



# Physical education: Physical Activity Guidelines for the Brazilian Population

## Educação física escolar: Guia de Atividade Física para a População Brasileira

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### ABSTRACT

Physical Education (PE) classes represent an appropriate time to know and experience the plurality of the human movement, favoring the promotion of a healthy and active life. The importance of PE was recognized by the Physical Activity Guide for the Brazilian Population, which dedicated a chapter to guide the school community on the health benefits and successful strategies adopted in PE classes. This study aimed to show the process of elaborating Brazilian recommendations for PE for the Brazilian population, more specifically students, teachers, parents and guardians, and managers. This chapter of the Guide was developed by ten Brazilian researchers, including a spokeswoman of the Ministry of Health. Three syntheses of evidence, focus groups/interviews and public consultation were carried out to construct the recommendations. Data from 49 systematic reviews on the health benefits of PE and 22 interventions in PE classes with Brazilian students were summarized. Also, 63 documents were synthesized with strategies recommended for PE classes, focusing on the dimensions: politics and environment; curriculum; appropriate instruction; evaluation; and strategies that interact with PE. The focus groups and the public consultation were the basis for the elaboration and improvement of the final version of the recommendations. It is expected that these recommendations can assist the creation of public policies, the improvement of practice PE and the need to conduct future studies in this area of knowledge.

**Keywords:** Physical education; Motor activity; Strategies; School; Students.

### RESUMO

*As aulas de educação física (EF) escolar representam um momento propício para conhecer e vivenciar a pluralidade do movimento humano, favorecendo a promoção de uma vida ativa e saudável. A importância da EF escolar foi reconhecida pelo Guia de Atividade Física para a População Brasileira (Guia), que dedicou um capítulo para orientar a comunidade escolar sobre os benefícios à saúde e as estratégias de sucesso adotadas nas aulas de EF escolar. O objetivo deste estudo é apresentar o processo de elaboração das recomendações brasileiras de EF escolar para a população brasileira, mais especificamente os estudantes, professores, pais e responsáveis, e gestores. Esse capítulo do Guia foi desenvolvido por dez pesquisadores brasileiros, incluindo um representante do Ministério da Saúde. Três sínteses de evidências, escutas ao público-alvo e consulta pública foram realizadas para a construção das recomendações. Dados de 49 revisões sistemáticas sobre os benefícios da EF escolar à saúde e de 22 intervenções nas aulas de EF escolar com estudantes brasileiros foram sumarizados. Ainda, foram sintetizados 63 documentos nacionais e internacionais com estratégias recomendadas para a EF escolar, com foco nas dimensões: política e ambiente; currículo; instrução apropriada; avaliação; e estratégias que interagem com a EF escolar. Os grupos focais e a consulta pública fundamentaram a elaboração e o aprimoramento da versão final das recomendações. Espera-se que estas recomendações alicercem a criação de políticas públicas, melhorem a conscientização sobre a importância da prática de atividade física na EF escolar e enfatizem a necessidade de realizar estudos futuros nesta área de conhecimento.*

**Palavras-chave:** Educação física; Atividade motora; Estratégias; Escola; Estudantes.

## Introduction

Physical education (PE) is an obligatory curriculum component of basic education in Brazil<sup>1</sup>, included in the National Common Core Curriculum<sup>2</sup>. The hybrid nature of PE encompasses aspects of education and health by means of knowledge, learning and bodily experiences that contribute to one or more dimensions of health (physical and motor, psychological, social and environmental, and cognitive)<sup>3-11</sup>. Due to this, many strategies have been evaluated and implemented (related to dimensions like policy and environment, curriculum, appropriate instruction, and student assessment)<sup>12</sup> with the aim of producing a positive impact on students' life and health<sup>3-11</sup>.

The positive contribution of PE classes to health<sup>3-11</sup> has guided the construction of recommendations for PE in different countries<sup>12-17</sup>. Benefits have been reported in physical and motor health indicators, such as cardiorespiratory fitness (CRF)<sup>18</sup> and fundamental motor skills<sup>18</sup>; in psychological health indicators, such as engagement, motivation and autonomy<sup>7</sup>, affect<sup>6,9</sup>, and reduction in anxiety and depression<sup>5</sup>; and in socio-environmental health indicators, especially regarding empathy and cooperation<sup>5,19,20</sup>, friendship<sup>7,20</sup> and prosocial behavior<sup>19,20</sup>. Recent reviews have also shown the benefits of PE classes for school performance (improvements in attention, concentration, memory, classroom behavior, problem-solving and grades)<sup>21,22</sup> and cognitive health (decision-making, technical skills and task instructions)<sup>23,24</sup>.

The different strategies to improve students' health by means of PE classes are organized in specific dimensions like policy and environment (for example, value recognition and structure), appropriate instruction (for example, utilization of equipment in classes and promotion of physical activity practice), curriculum (for example, content progression and use of educational standards), and assessment (for example, development and progression of different skills)<sup>12</sup>. In addition, there are strategies that do not occur specifically in PE classes but interact with the discipline, like offering sports or physical activity in the afternoon shift for students who have classes in the morning and vice-versa. In Brazil, governmental programs support these strategies in the school environment, like *Programa Saúde na Escola* (School Health Program)<sup>25</sup> and *Programa Segundo Tempo* (Second Shift Program)<sup>26</sup>.

The present study systematizes the construction process of Chapter 6, "Physical Education", developed

for the Physical Activity Guidelines for the Brazilian Population (Guidelines). Detailed information about the Guidelines can be found in a previous publication<sup>27</sup>. The aim of this study was to synthesize the construction process of this section of the Guidelines, focusing on the description of the methodological aspects and the main evidences that guided the recommendations for PE classes in Brazil.

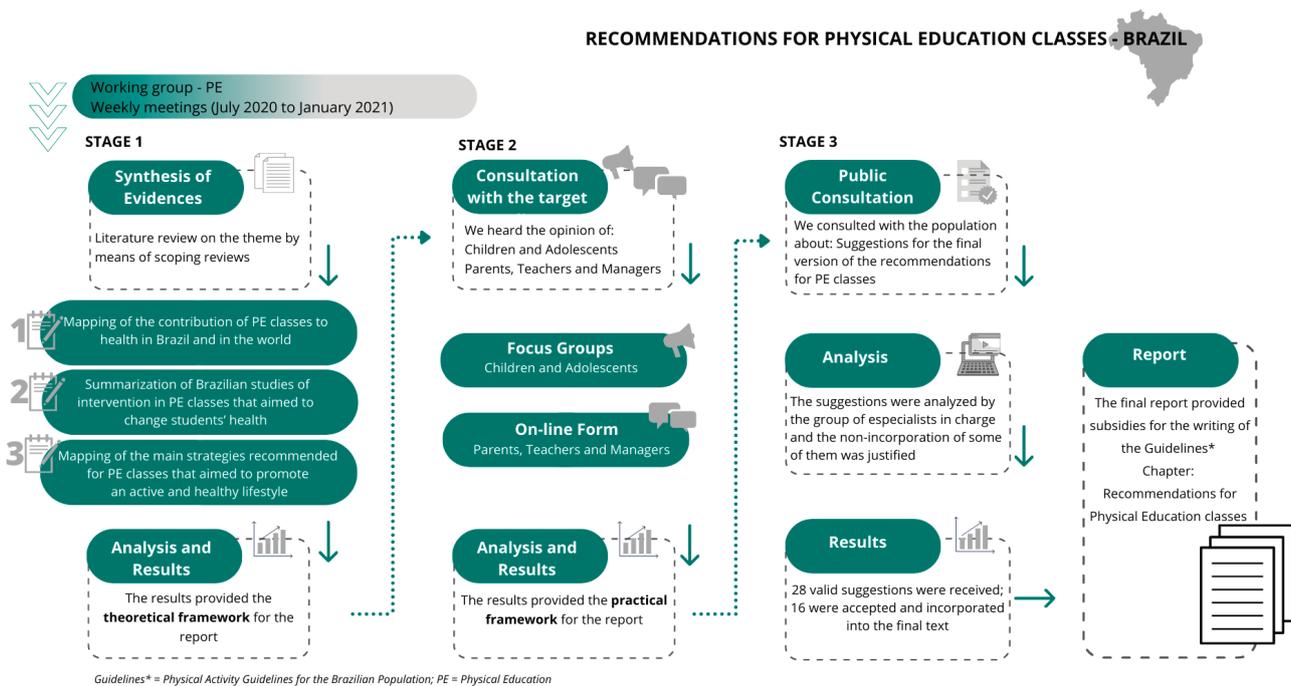
## Method

The working group held meetings once a week from May 2020 to January 2021, using the Google Meet platform. All the decisions were registered and shared as files in Dropbox. The planning and execution of the activities and the work schedule were decided in the first meetings, and it was established that the following stages would be performed: (i) systematic reviews; (ii) consultation with the target audience of the recommendations; (iii) public consultation, as described in Figure 1<sup>27</sup>.

The first stage was the conduction of three scoping reviews, which were carried out with the purpose of providing relevant scientific evidences for the construction of the document. To map the contribution of PE classes to health, a synthesis of systematic reviews on interventions in PE classes was developed. Then, Brazilian studies about interventions in PE aiming to change students' health were summarized. Finally, the main strategies recommended for PE classes, focusing on the promotion of an active and healthy lifestyle, were mapped.

We performed the reviews to gain a general view of available research on the theme, registering the main characteristics, evidences and gaps of the studies<sup>28</sup>. These reviews followed international protocols for performing syntheses of studies<sup>28</sup>, considering the stages: 1) identification of the research problem; 2) identification of relevant studies; 3) selection of studies; 4) data extraction; and 5) summarization of results. Documents published from 2000 onwards, in Portuguese, English and Spanish were included in the reviews. Detailed information about the elements and criteria that were used can be found in a previous publication<sup>27</sup>.

The following questions guided the reviews: (i) What do the evidence syntheses tell about the contribution of PE classes to different components of the active and healthy lifestyle in students? (ii) What are the evidences of the contribution of interventions implemented in PE classes in Brazil to the promotion of an active and healthy lifestyle? and (iii) What strategies related to PE classes have been recommended for pro-



**Figure 1** – Description of the development stages of the Recommendations for Physical Education classes.

motion of an active and healthy lifestyle in students?

On June 4, 2020, the electronic databases/repositories WEB OF SCIENCE, MEDLINE/PUBMED, LILACS, SCIELO, ERIC Proquest, PsycINFO, Scopus and SPORTDiscus were accessed. In the same month, 82 (eighty-two) portals from national and international institutions related to PE, physical activity, sports, health or education were searched. In addition, a secondary search for studies in the references section of two reviews of reviews<sup>29,30</sup> was performed, and also in the personal library of the researchers involved in the project<sup>27</sup>. The titles found were imported to a library in the *EndNote Web* software. Duplicate references were excluded by using the functions of the reference manager and also manually. The eligible titles were organized and analyzed separately by four evaluators (ASB, PCS, FR and VR). The selection stage involved: 1) reading the titles and abstracts; 2) reading the full documents. In case the evaluators disagreed, a third evaluator (VBF) was consulted, so that a consensus could be reached. The research in the websites was performed by at least one of the evaluators (ASB, PCS, VBF, MCMT and PFS), and the analysis of the eligible documents was carried out by four evaluators (ASB, PCS, FR and VR).

Data extraction was performed by two researchers using a standardized instrument. In question 1, the main evidences of the studies were grouped and dis-

cussed. Reviews that adopted meta-analysis or strategies to assess the degree of certainty of the evidences were emphasized. In question 2, the interventions in Brazil were described, considering context of implementation, strategies used, outcomes and main results. In question 3, the recommendations were organized in the dimensions that encompass the essential components of physical education (policy and environment, curriculum, appropriate instruction, assessment, and strategies that interact with PE).

In the second stage of the construction of the recommendations, the actors involved in this research (students, teachers, parents/guardians and education managers) were consulted, so that we could collect important information for the development of recommendations for PE. Information was obtained in two ways: in focus groups with students and through online forms filled in by teachers, parents/guardians and managers.

Participants were selected by convenience sampling. They were aged 10 to 13 years (60% girls; n = 9) or 14 to 17 years (60% girls, n = 15) and were enrolled in public schools from different regions of Brazil. The sessions were conducted remotely and one single researcher moderated the groups. The focus groups lasted approximately 60 minutes and followed a conceptual matrix with a semi-structured script divided into three parts: intrapersonal, interpersonal and environmental factors for physical activity practice in PE classes<sup>27</sup>. The

answers and discussions were registered and recorded by the remote system of Google Meet. The files were fully transcribed, and the sentences and information we obtained were grouped according to their themes and analyzed by means of a qualitative approach, with the use of content analysis.

Questions to PE teachers (12 questions), parents/guardians (16 questions), and state and municipal managers (16 questions) were created in Google Forms. Open-ended and closed-ended questions about the importance, barriers and facilitators of PE classes were created based on the literature reviews described above. Participants were selected by convenience sampling. The forms were sent by e-mail or by a messaging app and participation was voluntary. Anonymity was assured to all respondents<sup>27</sup>.

After the first version of the Physical Activity Guidelines for the Brazilian Population was written, the document was submitted to public consultation in August 2020. The text was hosted on the website of the Ministry of Health, together with an online form where the general population could register suggestions for the final version of the Guidelines. The suggestions were analyzed by the group of specialists responsible for creating the recommendations, and the non-incorporation of some of them was justified<sup>27</sup>. For the chapter referring to PE, 28 valid suggestions were received. Sixteen of them that had technical and/or social relevance were accepted and incorporated into the final text.

## Results

To answer the question “*What do the evidence syntheses tell about the contribution of PE classes to different components of the active and healthy lifestyle in students?*”, 2,287 references retrieved from the databases, repositories, homepages and lists of references were analyzed. Of these, 2,136 were excluded by screening the titles and abstracts, and 107 articles and 46 documents remained to be read in full. After the full reading of the articles and documents, 49 documents (45 systematic reviews and 4 institutional documents) were included (see the list of references in supplementary material 1). The outcomes were grouped in dimensions (physical activity, physical and motor health, psychological health, socio-environmental health, and cognitive health) and the results are presented on Table 1. Of the 49 analyzed documents, 23 evaluated whether interventions in PE classes influenced the practice of physical activity. In relation to physical and motor health, 22 reviews

evaluated the impact of PE, with more consistent evidences related to improvement in cardiorespiratory fitness, fundamental motor skills, flexibility, and body mass index. Regarding students’ psychological health, 9 reviews analyzed the relationship between PE and this health dimension, and all highlighted positive results. Only 4 reviews analyzed the effect of PE on socio-environmental health outcomes and 13 reviews analyzed cognitive aspects. The main strategies mentioned in the reviews to increase physical activity practice in PE classes were: increasing the classes’ duration and frequency (11 reviews), increasing the classes’ intensity (7 reviews), making changes in the content (8 reviews) and in the quality of the classes (5 reviews). Further information will be provided in future publications (in press).

To answer the second question, “*What are the evidences of the contribution of interventions implemented in PE classes in Brazil to the promotion of an active and healthy lifestyle?*”, we found 896 eligible documents in the literature and, after the exclusion of duplicates, 737 remained. A total of 35 documents were included in this review (see the list of references in supplementary material 2), referring to 22 intervention studies. Of these, 16 presented effectiveness results showing that intervening in PE classes contributed to improve some health indicator, namely: increase in physical activity time (5 studies), reduction in screen time and improvement in eating habits (4 studies), improvement in psychological health indicators (3 studies), and improvement in socio-environmental and cognitive health (4 studies) (Table 2).

To answer the third question, “*What strategies related to PE classes have been recommended for promotion of an active and healthy lifestyle in students worldwide?*”, a total of 2,408 documents were found in the search. After the selection process, 63 documents published from 2000 to 2020 were analyzed (see the list of references in supplementary material 3). Of these, 27 (42.8%) referred to practical guidelines; 19 (30.1%) to positions; 10 (15.9%) to recommendations; and 7 (11.1%) to reports. The majority of them was directed at managers and politicians (62 documents; 98.4%), followed by teachers (47 documents; 74.6%), parents/relatives (28 documents; 44.4%) and students (20 documents; 31.7%). A sizable number of strategies for PE was found in the literature. After consensus meetings, the following number of recommendations were compiled in each dimension: (i) policy and environment: seven recommendations focusing on valuing PE as an

**Table 1** – Synthesis of the main effects of the interventions made in physical education (PE) classes on different health dimensions in students from different age groups

References	School year/age (EJ <sup>†</sup> or HS <sup>‡</sup> )	PA#	Other behaviors*	Physical/ motor health	Health indicator		
					Psychological health	Socio-environmental health	Cognitive health/ school performance
Systematic reviews							
Álvarez-Bueno et al. <sup>1</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS						↑
Barba-Martín et al. <sup>2</sup>	NR				?		
Becerra-Fernández et al. <sup>3</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS			↑			
Becerra Fernandez et al. <sup>4</sup>	Up to 11 years			↑			
Bessa et al. <sup>5</sup>	NR				↑	↑	
Braithwaite et al. <sup>6</sup>	NR			↑	↑		↑
Camacho-Miñano et al. <sup>7</sup>	Elementary until High School	↑					
Chacón-Borrego et al. <sup>8</sup>	Elementary until High School			↑			
Dobbins et al. <sup>9</sup>	6 to 18 years			↑			
Donnelly et al. <sup>10</sup>	EJ (5 – 13 years)						?
Dudley et al. <sup>11</sup>	3 to 18 years	↑		↑			↑
Dudley et al. <sup>12</sup>	5 to 18 years			↑			
Gomes et al. <sup>13</sup>	6 to 10 years				↑		
Gunnell et al. <sup>14</sup>	Up to 18 years						?
Hermoso et al. <sup>15</sup>	3 to 18 years			↑			
Hoehner et al. <sup>16</sup>	NR	↑					
Jenkinson et al. <sup>17</sup>	5 to 18 years	?		?			
Kahn et al. <sup>18</sup>	5 to 17 years	↑		↑			
Kopp et al. <sup>19</sup>	6 to 18 years	↑					
Lai et al. <sup>20</sup>	3 to 18 years	↑		↑			
Lambrinou et al. <sup>21</sup>	Only children	↑	↑	↑			
Lonsdale et al. <sup>22</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑					
McDonald et al. <sup>23</sup>	3 to 18 years	↑					
Marques et al. <sup>24</sup>	3 to 18 years						↑
Matson-Koffmann et al. <sup>25</sup>	EJ and HS	↑	↑				
Minatto et al. <sup>26</sup>	10 to 19 years			↑			
Morgan et al. <sup>27</sup>	Elementary until High School			↑			
Opstoel et al. <sup>28</sup>	6 to 18 years					↑	
Quitério et al. <sup>29</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑	↑	↑			
Rasberry et al. <sup>30</sup>	5 to 18 years						↑
Robinson et al. <sup>31</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑		↑			
Salmon et al. <sup>32</sup>	4 to 19 years	↑					
Sharma et al. <sup>33</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑		↑			
Schieffer et al. <sup>34</sup>	EJ and HS	↑		↑			
Schüller et al. <sup>35</sup>	6 to 19 years					↑	
Slingerland et al. <sup>36</sup>	7 to 15 years	↑					
Soriano-Férriz et al. <sup>37</sup>	6 to 12 years			↑			
Tompsett et al. <sup>38</sup>	5 to 18 years	↑		↑	↑		
Trudeau et al. <sup>39</sup>	EJ and HS				↑		
Van de Kop et al. <sup>40</sup>	12 to 17 years	↑					
Van Sluijs et al. <sup>41</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑					
Vazou et al. <sup>42</sup>	5 to 18 years						↑
Vella et al. <sup>43</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS						↑
White et al. <sup>44</sup>	NR				?		
Zach et al. <sup>45</sup>	5 to 18 years						↑
Documents							
CDC <sup>46</sup>	5 to 18 years						↑
CDC <sup>47</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑		↑	↑	↑	
IOM <sup>48</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑			↑		↑
PAGAC <sup>49</sup>	1 <sup>st</sup> year EJ – 3 <sup>rd</sup> year HS	↑					

#PA = physical activity; other behaviors\* = diet and cardiorespiratory fitness <sup>†</sup>EJ = elementary and junior high school; <sup>‡</sup>HS = high school; NR = not reported; CDC = Centers for Disease Control and Prevention; IOM = Institute of Medicine (Washington, DC); PAGAC = Physical Activity Guidelines Advisory Committee; ↑ = positive direct of the effect; ? = inconclusive results.

**Table 2** – Effect of PE classes from Brazilian interventions on students' active and healthy lifestyle

Identification of the study			Health indicator					
Reference (author and year)	Place/ State	School year (ES <sup>†</sup> JH <sup>‡</sup> or HS <sup>§</sup> )	PA#	Other behaviors*	Physical/motor health	Psychological health	Socio-environmental health	Cognitive health/ school performance
<b>Interventions focusing primarily on physical education</b>								
Cardeal et al. <sup>1</sup>	Taguatinga/ Distrito Federal	3 <sup>rd</sup> and 4 <sup>th</sup> ES			↑			↑
Coledam et al. <sup>2</sup>	Nova Europa/São Paulo	5 <sup>th</sup> ES			↑			
Costa et al. <sup>3</sup>	Região do Cariri/ Ceará	1 <sup>st</sup> to 4 <sup>th</sup> ES			↑			
Cunha et al. <sup>4</sup>	São Paulo/ São Paulo	1 <sup>st</sup> and 2 <sup>nd</sup> ES	↑					
Farias et al. <sup>5,6</sup>	Porto Velho/ Rondônia	6 <sup>th</sup> to 9 <sup>th</sup> JH			↑			
Finco et al. <sup>7</sup>	Porto Alegre/Rio Grande do Sul	ES + JH	↑			↑	↑	
Gonzales et al. <sup>8</sup>	Canguçu/Rio Grande do Sul	5 <sup>th</sup> ES to 3 <sup>rd</sup> HS						↑
Rossi Filho & Silva <sup>9</sup>	Capivari/São Paulo						↑	↑
Silva et al. <sup>10</sup>	Matinhos/Paraná	3 <sup>rd</sup> to 5 <sup>th</sup> ES			↑			
Silveira et al. <sup>11</sup>	São Paulo/São Paulo	ES			↑			
Spohr et al. <sup>12</sup>	Pelotas/RS	5 <sup>th</sup> ES to 3 <sup>rd</sup> HS						↑
Oliveira et al. <sup>13</sup>	Porto Alegre/RS	1 <sup>st</sup> HS			↑			
Zanetti et al. <sup>14</sup>	São José do Rio Pardo/São Paulo	NR			↓			
<b>Interventions that integrate physical education to other strategies (multi-components)</b>								
Barbosa Filho et al. <sup>15-18,19-21</sup>	Fortaleza/Ceará	7 <sup>th</sup> to 9 <sup>th</sup> JH	↑	↑		↑	↑	
Nahas et al. <sup>22-28</sup>	Florianópolis/ Santa Catarina Recife/ Permanbuco	1 <sup>st</sup> and 2 <sup>nd</sup> HS	↑	↑	↑			
Knebel et al. <sup>29</sup>	Florianópolis/ Santa Catarina	7 <sup>th</sup> to 9 <sup>th</sup> JH		↑				
Medeiros et al. <sup>30-32</sup>	São Paulo/São Paulo	1 <sup>st</sup> to 3 <sup>rd</sup> HS	↑	↑	↑	↑	↑	
Minatto et al. <sup>33-35</sup>	Florianópolis/ Santa Catarina	6 <sup>th</sup> to 9 <sup>th</sup> JH						

#PA = physical activity; †ES = elementary school; ‡JH = junior high school; §HS = high school; NR = no reported; other behaviors\* = sleep, sedentary behavior and diet.

obligatory curricular discipline, working conditions, the need to offer high-quality PE at least three times per week (in all basic education levels), and the need of providing teachers with continuing education; (ii) curriculum: four recommendations related to content type and progression and coherence with national, state and municipal standards; (iii) appropriate instruction: eight recommendations approaching student inclusion, utilization of equipment in classes and promotion of physi-

cal activity practice; (iv) assessment: two recommendations targeted at the development and progression of different skills; (v) strategies that interact with PE: five recommendations with additional information to students about PE classes (Table 3). Further information will be provided in future publications (in press).

Description of the content generated by means of the consultations formed two matrices: I - Contributions of PE to health: a) focus on physical activity; b)

**Table 3** – Strategies recommended for physical education classes in the promotion of an active and healthy lifestyle.

Recommendation	Messages to the population	Section of the Guidelines
<b>Policy and environment</b>		
The Brazilian population must recognize that PE is an important part of education and health policies and that it contributes to people's and to the country's health, wellbeing, and human and social development <sup>1-6</sup> .	The school community must recognize that physical education is an important part of education and health policies and that it contributes to students' health, quality of life, and human and social development.	School community
Quality PE classes must be obligatory throughout all the years of Basic Education, including early childhood education <sup>4,7-31</sup> .	To promote health benefits, quality physical education must be obligatory throughout all the years of Basic Education, including Early Childhood Education.	What are the recommendations for physical education classes?
The school community must provide and support physical education situations with the same rigor of the other disciplines; for example, the application of contents, assessment and professional development <sup>4,5,8,10,22,25,26,29,32-39</sup> .	The school community must provide and support physical education in the same way it does with the other disciplines, with the application of contents, assessment and professional development, for example.	School community
The school community must guarantee and value working conditions (materials and spaces) and professional qualification (specialized education, continuing education and pedagogical support) that enhance the quality of PE classes <sup>4,8,12,18,20,26,27,34-36,40</sup> .	The school community must guarantee and value working conditions (materials and spaces) and professional qualification (specialized education, continuing education and pedagogical support) that enhance the quality of PE classes.	School community
Consider schools that value the role played by physical education in your child's formation throughout all the schooling years <sup>1-4,8,32</sup> .	For these directions to be followed, it is essential to promote the qualification of physical education teachers and to value these professionals.	What are the recommendations for physical education classes?
At least three physical education classes must be offered per week, in all Basic Education levels <sup>4,8-32</sup> .	Choose schools that value the role played by physical education in the child's and adolescent's formation throughout all the schooling years.	Parents or guardians
Minimum frequency and duration must be established for PE: at least 2 times/week or 120 minutes/week for elementary and junior high school and 180 minutes/week for high school; at least 30 minutes/session <sup>7,10,11,14,16,22,24-27,29,30,35,41-45</sup> .	Schools must offer at least three physical education classes per week, each lasting 50 minutes.	What are the recommendations for physical education classes?
<b>Curriculum</b>		
Curricula must present a sequential and progressive structure of specific physical education learning objectives, according to national, state and municipal standards <sup>7,9,13,16,22,25,27,29,34,35</sup> .	Curricula must present a sequential and progressive structure of specific PE learning objectives, according to national, state and municipal standards.	School community
The other school disciplines must interact with physical education in health education contents <sup>10,19,23,25,34,35,46,47</sup> .	The other school disciplines also can work with body movement in the same way that physical education can explore mathematical principles in games.	School community
Engage actively in the PE classes and help the teacher choose contents and practices that respect and develop your physical/motor, psychological, social and cognitive health <sup>1,10,12,23,27,32,34,35,46,48</sup> .	You must engage actively in the PE classes and help the teacher choose contents and practices that respect and develop your health.	Students
Advance to competency-based curricula that incorporate transversal themes related to the key concepts in physical education (for example, digital literacy, citizenship, environment, nutrition and sustainability), supporting interdisciplinarity.	Incorporate transversal themes related to physical activity and health, like digital literacy, citizenship and sustainability, to stimulate interdisciplinarity.	Teachers
<b>Appropriate instruction</b>		
Welcome and respect classmates with different skills, disabilities and tastes during the classes, to contribute to the construction of an inclusive and fair society <sup>4,10,22,23,25,27,29,32,34,35</sup> .	Welcome and respect classmates with different skills, disabilities and preferences during the classes.	Students
Encourage your child to explore the activities learned in the physical education classes outside school, focusing on an active and healthy life throughout life <sup>9,10,18-21,25,27,32,34</sup> .	Encourage the child and adolescent to explore the activities learned in the physical education classes outside school, focusing on an active and healthy life throughout life.	Parents or guardians
Try to improve the quality of the classes by attending qualification courses and exchanging experiences about curriculum, pedagogical practices and assessment <sup>25,32,34,36</sup> .	Try to improve the quality of your classes by attending qualification courses and exchanging experiences about curriculum, pedagogical practices and assessment.	Teachers
Adopt strategies that maintain students active and participating during most of the class, by means of diversified, interactive, challenging, pleasant pedagogical practices that stimulate students' confidence and autonomy <sup>9,10,13,15,16,19,22,25,26,29,30,34,39,41,45,49</sup> .	Adopt strategies that maintain students physically active and participating during most of the class, by means of diversified, interactive, challenging pedagogical practices that bring satisfaction and stimulate students' confidence and autonomy.	Teachers

Continuation of **Table 3** – Strategies recommended for physical education classes in the promotion of an active and healthy lifestyle.

Recommendation	Messages to the population	Section of the Guidelines
Approach the theme of physical activity and its relations to knowledge about culture and body expression, promoting discussions about social inequalities, like ethnicities and gender, and health determinants <sup>25,31,34,35,47</sup> .	Approach the theme of physical activity and its relations to knowledge about culture and body expression, respecting local and regional specificities, to promote discussions also about social inequalities, like ethnicities and gender, and health determinants.	Teachers
Stimulate the involvement of all students in the classes, regardless of skills, disabilities and health conditions <sup>4,10,16,22,23,25,27,29,32,34,35,39,47</sup> .	Stimulate the involvement of all students in the classes, regardless of skills, disabilities and health conditions.	Teachers
Use innovative technologies and pedagogical strategies in the classes, and stimulate students' participation in field classes and activities in the community <sup>25,32,34,46</sup> .	Use innovative technologies and pedagogical strategies in the classes, and stimulate students' participation in classes and activities in the community.	Teachers
The Physical Education teacher must use innovative technologies and approaches (for example, electronic games, applications, systems and others), both in the development of the classes and in student assessment <sup>25,32,34,46</sup> .	The classes must include contents that enable positive experiences and innovative approaches for students.	What are the recommendations for physical education classes?
Build a favorable environment so that students feel motivated to participate in the physical education classes <sup>32,46,50</sup> .	Build a favorable environment so that students feel motivated to participate in the physical education classes <sup>32,46,50</sup> .	Teachers
Build a favorable environment so that students feel motivated to participate in the physical education classes <sup>32,46,50</sup> .	Build a favorable environment so that students feel motivated to participate in the physical education classes <sup>32,46,50</sup> .	Students
<b>Assessment</b>		
Participate in the PE classes to develop knowledge, skills and competencies to undertake different types of physical activity (sports, games, plays, gymnastics, dances and fights) <sup>9,10</sup> .	Participate in the PE classes to develop skills and to know different types of physical activity. This will help you have an active life!	Students
Stimulate active participation and monitor the progress of your child in the PE classes so that they develop knowledge, skills and competencies to undertake different types of physical activity <sup>22,25,29,32,34,35,41</sup> .	Stimulate active participation and monitor the child's and adolescent's progress in the physical education classes.	Parents or guardians
<b>Strategies that interact with PE</b>		
Pay attention to the teacher's instructions during classes and to the practice environments for your safety and your classmates' <sup>34,35,42,43,51,52</sup> .	Pay attention to the teacher's instructions during classes and to the practice environments for your safety and your classmates'.	Students
Do not be ashamed to participate in the PE classes. The teacher and your classmates will help you learn the activities.	Do not be ashamed to participate in the PE classes. The teacher and your classmates will help you learn the activities.	Students
Whenever possible, wear light clothing and adequate and comfortable shoes for physical activity practice.	Whenever possible, wear light clothing and adequate and comfortable shoes for physical activity practice.	Additional instructions for students
You must drink water before, during and after the practice of physical activity. You must also eat healthily. To know more about this theme, refer to the Dietary Guidelines for the Brazilian Population <sup>16,24,42,43,47</sup> .	You must drink water before, during and after the practice of physical activity. You must also eat healthily. To know more about this theme, refer to the Dietary Guidelines for the Brazilian Population.	Additional instructions for students
When you practice physical activity outdoors, use some kind of protection, like a cap, a long-sleeve T-shirt and sunscreen lotion, if possible.	When you practice physical activity outdoors, use some kind of protection, like a cap, a long-sleeve T-shirt and sunscreen lotion, if possible.	Additional instructions for students

PE = physical education.

on other health behaviors; c) physical/physiological health; d) psychological health; e) social and environmental health; II - Recommendations by analysis dimension: a) policy and environment; b) curriculum; c) appropriate instruction; d) assessment; e) school actions related to physical education. This information was obtained from students (n = 24), managers (n = 20), physical education teachers (n = 20), and parents/guardians (n = 11) - Table 4.

Compilation of the evidences found in the stages described above enabled the creation of recommenda-

tions for PE classes to the Brazilian population. The main message is:

**At least three physical education classes must be offered per week, each lasting 50 minutes.** Classes must include contents that enable positive experiences and innovative approaches for students.

Instructions for students and recommendations for teachers, parents/guardians, and the school community in general can be visualized in Table 3.

**Table 4** – Perception of the contribution and importance of physical education (PE) classes for health and suggested recommendations by approached dimensions.

Population: school students	
Objective: Contribution of the classes to health	Recommendations - Schools must:
<p>Physical activity</p> <ul style="list-style-type: none"> <li>• Stimulates physical activity practice outside school.</li> <li>• Stimulates students to care for the body.</li> <li>• Provides pleasant experiences.</li> </ul> <p>Other behaviors</p> <ul style="list-style-type: none"> <li>• Improves health and quality of life perception.</li> <li>• Helps to have healthy eating habits, good hygiene and adequate body weight.</li> <li>• Combats sedentariness and prevents diseases.</li> </ul> <p>Physical/motor health</p> <ul style="list-style-type: none"> <li>• Helps to know about the human body and how to move it.</li> <li>• Enables to learn about and improve motor, physical and physiological performance skills.</li> </ul> <p>Psychological Health</p> <ul style="list-style-type: none"> <li>• Contributes to mental health and reduces stress.</li> </ul> <p>Social-environmental Health</p> <ul style="list-style-type: none"> <li>• Helps to develop interpersonal relationships.</li> <li>• Expands the values and cultural repertoire.</li> <li>• Establishes a relationship to the social environment.</li> </ul> <p>Cognitive Health/School performance</p> <ul style="list-style-type: none"> <li>• Enhances full cognitive development and school performance.</li> </ul>	<p>Policy and environment</p> <ul style="list-style-type: none"> <li>• Recognize the importance of physical education by promoting its equality to the other disciplines.</li> <li>• Guarantee adequate spaces and material resources for the classes.</li> <li>• Guarantee more physical education classes to generate experiences and learning about the human movement.</li> <li>• Develop actions that enable to include all students in the classes, independently of sex and health condition.</li> </ul> <p>Curriculum</p> <ul style="list-style-type: none"> <li>• Guarantee the teaching of the contents present in the curriculum, not limiting it to sports practice.</li> </ul> <p>Appropriate instruction</p> <ul style="list-style-type: none"> <li>• Develop structured and organized didactic actions that ensure the diversification of contents and their meanings.</li> <li>• Guarantee an adequate number of physical education teachers and provide continuing education for them.</li> <li>• Ensure that the teacher conducts structured and organized teaching actions to guarantee that students develop the necessary skills for life.</li> </ul> <p>Assessment</p> <ul style="list-style-type: none"> <li>• Create and implement assessment strategies to monitor students' development.</li> </ul> <p>Strategies that interact with physical education</p> <ul style="list-style-type: none"> <li>• Develop actions that involve the family as a stimulator of physical activity practice inside and outside school.</li> <li>• Develop actions involving different school events, like interclass tournaments, cultural festivals, etc.</li> <li>• Develop actions that provide scientific initiation related to physical activity promotion.</li> <li>• Develop actions that enable to apply the physical education contents to physical activity inside and outside school.</li> <li>• Guarantee the development of transversal themes, emphasizing health and human values.</li> </ul>
Population: managers	
Objective: Contribution of the classes to health	Recommendations:
<p>Physical activity</p> <ul style="list-style-type: none"> <li>• Stimulates non-sedentariness.</li> <li>• Stimulates physical activity.</li> </ul> <p>Other behaviors</p> <ul style="list-style-type: none"> <li>• Improves quality of life.</li> <li>• Stimulates healthy habits.</li> <li>• Prevents many diseases.</li> </ul> <p>Physical/motor health</p> <ul style="list-style-type: none"> <li>• Improves health, physical fitness and the development of physical skills.</li> <li>• Provides knowledge about body skills.</li> </ul> <p>Psychological Health</p> <ul style="list-style-type: none"> <li>• Improves daily disposition.</li> <li>• Improves mental health.</li> </ul> <p>Social-environmental Health</p> <ul style="list-style-type: none"> <li>• Improves social wellbeing.</li> <li>• Enables socialization.</li> </ul> <p>Cognitive Health/School performance</p> <ul style="list-style-type: none"> <li>• Improves motor skills.</li> <li>• Improves cognitive development.</li> </ul>	<p>Policy and environment</p> <ul style="list-style-type: none"> <li>• Increase and improvement in physical spaces and in the available equipment and materials.</li> <li>• Qualification of teachers; design of dynamic and attractive classes that emphasize the importance of physical activity and healthy eating and deal with scientific contents produced for school students.</li> <li>• Distribution and increase in the number of teachers.</li> <li>• Adherence and support to projects suggested by the professionals.</li> <li>• Increase in the number of physical education classes per week.</li> <li>• Creation of guidelines for physical education classes.</li> </ul> <p>Curriculum</p> <p>---</p> <p>Appropriate instruction</p> <p>---</p> <p>Assessment</p> <p>---</p> <p>Strategies that interact with physical education</p> <ul style="list-style-type: none"> <li>• Stimulation to the development of events and adherence to programs.</li> <li>• Implementation of the School Health Program.</li> <li>• Promotion of school games, education fairs, and exchange events.</li> </ul>

Continuation of **Table 4** – Perception of the contribution and importance of physical education (PE) classes for health and suggested recommendations by approached dimensions.

Population: parents and guardians	Population: physical education teachers
Objective: Contributions of the classes to health	Objective: Factors that hinder pedagogical practice
Physical activity <ul style="list-style-type: none"> <li>• Active adult life.</li> <li>• Adds physical activity alternating with theoretical lessons in the classroom.</li> </ul>	Policy and environment <ul style="list-style-type: none"> <li>• Increase the investment to qualify teachers.</li> <li>• Increase the investment to improve school structure.</li> <li>• Amplify interaction with universities.</li> <li>• Reduce the number of students per class.</li> <li>• Improve infrastructure and materials.</li> </ul>
Other behaviors <ul style="list-style-type: none"> <li>• Combats sedentariness.</li> <li>• Stimulates healthy habits.</li> <li>• To have a good health.</li> <li>• Disease prevention.</li> </ul>	Curriculum <ul style="list-style-type: none"> <li>• Standardize contents.</li> <li>• Stimulate interdisciplinarity.</li> <li>• Enhance knowledge about the curriculum.</li> </ul>
Physical/motor health <ul style="list-style-type: none"> <li>• Develops motor coordination.</li> <li>• Helps in growth and development.</li> </ul>	Appropriate instruction <ul style="list-style-type: none"> <li>• Improve qualification courses about teaching methods.</li> <li>• Offer more education and recycling courses for new knowledge.</li> <li>• Diversify methodologies.</li> <li>• Apply the curriculum contents.</li> </ul>
Psychological Health ---	Assessment ---
Social-environmental Health <ul style="list-style-type: none"> <li>• Interaction and socialization with classmates.</li> <li>• Values and norms.</li> </ul>	Strategies that interact with physical education ---
Cognitive Health/School performance ---	

## Discussion

The development stages of the PE chapter presented in the Guidelines were described in the present article. The scientific evidence syntheses indicated that PE classes contributed to different dimensions of health, mainly physical/motor health. Many strategies have been tested, and the main message pointed to the need of guaranteeing at least three quality PE classes per week in all the years of Basic Education.

Results from the first review emphasize the countless health benefits deriving from participation in PE classes<sup>3-11</sup>. When we consulted the school community, the recognition that PE contributes to health was unanimous. Students reported that PE contributes to stimulate the practice of physical activity and brings benefits to physical/motor, psychological and socio-environmental health. In the managers' perception, physical activity practice improves quality of life, social well-being, daily disposition, mental health and stimulates healthy habits. Parents and guardians reported that PE stimulates physical activity practice throughout life; in addition, it contributes to the adoption of healthy behaviors and to social health. This was important to show that the scientific evidences were validated by the school community members, who recognize the bene-

fits of participation in PE classes for students' health.

The strategies for PE were analyzed according to the proposal of the American Society of Health and Physical Educators<sup>12</sup>. We found that, in 63 published documents, the most used strategies are those that interact with PE, followed by policy and environment, appropriate instruction, curriculum and assessment. The target audience is mostly composed of managers and politicians, followed by teachers, parents/guardians and students. In the sphere of policy and environment, the following strategies were mentioned: the need of (a) recognition of the importance of PE (students), (b) structure and materials (students, managers and teachers), (c) more PE classes (students, managers), (d) teachers' presence and posture (students), (e) teacher qualification (managers and teachers), (f) distribution and increase in the number of teachers (managers), and (g) reduction of the number of students in the classroom (teachers).

In relation to curriculum, the following aspects were mentioned: the need to (a) guarantee the teaching of contents present in the curriculum beyond sports practice (students), (b) standardize the content and enable interdisciplinarity (teachers). For appropriate instruction, special attention must be paid to diversification of

contents (students) and to teacher qualification (students and teachers). As for assessment, the implementation of strategies that enable to monitor the student's development was mentioned (students). When we asked what strategies interact with PE, the participants reported the importance of: (a) developing actions that involve the family; (b) working with themes targeted at health and human values (students); (c) developing school events and games (students and managers). In short, the main strategies mentioned by the literature and in the consultations converged, focusing on the policy and environment dimension to guarantee sufficient and high-quality PE classes.

Unlike some physical activity recommendations published in other countries, the inclusion of PE classes in the Guidelines is an innovation. This initiative is important to guide the agenda of Brazil's public policies targeted at the promotion of physical activity and at the improvement in other health indicators. The main message for managers and politicians is that investing in PE can be the best path to provide immediate benefits for child and adolescent health and to contribute to change the paradigm and culture of the future generations. This happens because, in the majority of times, the first theoretical-practical opportunity of structured physical activity that the child has is the school PE. Knowing and experiencing the culture of body movement and its benefits to health as early as in childhood education will produce a society that is not only physically active, but also healthy.

In the field of research, we recommend that further studies should be conducted to test associations between PE classes and psychological and cognitive health/school performance, given the low number of studies found. In relation to the strategies, now it is necessary to test the implementation and assess the effectiveness of the strategies presented here in different settings and health outcomes. In addition, it is fundamental that the Guidelines are disseminated beyond the academic world, as specific recommendations were summarized to the entire school community.

The compilation of evidences about the effect of participation in PE classes on the health of children and adolescents and about the main strategies to achieve these benefits is part of the Physical Activity Guidelines for the Brazilian Population. In short, it is recommended that access to PE should be guaranteed in all the cycles of the Brazilian Basic Education, and that at least three obligatory, quality classes per week should

be taught by teachers holding undergraduate degrees in Physical Education. This goal will only be met if all the sectors that compose the system work together, especially politicians and managers - the main actors in decision-making for the development of policies, action plans and programs aiming to change the reality.

### Conflicts of interest

The authors declare there are no conflicts of interest.

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### Authors' contribution

Silva KS participated in the conception and writing of the manuscript, in data analysis and interpretation. Barbosa Filho VC, Camargo EM, Oliveira VJM, Ravagnani FCP, Sandreschi PF, Santos PC, Silva AB, Ramires VV, Tenório MCM participated in the conception, data collection and analysis, critical review and approval of the manuscript. Hallal PC participated in the conception, writing and general review of the manuscript. All the authors approved the final version of the manuscript.

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## Supplementary material 1

**List of references included for question 1** *“What do the evidence syntheses tell about the contribution of PE classes to different components of the active and healthy lifestyle in students?”*

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## Supplementary Material 2

**List of references included for question 2** “*What are the evidences of the contribution of interventions implemented in PE classes in Brazil to the promotion of an active and healthy lifestyle?*”

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## Supplementary material 3

**List of references included for question 3** “*What strategies related to PE classes have been recommended for promotion of an active and healthy lifestyle in students worldwide?*”

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