶¹.

Finally, medical students exposed to curricula that promote a healthy lifestyle are more likely to engage

in healthy habits, have a more positive attitude toward lifestyle counseling, and are more likely to counsel patients about PA³¹. These results suggest that efforts to transmit knowledge about their personal health to medical students, in addition to curricula designed to increase knowledge and skill in PA counseling, may lead to higher frequencies of patient counseling (Summary box). Given the expanding evidence base on the dangers of sitting still, and the hours and hours that medical students sit in class, efforts to “activate” the classroom environment should also be considered. Creating breaks for students to get up and move between classes and deliberately facilitating PA demonstrates a commitment to health promotion among medical students and the recognition that a healthy doctor leads to a healthy patient²⁸.

As a starting point for the construction of public policies based on evidence centered on the promotion of physical activity, the systematic investigation of the conduct and knowledge of Brazilian physicians on the subject in question is relevant. Limitations of our work are the possibility of missing a relevant study that is not available in the searched databases or outside the chronological search limit, as well as the lack of evaluation of the quality of the selected Works. In addition, highly representative national data were not found, with probabilistic samples, for example, that evaluated the knowledge and clinical practice of Brazilian physicians regarding physical activity recommendations, which is a future topic of investigation.

CONCLUSION

Assuming that the regular practice of physical activity prevents and treats chronic diseases, in addition to promoting health and quality of life, the post-pandemic period will be characterized by an enormous challenge in an attempt to reverse the levels of physical inactivity in the general population. Thus, for the advice and prescription of physical activity to become routine in doctors’ offices and outpatient clinics, an effort is necessary to improve knowledge about physical activity at all levels of medical training, including medical schools, medical residency and programs of postgraduate studies.

Authors participation: DBR: bibliographic survey and content writing; DANR: bibliographic survey and content writing; BG: writing and critical review of the content.

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