Teaching about Physical Activity Counselling for Medical Students: A Systematic Review

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Abstract. Physical activity is proven to have great benefits for individual health. General practitioners have an important role to increase the level of physical activity in society by providing counseling, but many have not done so, due to their lack of understanding of physical activity counseling since they were still in their education. The purpose of this study was to determine the learning strategies used to teach the topic of physical activity counseling in medical education. This study used a systematic review design, beginning with filtering articles from four databases namely EbscoHost, PubMed, Scopus, and ScienceDirect, manual searching based on related journals, and followed by snowballing techniques. Inclusion criteria were articles published in 2010-2022, population of medical students, interventions in the form of various learning strategies regarding physical activity counseling, and outcomes in the form of evaluating knowledge, skills, and attitudes according to Kirkpatrick level 2. 16 selected articles describe various learning strategies regarding physical activity counseling. The majority of the articles use multimodal learning and experential learning methods. All articles show learning strategies proven to increase attitudes towards physical activity counseling. The challenges faced include a lack of provision regarding the theory of physical activity and communication skills, a lack of role models, and also a lack of time allocation. The results of the study show an overview of learning strategies that can be used to teach physical activity counseling to students along with evaluations and challenges faced. There needs to be more interventional research that examines aspects of knowledge and skills. In facing the challenges that will arise, the curriculum team must design learning strategies carefully and in line with learning objectives.

Keywords: *Learning strategies, Physical activity counseling, Medical students.*

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1. Introduction

Based on World Health Organization (WHO), physical activity is any body movement produced by skeletal muscles that requires energy expenditure. Physical activity has many benefits for physical and mental health. The physical activity recommended by WHO for normal adults is 150 minutes per week with moderate intensity, or 75 minutes per week with high intensity. Data from WHO in 2016 showed that globally, 28% of the population or approximately 1.4 billion adults aged 18 years and over are included in the category of physically inactive. In fact, lack of physical activity risks increasing the negative impacts and deaths from non-communicable diseases and decreasing quality of life [1].

General practitioners are health workers who interact with patients in primary care facilities, so they can play an active role in preventing various non-communicable diseases through physical activity counseling [2]. Physical activity counseling helps patients build perceptions, understanding, and behavioral changes regarding physical activity. Counseling has been shown to help increase the level of physical activity of patients so that it also affects their fitness and quality of life [3]. However, many of them feel inadequate to conduct physical activity counseling, including providing education and patient management planning related to their physical activity. A systematic review stated that physical activity counseling by general practitioners in primary care in clinical settings has many barriers, one of which is the lack of understanding and training during education [4]. Content on physical activity counseling to improve healthy lifestyles has been included in the medical education curriculum [5,6]. The purpose of this systematic review is to determine learning strategies on the topic of physical activity counseling in medical education, because there have been no previous articles that have focused on this.

2. Methods

This study used a systematic review method, referring to the systematic review guidelines in medical education [7]. PICO used to determine the inclusion criteria is the population of medica l students; contains interventions in the form of learning strategies on the topic of physical activity counseling in medical education; contains outcomes in the form of increased knowledge, skills, and attitudes according to Kirkpatrick level 2. Other inclusion criteria are English-language articles published in 2010-2022. Literature search by entering keywords with a Boolean combination using AND and OR, in the Pubmed, EbscoHost, Scopus, and Science Direct databases. Keyword searches were also carried out in journals related to sports medicine and medical education. Keywords and their derivatives are depicted in Table 1. Literature searches were also carried out using the snowballing technique. The identified articles were then screened based on the suitability of the title and abstract. Articles included in the study were eligible articles after being reviewed in full text and met the study quality assessment score with the MERSQI instrument. The next stage is article extraction, followed by synthesis and narrative analysis. This systematic review uses the rayyan.org application to facilitate research and discussion between reviewers. The systematic review process is shown in Figure 1.

Table 1. Keywords and its development.

Keywords	Keywords Developmnet
Medical Student	Medical Students, Medical School, Medical Education, Undergraduate medical student, Preclinical medical student, Clerkship
Educational strategies	Teaching strategies, Teaching Methods, Learning activity, Learning strategies, Curriculum
Exercise Counselling	Physical Activity Counselling, Physical Activity Promotion, Exercise Promotion, Exercise Prescription, Physical Activity Prescription
Medical Student	Medical Students, Medical School, Medical Education, Undergraduate medical student, Preclinical medical student, Clerkship
Educational strategies	Teaching strategies, Teaching Methods, Learning activity, Learning strategies, Curriculum

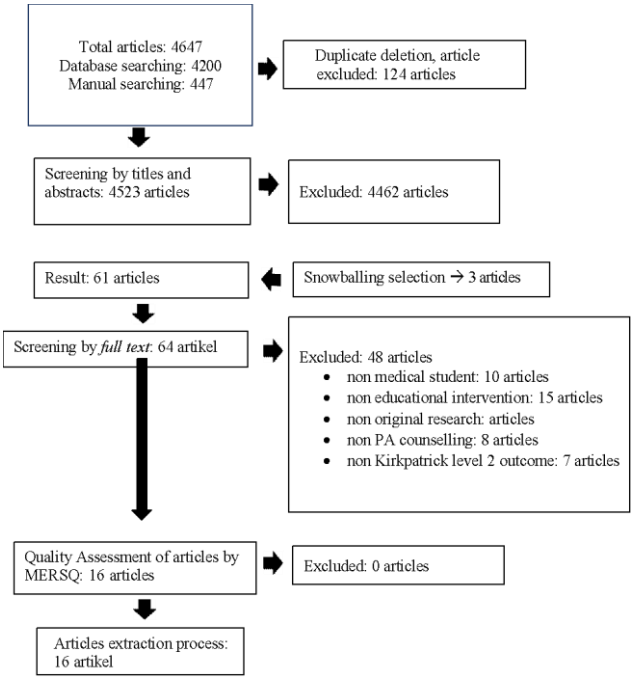

Fig. 1 Flowchart of article search and selection.

3. Results and Discussion

The extraction results of 16 articles are shown in Appendix 1. The location of the most research was conducted in the United States, which was 6 articles (37.5%], the second most was conducted in the United Kingdom, which was 4 articles, in Israel as many as 3 articles, in Australia as many as 2 articles, and in Singapore as many as 1 article. The number of participants from the 16 articles was 2410 medical students, with details of 912 preclinical students, and 1498 clinical students. In order to find out the broad picture of learning strategies on the topic of physical activity counseling, the

synthesis data is shown to describe 3 things: (1) learning strategies used; (2) evaluation of learning strategiess; and (3) challenges of learning strategies implementation.

Learning Strategies

In general, the learning strategies used to teach physical activity counseling are divided into two, namely multimodal and single. Of the sixteen articles included in the study, the majority of articles used multimodal learning, and only 3 articles used a single learning strategy [8–10]. Multimodal learning is needed in a competency-based curriculum because this strategy can accommodate various learning objectives, be it aspects of knowledge, skills, or attitudes, and also various learning styles or preferences of students [11–13]. Multimodal learning can also improve understanding and retention of the information obtained because of increased student interest and focus in retrieval and reinforcement of the material taught [14–16].

Learning can be provided with special content for counseling on physical activity (8 articles) [8–10,17–21], physical activity counseling content included in the lifestyle medicine curriculum (7 articles) [22–28] and physical activity counseling content included in the weight management curriculum (1 article) [29]. Health behavior modification is a holistic program that cannot be separated from other healthy living materials, such as nutrition, smoking cessation, stress management, and healthy sleep patterns [24]. However, physical activity counseling can also be a specific program, because if physical activity counseling is successfully implemented in primary health facilities, then 1 in 12 sedentary people can be changed to be physically active and of course have an impact on their health [3]. The learning methods used in teaching physical activity counseling also vary, including experiential learning, didactics, self-learning, small group discussions, and e-learning. The experiential learning method is the most widely used method, with 12 articles. The experiential learning method is carried out with various activities, ranging from role play [21,28], standard patients [22], sports practice [21,24,28], workplace based learning [18–20,25,29] and community based learning [10,17,23,27]. These results are in line with previous studies [5,30]. Experiential learning is a learning process where learners combine knowledge, skills, and values through direct experiences [31]. Facilitating student learning with a specific learning environment, either through simulation or direct involvement, can encourage students to learn from the experience both individually and collectively [32].\

The second most widely used method is learning through lectures or didactics, which is 10 articles, either as a single method [9] or combined with other activities [9,17,19–21,24,26–28]. The didactic method is still considered an effective method for transferring knowledge to students. The didactic method is given as a provision for communication skills and is carried out before conducting experiential learning [33].

Other learning methods are, respectively, self-learning (6 articles) [17,19,20,22,23,29], small group discussion (6 articles) [20,21,23,25,26,28], and e-learning (2 articles) [8,29]. Most of the articles explain that self-learning is illustrated by providing handouts of materials before other learning sessions are carried out. Small group discussions are conducted by discussing case scenarios in

small groups accompanied by a facilitator. The e-learning used is a website-based electronic booklet containing content on physical activity counseling with the aim of improving students' knowledge and attitudes [8] and website-based patient simulations given to second-year medical students as a series of weight management counseling learning [29].

Evaluation of Learning Strategies

The implementation of learning strategies cannot be separated from the evaluation of learning outcomes. The expected outcomes of learning strategies can be measured based on Kirkpatrick level 2, where at the end of learning students will be evaluated regarding their knowledge, skills, and attitudes towards physical activity counseling. All articles included in this study assessed the attitude aspect. There are 3 articles that assess aspects other than attitudes, namely Pugh et al (2020) assessing knowledge, Ockene et al (2021) assessing skills, and Malatskey et al (2019) assessing the impact felt by patients [8,27,29].

The definition of attitudes towards physical activity counseling varies in each article. After analysis, there are two main categories of attitude definitions, namely importance or attitudes regarding the importance of conducting physical activity counseling and self-efficacy or individual self-confidence attitudes to conduct physical activity counseling. This 'importance' attitude explains students' perceptions of the importance of physical activity in supporting a healthier lifestyle and the importance of a doctor's role in providing physical activity counseling to patients. Meanwhile, the attitude of 'self-efficacy' explains students' assessment of their competence and confidence to conduct physical activity counseling in the future. Students' health behavior during education is important in predicting doctors' counseling practices after graduation. Doctors who practice a healthy lifestyle are more able to intervene in patients' healthy behavior [34]. Therefore, it is necessary to foster an attitude of importance by targeting changes in students' own healthy behavior [21,24]. This is also important to increase students' perception that doctors play an important role as role models for the community in behaving healthily [28]. Increasing students' self-efficacy towards physical activity counseling can support its implementation in the future, where after graduating as doctors, they will be encouraged to do it more often and effectively with patients [35]. The assessment of the attitude aspect is mostly carried out by students filling out a Likert scale questionnaire and there are also articles that mention qualitative assessments with focus group discussions, writing reflections, and semi-structured interviews. This self-assessment is indeed appropriate for evaluating the attitude aspect, but its subjectivity tends to be high, so it is feared that there is bias in achieving learning objectives. More objective assessments to measure the attitude aspect can use case study tests, supervisor assessments with checklists, multisource feedback [36]. Pugh et al (2020) assessed the knowledge aspect with multiple choice questions, and Ockene et al (2021) assessed skills with OSCE [8,29]. Malatskey et al (2022) assessed the impact aspect felt by patients by looking at the results of the examination and the level of healthy behavior after being coached by students [27].

Researchers found that there was something that was not in line between the learning objectives, namely that students could carry out physical activity counseling, with the assessment method which only assessed the attitude aspect. In

fact, to carry out counseling, students must be able to integrate aspects of knowledge, skills, and attitudes, so that the assessment carried out did not describe whether an intervention or strategy was truly effective. For example, in the first article by Mohler et al (2010), it was stated that the learning objective was that students could practice how to conduct interviews and counseling regarding physical activity in the elderly, but the aspects assessed were only self-perceived competence and self-perceived importance [17].

Challenges of Learning Strategies Implementation

Each learning strategy faces challenges when implemented. Some challenges in implementing learning strategies regarding physical activity counseling are that students do not get enough preparation to start directly involved in the community or other workplaces, both in terms of theory regarding physical activity itself, and basic communication techniques for conducting counseling. This challenge is mentioned in 9 articles [8–10,17–19,22,27,29]. Communication skills are needed to help students negotiate with patients to develop mutual agreements, so they must be the target of learning about counseling, in addition to knowledge and attitudes [37]. Counseling is a process that involves both parties, not just one way, so it is also necessary to teach the partnership relationship between doctors and patients so that they can determine a mutual agreement regarding physical activity that can be done by patients. The challenge regarding the lack of role models in conducting physical activity counseling is mentioned in 4 articles [18,24,25,28]. This causes students to lack direct examples for conducting physical activity counseling in real settings. Role modeling in medical education is very influential in developing student professionalism [38,39]. The importance of role modeling from facilitators and lecturers in learning about physical activity counseling because students imitate what they see in their learning environment [18]. If the lecturers do not demonstrate this during learning, students will form a less favorable perception of the role of doctors in counseling.

Another challenge is the limited time allocation provided to implement learning strategies regarding physical activity counseling mentioned in 7 articles [10,20,21,24–27], and the lack of experience interacting with patients in articles without experiential learning interventions, which are 2 articles [8,9]. In overcoming this challenge, the curriculum team must be careful in determining effective learning methods and determining efficient learning duration while still prioritizing the achievement of learning objectives.

Limitations

All articles included in the study are interventional with experimental designs, both quasi-experimental and randomized controlled trials, so that the results shown by each article are expected to have a meaning that can be accounted for. This study also obtained various descriptions of learning strategies regarding physical activity counseling so that they can enrich the inspiration of the curriculum team in determining learning strategies regarding physical activity counseling. The population included in this study included medical students at both academic and professional levels. The

research locations included in the study are relatively spread across various continents, so indirectly it also provides an overview of its generalizability aspect.

Methodologically, systematic reviews in medical education have their own weaknesses due to the heterogeneity of research designs and the limited number of articles included in the study, which can affect the quality of the research results. In addition, in the selection of articles, there may be relevant articles that are excluded due to keywords in the database that are not varied enough, and there may be differences in meaning in concluding and interpreting data. In addition, this study may miss important values contained in the literature. Consultation with a supervisor is very helpful so that mistakes do not occur when conducting research.

From a theoretical perspective, interventional researches are needed to evaluate learning outcomes with more objective measurements. From a practical perspective, lecturers can use learning strategies that are in accordance with the learning objectives that have been determined by the institution. Learning about physical activity counseling should begin with providing an adequate knowledge base about the science of physical activity and also good communication skills

4. Conclusion

The recommended learning strategy that can be used to teach physical activity counseling is multimodal learning consisting of various learning methods. There are 5 types of learning methods that can be used, namely experiential learning, didactic, self-learning, e-learning, and small group discussion. Experiential learning is the most widely used method in learning about physical activity counseling. All learning strategies contained in this article have been proven to increase the level of evaluation of student attitude aspects, both importance and self-efficacy attitudes towards physical activity counseling. The challenges found in the implementation of these learning strategies include: students do not get enough preparation to carry out experiential learning, both in terms of theory about physical activity and basic communication techniques for conducting counseling; lack of role models from supervisors and facilitators, and limited time allocation.

5. Conflict of Interest

The authors declared no conflict of interest.

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APPENDIX 1. RESULTS

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
Mohler et al	2010	Quasi-experimental, post only	US	26	Third-year medical students	Didactic lecture and face-	Student attitudes towards the role of physical	Improvement in attitudes (moderate/much

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
		evaluation				to-face counseling practice with elderly mentors; several references provided before the session for self-learning	activity in elderly health, the importance of prescribing physical activity, perceptions about active and healthy elderly	more) towards the role of physical activity, importance of counseling elderly on physical activity, and perception of active and healthy elderly
Wagenschutz et al	2011	Quasi-experimental, pre and post assessment	US	199	Third-year medicine clerkship students	Web-based preparation and booklet before practice with standardized patient instructor (SPI), interaction with SPI	Student comfort level in providing counseling	Significant improvement in student comfort level in counseling (mean increased from 3.79 to 4.48)
Cooke et al	2013	Randomized	UK	136	Fourth-year	Four-week	Primary outcome:	Primary: increase

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
		controlled trial, pre and post assessment			medical students	primary care placement	increase in daily step count; Secondary outcome: increased intention to promote physical activity	in step count in intervention group compared to control; Secondary: significant increase in intention to promote physical activity in intervention group, though declined at 9-week follow-up
Jones et al	2013	Quasi-experimental, pre and post assessment	UK	122	First- and second-year medical students	Didactic lectures	Student belief and confidence regarding physical activity	Significant improvement in beliefs and confidence before and after lectures
Yang Huang Koh et al	2014	Quasi-experimental, post only evaluation	Singapore	106	Third-year medical students	Task-based learning combined with reflecti	Student reflections on their experiences in selective communication	Students reported improvements in personal and professional

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
						ve writing	(counseling)	development, critical-thinking and self-directed learning skills, and social responsibility for counseling patients and communities
Malatskey et al	2017	Quasi-experimental, pre and post assessment	Israel	114	First-year medical students	Didactic lectures with optional practical sessions (aerobic and anaerobic exercise)	Students' healthy lifestyle patterns, attitudes toward healthy behavior, and doctor's role	Decrease in healthy lifestyle patterns, attitudes toward healthy behaviors, and doctor's role
Jadzack et al	2017	Quasi-experimental, post only evaluation	Australia	81	Fifth-year medical students	Didactic lectures, community-based learning visits,	Perceived importance and competence	Significant increase in perceived importance and competence before

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
						self-directed learning		and after the course
Jadzack et al	2018	Quasi-experimental, post only evaluation	Australia	161	Fifth-year medical students	Didactic lectures, community-based learning visits, self-directed learning, physical activity module	Perceived importance and competence	Significant increase in perceived importance and competence before and after the course
Pugh et al	2020	Quasi-experimental, pre and post assessment	UK	205	2nd, 3rd, and 4th year medical students	Web-based educational tool	Knowledge of current physical activity recommendations and management of specific diseases; student confidence and beliefs before and after	Increase in knowledge and confidence after learning

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
							reading the e-booklet	
Manning et al	2020	Quasi-experimental, pre and post assessment	US	105	Not specified	Clinical experience	Better understanding of the role as a physical activity advocate	88% of students felt they had a better understanding of their role as advocates of physical activity
Malni et al	2020	Quasi-experimental, pre and post assessment	UK	39	Third-year medical students	Experiential learning, health coaching with patients regarding lifestyle behavior change	Impact of training and student's experience of the training process	Perceived value of coaching, mindset, coaching skills, application of coaching skills, context
Rockheld et al	2020	Quasi-experimental, pre and post assessment	US	183	Third-year medical students	Lectures, small group discussions (SGD), reflection	Self-perceived knowledge, skills, and attitudes towards a healthy lifestyle	Improvement in self-perceived knowledge, skills, and attitudes toward

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
							and behavior change counseling	healthy lifestyle and counseling before and after the course
Brennan et al	2021	Quasi-experimental, pre and post assessment	Canada	54	Second-year medical students	Behavior change techniques through various learning activities	Social cognition regarding physical activity counseling	Significant improvement in social cognition before and after learning
Ockene et al	2020	Randomized controlled trial, post only evaluation	US	915	Third-year medical students	Multimodal education	Counseling skills for weight management (5A and patient-centeredness), self-perceived weight management counseling (WMC) skills	OSCE results between MME and TE were not significantly different (p=0.16); self-reported WMC skills between MME and TE also not significantly

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
								different (p=0.25)
Malatskey et al	2022	Quasi-experimental, pre and post assessment	Israel	32	Second-year medical students	Experiential learning	Evaluation of student attitude, competence, and behavior change before and after the course; perceived impact on patients	Significant improvement in students' attitudes towards healthy living, increased self-reported competence and confidence, improved student healthy lifestyle; patients coached by students showed better examination results and health behavior, especially in physical activity
Essa Haddad et al	2022	Quasi-experimental, post	Israel	131	Second- and fourth-year	Full curriculum using	Student attitudes toward lifestyle	Improved attitudes about doctors'

Author	Year of Publication	Study Design	Study Location	Number of Participants	Participant Characteristics	Learning Method	Outcomes Measured	Results
		only evaluation			medical students	various learning methods	medicine in terms of self-perceived competence and skills in healthy behavior counseling; student attitudes about doctor's role in healthy lifestyle promotion	roles in lifestyle medicine; average self-perceived competence score in general counseling: 3.3 out of 4; specifically for physical activity topic: average score of 3