



## THE PRACTICE OF PHYSICAL ACTIVITY AND THE USE OF CHATGPT AS A COUNSELING TOOL

### A PRÁTICA DE ATIVIDADE FÍSICA E O USO DO CHATGPT COMO UMA FERRAMENTA DE ACONSELHAMENTO

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**Abstract:** This study analyzed ChatGPT's responses when questioned about physical activity recommendations for health based on the characteristics of users served by the Primary Health Care in the Brazilian Unified Health System (SUS). A simulation was conducted with an SUS user seeking information about physical activity for themselves and their family. The responses provided by ChatGPT were analyzed by a committee of experts and classified according to their alignment with global and national (Brazilian) physical activity guidelines. As a result, the responses were moderately satisfactory, with 23.1% of responses considered misaligned with information from reference documents, 46.2% moderately aligned, and 30.7% highly aligned. As more information becomes available regarding the formulation of responses provided by ChatGPT, the tool may assist in advising on public health physical activity.

**Keywords:** Physical Activity; Artificial Intelligence; Primary Health Care; Sedentary Behaviour.

**Resumo:** Este estudo analisou as respostas do ChatGPT ao ser questionado sobre recomendações de atividade física para a saúde com base em características de usuários atendidos pela Atenção Primária à Saúde, no Sistema Único de Saúde (SUS) do Brasil. Foi realizada a simulação de uma usuária do SUS em busca de informações sobre a prática de atividade física para si e para sua família. As respostas apresentadas pelo ChatGPT foram analisadas por um comitê de especialistas e classificadas de acordo com o alinhamento com diretrizes globais e nacionais de atividade física. Como resultado, as respostas foram moderadamente satisfatórias, sendo 23,1% de respostas consideradas não alinhadas com as informações dos documentos de referência, 46,2% moderadamente alinhadas e 30,7% altamente alinhadas. Na medida em que se tenham mais informações sobre a formulação das respostas apresentadas pelo ChatGPT, a ferramenta poderá auxiliar no aconselhamento de atividade física na saúde pública.

**Palavras-chave:** Atividade Física; Inteligência Artificial; Atenção Primária à Saúde; Comportamento Sedentário.

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## 1 Introduction

The importance of physical activity for promoting the health and well-being of individuals and communities and for the prevention, treatment, and rehabilitation of various diseases, especially Non-Communicable Chronic Diseases (NCDs), has gained prominence in public health at national and international levels. From this perspective, the inclusion of physical activity has been the subject of documents from the World Health Organization (WHO) that guide public policies in various countries. Such documents include the Global Strategy on Diet, Physical Activity and Health and the Global Action Plan on Physical Activity 2018-2030. Additionally, physical activity can contribute to achieving the Sustainable Development Goals by 2030, such as health and well-being and sustainable cities and communities (World Health Organization, 2004; 2018; United Nations, 2015).

In Brazil, in the normative documents of the Unified Health System (SUS), physical activity is included as a priority theme in the National Policy for Health Promotion (PNPS) and the National Primary Care Policy (PNAB) (Brasil, 2014; 2017). Furthermore, in the Strategic Action Plan for Coping with Chronic Diseases and Non-Communicable Diseases in Brazil (2021-2030), physical activity is also considered as an action to address risk factors, for the prevention of injuries, for care production, and health assistance (Brasil, 2021a). Moreover, the publication of Ordinance No. 154 of 2008 by the Ministry of Health, which created the Family Health Support Centers (NASF), included the physical education professional in the multi professional team (Brasil, 2008). Recently, this professional category was also considered part of the eMulti, a new modality of multi professional teams (Brasil, 2023). Another meaningful action was the publication of Ordinance No. 1,105 of May 15, 2022, which instituted the Federal financial incentive for funding to implement Physical Activity actions in Primary Health Care, called IAF (Brasil, 2022).

In the global context, the WHO developed a Global Action Plan on Physical Activity (2018-2030), which contributed to disseminating policies, guidelines, and tools for developing physical activity actions in different areas (World Health Organization, 2018). About 40% of European countries have national physical activity recommendations (Kahlmeier *et al.* 2015). In the Americas, approximately 28% of countries have national recommendations, indicating the need for more documents to be developed to promote physical activity for the population (Guerra *et al.* 2021). In this



sense, WHO published, in 2010 (and updated in 2020) physical activity recommendations for the prevention of NCDs at the population level (World Health Organization, 2010; 2020), adopted by Brazil as a parameter for the development of its actions and for the monitoring of physical activity (Brasil, 2021b; 2021c; 2021d). In 2021, Brazil published the Physical Activity Guidelines for the Brazilian Population (Brasil, 2021b). The document, presented in simple and accessible language for the population, was also pioneering in including essential topics such as recommendations for school physical education, and it has a Braille version. The content of the Guidelines is also available in audio on digital platforms (Umpierre *et al.* 2022).

Notably, the publication of health-related guidelines must be accompanied by knowledge translation. For this to be effective, it is necessary to carry out the diffusion, dissemination, and implementation of the information in such documents (Brasil, 2020). Bibliographic and scientific searches based on the best evidence can occur through different sources of databases, from virtual library search tools to scientific journals. More recently, artificial intelligence has gained space as a tool for use, such as Chatbots like ChatGPT. This new resource may also be used to search for information in the health area and conduct research on different topics. There still needs to be more information about the capacity of this resource to produce adequate and satisfactory responses to support evidence or guidance on physical activity. Thus, this study aims to contribute to the gathering of such information and seeks to analyze the responses of ChatGPT when questioned about physical activity recommendations for health based on characteristics of users served by Primary Health Care (PHC) in the public health system of Brazil.

## 2 Method

ChatGPT is a natural language model trained on a large amount of text data to generate coherent responses and conversations. The model uses the GPT-3.5 architecture from the United States-based artificial intelligence research laboratory, OpenAI. It is one of the largest and most advanced virtual conversation assistants. When a user types a message or question, the model analyzes the input text, attempts to understand what is being requested, and then generates a response related to the input in natural language. This response is generated based on the model's training on large amounts of text data and analysis of language patterns in previous input and output data (OpenAI, 2021).



ChatGPT can generate natural and understandable responses, creating a conversational experience that is as real as possible with the user.

This exploratory study used a pre-structured script to conduct a conversation with ChatGPT in Brazilian Portuguese. Thus, a simulation was carried out of a middle-aged Woman, a user of the SUS, seeking information about physical activity for herself and her family. The profile of the simulated person was established based on the main characteristics of SUS PHC users (Guibu *et al.* 2017). Table 1 presents the script, elaborated by the authors of this study, based on two reference documents: (1) Physical Activity Guidelines for the Brazilian Population (GAF) (Brasil, 2021b) and (2) WHO Guidelines on Physical Activity and Sedentary Behavior (WHO-GPASB) (World Health Organization, 2020).

Furthermore, it is worth noting that international guidelines do not present recommendations for children under five years old. Thus, the document "Guidelines on Physical Activity, Sedentary Behavior and Sleep for children under five years of age" was used for this comparison. In addition to these documents, rising searches related to the term "physical activity" were considered, conducted by users of the Google search engine during the study period, as observed through a search on the Google Trends tool in April 2023. Among the top ten searches were: what is physical activity?; Consequences of sedentary lifestyle; is there any contraindication for physical activity?; domains of physical activity; and physical activity, exercise, and physical fitness.

**Table 1:** Script based on the information contained in the Physical Activity Guidelines for the Brazilian Population (GAF), in the WHO Guidelines on Physical Activity and Sedentary Behaviour (WHO-GPASB), and the rising searches related to the term 'physical activity' on the Google search engine (April 2023).

Question	Theme	Response references
1. Hello, I'm a 35-year-old woman, and I would like to get some information on how to become more physically active. Can you help me?	Presentation	Not applicable
2. Is there a difference between physical activity and exercise?	Concept and difference between physical activity and exercise	GAF - pages 8 and 10 WHO-GPASB - page vi
3. What is sedentary behavior?	Concept of sedentary behavior	GAF - page 10 WHO-GPASB - page vii
4. What is the importance of physical activity?	Benefits of regular physical activity	GAF - pages 12, 17, 24, and 29



		WHO-GPASB - page 15
5. I have a 4-year-old son. What are his recommendations for physical activity?	Recommendations for physical activity time for children	GAF - pages 12 and 13 WHO-GPASB* - page 6
6. I have another son who is 15 years old. What are his recommendations for physical activity?	Recommendations for physical activity time for adolescents	GAF - pages 17 and 18 WHO-GPASB - page 25
7. I am 35 years old, so what are my recommendations for physical activity?	Recommendations for physical activity time for adults	GAF - pages 24 and 25 WHO-GPASB - page 32
8. I am pregnant, can I do physical activity?	Physical activity recommendations for pregnant and postpartum women	GAF - pages 40, 41 and 42 WHO-GPASB - pages 47, 48, 49, and 50
9. My father is 67 years old; what are his recommendations for physical activity?	Recommendations for physical activity time for the elderly	GAF - pages 24 and 25 WHO-GPASB - page 43
10. Where can I do physical activity?	Support network for adult physical activity practice	GAF - page 28
11. Does the SUS offer physical activity?		
12. Are these pieces of information you provided validated by reliable health institutions such as the Ministry of Health and the World Health Organization?	Source of information	Not applicable
13. What were the guidelines you relied on to provide this information?		Not applicable

**Source:** authors.

\* The WHO recommendations for children under five years of age are published in a separate document called "Guidelines on Physical Activity, Sedentary Behavior and Sleep for children under five years of age."

The questions to ChatGPT were conducted on April 5, 2023, and then copied and transferred to a spreadsheet using Microsoft Excel software. Subsequently, the spreadsheet was analyzed by a committee of experts to align the content with the information contained in the GAF and WHO-GPASB. The expert committee consisted of five researchers (four PhDs and one master's degree holder) in the field of Physical Education or a related area, selected for convenience, who have experience in physical activity and health, demonstrated through their professional activities and publications of



scientific manuscripts, books, technical documents, work with the Ministry of Health, and other experiences. The experts were instructed to analyze ChatGPT's responses to each question and indicate their degree of alignment with the reference guidelines (Table 2).

**Table 2:** Scale for analyzing the degree of alignment between ChatGPT responses and the Physical Activity Guidelines for the Brazilian Population (GAF) and the WHO Guidelines on Physical Activity and Sedentary Behavior (WHO-GPASB).

Degree of alignment	Description
High	The information was fully covered in the reference guideline
Medium	The information was partially covered in the reference guideline
Low	The information was not covered in the reference guideline

Source: authors.

Each expert analyzed the responses individually. Afterward, the experts' analyses were compared, and when at least three (majority) marked a particular option, it was retained. Any other situation was brought for discussion, and the experts reached a consensus.

### 3 Results

ChatGPT answered all questions in the script. Most of the responses were considered to have a moderate degree of alignment with the GAF and WHO-GPASB, and none were considered to have a low degree of alignment. The detailed responses and analyses are presented in Table 3.

**Table 3:** Conversation with ChatGPT and alignment analysis of responses with the Physical Activity Guidelines for the Brazilian Population (GAF) and the WHO Guidelines on Physical Activity and Sedentary Behavior (WHO-GPASB).

Question	Response	Degree of alignment	
		GAF	WHO-GPASB
Hello, I'm a 35-year-old woman who likes to learn about becoming more physically active. Can you help me?	Of course, I'd be happy to help! There are many ways you and your family can be more physically active. Here are some suggestions:  Take walks or runs together: A brisk walk or run can be a great way to start the day and enjoy nature together.  Do workouts at home: There are plenty of workout videos available online that you can follow at home with your family. Make use of the open spaces in your home.  Choose fun activities: Playing a game of soccer	Not applicable	Not applicable



	<p>basketball, dancing together, or even a board game that involves movement is a fun way to be physically active.</p> <p>Try new sports: Try out new sports together, like tennis, volleyball, or swimming. Variety helps to keep things interesting.</p> <p>Set goals: Set realistic goals and reward yourself and your family when you achieve them. This will help keep you motivated.</p> <p>Make a schedule: Set aside specific times to be physically active; it makes it easier to stick to.</p> <p>Be a role model: As an active mom, you can be a positive example for your children. Make sure they see you exercising regularly.</p> <p>Start slowly: You can skip strenuous exercises immediately. Start with short walks and easy activities and gradually increase over time.</p> <p>Enjoy the time together: Enjoy being with your family while staying physically active.</p> <p>Remember, the most important thing is to find an enjoyable activity for you and your family that can be easily incorporated into your daily routine. I hope these suggestions are helpful and motivating for you and your family</p>		
<p>Is there a difference between physical activity and exercise?</p>	<p>Yes, there is a difference between physical activity and exercise.</p> <p>Physical activity is any bodily movement that involves energy expenditure, such as walking, climbing stairs, gardening, doing household chores, or any other form of movement that is part of a person's daily activities.</p> <p>Conversely, exercise is a planned and structured form of physical activity that aims to improve physical fitness, health, and well-being. It is generally performed intensely and for a specific period, such as engaging in one particular activity like running, weightlifting, yoga, or pilates, among others.</p> <p>Both are important for overall health and well-being. Still, Exercise is typically performed with specific goals and at a higher intensity, while physical activity can be performed more casually and integrated into daily activities. A balanced combination of physical activity and exercise is essential to maintaining health and well-being.</p>	<p>Medium</p>	<p>Medium</p>
<p>What is sedentary behavior?</p>	<p>Sedentary behavior is a condition in which a person spends long periods sitting or lying down without engaging in enough physical activity to maintain their health and well-being. A sedentary person engages in low physical activity and is generally inactive.</p>	<p>Medium</p>	<p>Medium</p>



	<p>Sedentary behavior can lead to a range of health problems, including an increased risk of obesity, heart disease, diabetes, high blood pressure, depression, and anxiety, among others. Lack of physical activity can also contribute to loss of muscle mass and bone density, as well as decreased flexibility and the ability to perform daily activities efficiently.</p> <p>It's important to note that sedentary behavior is not limited to people who have sedentary jobs or spend a lot of time watching television. Even people who consider themselves active can be sedentary if they spend long periods sitting or lying down without taking breaks to move. That's why it's important to incorporate physical activity into daily routines and avoid sedentary behavior.</p>		
<p>What is the importance of physical activity?</p>	<p>Physical activity is vital for the overall health and well-being of the body and mind. Here are some key benefits of physical activity:</p> <p>Improves cardiovascular health: Regular physical activity helps improve heart and blood vessel health, reducing the risk of heart disease and stroke.</p> <p>Increases endurance and muscle strength: Physical activity improves muscle endurance and strength, which can enhance the ability to perform daily tasks more efficiently.</p> <p>Aids in weight control: Physical activity is essential in weight control, as it helps burn calories and increase metabolism.</p> <p>Enhances mental health: Regular physical activity can help reduce symptoms of depression, anxiety, and stress, and improve self-esteem and quality of life.</p> <p>Improves bone health: Physical activity helps improve bone density and prevent bone loss, which can help reduce the risk of osteoporosis.</p> <p>Reduces the risk of chronic diseases: Physical activity can help reduce the risk of various chronic diseases, including type 2 diabetes, some types of cancer, and arthritis.</p> <p>Improves sleep quality: Physical activity can help enhance the quality of sleep, which can lead to increased energy and productivity during the day.</p> <p>Overall, regular physical activity is an important part of a healthy lifestyle and can help improve health and well-being at all stages of life.</p>	<p>Medium</p>	<p>High</p>
<p>I have a 4-year-old son. What are his recommendations</p>	<p>For 4-year-old children, it is recommended to have at least 3 hours of physical activity per day, with a combination of light, moderate, and vigorous activities. Here are some specific recommendations for physical activities for 4-year-old children:</p>	<p>Medium</p>	<p>Medium</p>





<p>for physical activity?</p>	<p>Outdoor play: Let your child play outdoors, run, jump, dance, kick a ball, and engage in other fun physical activities that encourage movement.</p> <p>Active games: Active games such as "follow the leader," "musical chairs," and "statues" are great ways to promote physical activity and help improve the child's motor coordination.</p> <p>Children's sports: Sports such as soccer, basketball, and tennis can be practiced in teams or individually and help improve coordination, agility, and muscle strength.</p> <p>Bike rides: Riding a bike with parents or other children is a great way to have fun while exercising.</p> <p>Active electronic games: Some electronic games can be a fun way for children to be physically active, such as dance games or games that encourage body movements.</p> <p>It's important to remember that safety is paramount when choosing physical activities for children. Be sure to select activities that are appropriate for your child's age and ability, supervise activities at all times, and use safety equipment such as helmets and knee pads when necessary.</p>		
<p>I have another son who is 15 years old. What are his recommendations for physical activity?</p>	<p>For 15-year-old teenagers, it is recommended to have at least 1 hour of physical activity per day, including light, moderate, and vigorous activities. Here are some specific recommendations for physical activities for 15-year-old teenagers:</p> <p>Aerobic activities: Activities such as running, cycling, swimming, dancing, and team sports like soccer and basketball are excellent ways to improve cardiovascular and respiratory endurance.</p> <p>Muscle strength exercises: 15-year-old teenagers can do muscle strength exercises with free weights, weight machines, or using their body weight. These exercises help strengthen muscles, bones, and joints, improve posture, and prevent injuries.</p> <p>Flexibility activities: Stretching and flexibility activities help improve joint range of motion and reduce the risk of injuries. Yoga and Pilates are examples of flexibility activities that can be practiced by teenagers.</p> <p>Coordination activities: Activities such as dance, martial arts, skating, and climbing help improve motor coordination, balance, and agility.</p> <p>Balance exercises: Balance exercises, such as walking on a straight line, can be practiced to help improve balance and prevent falls.</p> <p>It's important to remember that safety is paramount when</p>	<p>Medium</p>	<p>Medium</p>



	<p>choosing physical activities for teenagers. Be sure to select activities that are appropriate for your child's age and ability, supervise activities at all times, and use safety equipment such as helmets and knee pads when necessary.</p>		
<p>I am 35 years old. What are my recommendations for physical activity?</p>	<p>For adults aged 35, physical activity recommendations include at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity per week, as well as muscle-strengthening exercises on at least two days per week. Here are some specific recommendations for physical activities for adults aged 35:</p> <p>Aerobic activities: Activities such as brisk walking, running, cycling, swimming, dancing, and team sports help improve cardiovascular and respiratory endurance.</p> <p>Muscle-strengthening exercises: Muscle-strengthening exercises can be done with free weights, weight machines, resistance bands, or using your own body weight. They help strengthen muscles, bones, and joints, improve posture, and prevent injuries.</p> <p>Flexibility activities: Stretching and flexibility activities help improve joint range of motion and reduce the risk of injuries. Yoga and Pilates are examples of flexibility activities that can be practiced by adults aged 35.</p> <p>Balance exercises: Balance exercises, such as single-leg balance or balancing on a ball, help improve balance and prevent falls.</p> <p>Interval training: Interval training is a type of training that alternates short periods of intense physical activity with lighter recovery periods. This helps improve cardiovascular capacity and burn more calories in less time.</p> <p>It's important to remember that safety is paramount when choosing physical activities. Be sure to select activities that are appropriate for your physical condition and ability, and consult a healthcare professional before starting an exercise program.</p>	<p>Medium</p>	<p>Medium</p>
<p>I am pregnant, can I do physical activity?</p>	<p>Yes, in most cases, pregnant women are encouraged to engage in regular physical activity, provided they have approval from their obstetrician or gynecologist. Physical activity during pregnancy can bring benefits to both maternal and fetal health, including:</p> <ul style="list-style-type: none"> <li>Reducing the risk of gestational diabetes</li> <li>Improving cardiovascular and respiratory health</li> <li>Reducing the risk of excessive weight gain during pregnancy</li> <li>Improving mental health, including reducing stress and postpartum depression</li> <li>Improving sleep quality</li> </ul>	<p>High</p>	<p>High</p>



	<p>Recommendations for physical activity for pregnant women may vary depending on various factors such as the woman's health, stage of pregnancy, and the activities she engaged in before pregnancy. Generally, it is recommended that pregnant women engage in moderate-intensity physical activities such as walking, swimming, prenatal yoga, or strength training exercises. High-impact and contact sports should be avoided. It is important to avoid excessive fatigue and dehydration, and to monitor warning signs such as abdominal pain, shortness of breath, and vaginal bleeding.</p> <p>It's important to remember that each pregnancy is unique, and it's necessary to consult a healthcare professional before starting or modifying a physical activity program during pregnancy. If there are complications in the pregnancy or other medical conditions, limiting or avoiding physical activity may be necessary.</p>		
<p>My father is 67 years old. What are his recommendations for physical activity?</p>	<p>For older adults, like your 67-year-old father, physical activity recommendations are similar to those for younger adults but with some additional considerations due to potential physical or age-related health limitations. Here are some recommendations for physical activities for older adults:</p> <p><b>Aerobic activities:</b> Activities such as walking, swimming, cycling, water aerobics, and dancing can help improve cardiovascular and respiratory endurance, as well as reduce the risk of chronic diseases such as diabetes, hypertension, and heart disease.</p> <p><b>Muscle-strengthening exercises:</b> Muscle-strengthening exercises help maintain muscle and bone mass, reduce the risk of falls, and improve daily functional capacity. They can be done with free weights, weight machines, or resistance bands, but it's important to use light weights and do more repetitions to reduce the risk of injuries.</p> <p><b>Flexibility activities:</b> Stretching and flexibility activities help improve joint range of motion and reduce the risk of injuries. Yoga, tai chi, and stretching are among the most recommended flexibility activities for older adults.</p> <p><b>Balance exercises:</b> Balance exercises help reduce the risk of falls and improve daily functional capacity. They can be done on one leg or on a ball, and balance training is especially important for older adults.</p> <p><b>Recreational activities:</b> Recreational activities such as golf, bowling, gardening, and ballroom dancing are great ways to stay active and socialize simultaneously.</p> <p>It's important to remember that safety is paramount when choosing physical activities. Be sure to select activities that are appropriate for your father's physical condition and ability, and consult a healthcare professional before starting an exercise program, especially if there are chronic medical conditions.</p>	<p>Medium</p>	<p>Medium</p>



<p>Where can I do physical activity?</p>	<p>There are many places where you can engage in physical activity. Here are some options:</p> <p>Gyms: Gyms are great options for those who want to exercise with weightlifting equipment and cardio machines. Many gyms also offer group classes such as dance, yoga, and pilates.</p> <p>Parks: Public parks are an excellent option for outdoor exercise. They usually offer walking trails, running tracks, and areas for strength exercises.</p> <p>Pools: Pools are great for activities like swimming and water aerobics, which are low-impact activities ideal for people with injuries or joint problems.</p> <p>Sports centers: Sports centers offer a variety of physical activities such as basketball, volleyball, tennis, and more. They may also offer group classes such as spinning, zumba, and boxing.</p> <p>Outdoor activities: There are many outdoor activities you can do to exercise, such as hiking, climbing, cycling, kayaking, and more.</p> <p>At home: There are many physical activities you can do at home, such as weight training, strength exercises, stretching, and yoga.</p> <p>Regardless of the place you choose to exercise, make sure to select an activity that is safe and suitable for your physical condition and ability. It's also important to keep in mind that physical activity can be done in small amounts throughout the day, such as walking to work or taking the stairs instead of the elevator.</p>	<p>High</p>	<p>Not applicable</p>
<p>Does the SUS offer physical activity?</p>	<p>Yes, the Unified Health System (SUS) offers free physical activity programs and services for the population. These programs are offered at different health units, such as health posts, health centers, and hospitals, and aim to promote health and prevent noncommunicable chronic diseases.</p> <p>The Health Academy Program is an example of a service offered by SUS that aims to promote physical activity and healthy eating for the population. The program provides public spaces for physical activity practice, nutritional counseling, health education activities, and more.</p> <p>Additionally, many cities offer free physical activities in public spaces such as parks and squares. These activities are often organized by municipal health or sports agencies and may include fitness classes, walks, runs, and more.</p> <p>To learn more about the physical activity programs and services offered by SUS in your city, you can contact the local Health Department or visit the Ministry of Health's website.</p>	<p>High</p>	<p>Not applicable</p>



<p>Are these pieces of information you provided validated by reliable health institutions such as the Ministry of Health and the World Health Organization?</p>	<p>Yes, the information I provided is based on recommendations from reliable health institutions such as the Ministry of Health and the World Health Organization (WHO).</p> <p>The Ministry of Health and the WHO recommend regular physical activity to promote health and prevent noncommunicable chronic diseases. Additionally, these institutions provide specific guidelines for different age groups and health conditions based on updated scientific evidence.</p> <p>Therefore, the information I provided is based on these guidelines and recommendations and is considered reliable and safe. However, it's important to remember that each person is unique and may have different needs and limitations, so it's always recommended to consult a healthcare professional before starting a new physical activity program.</p>	<p>Not applicable</p>	<p>Not applicable</p>
<p>What were the guidelines you relied on to provide this information?</p>	<p>The guidelines I used to provide information about physical activity are based on recommendations from the Ministry of Health of Brazil and the World Health Organization (WHO).</p> <p>In Brazil, the Ministry of Health published the Physical Activity Guide for the Brazilian Population in 2019, which provides guidance for safely and effectively engaging in physical activity for different age groups and health conditions. The guidelines in the guide are evidence-based and recognized by healthcare and physical education professionals across the country.</p> <p>The WHO also published global guidelines for physical activity in 2020, aiming to promote health and prevent noncommunicable chronic diseases worldwide. The guidelines recommend specific amounts of physical activity for different age groups and include recommendations on intensity, duration, and type of physical activity.</p> <p>The information I provided aligns with these guidelines and recommendations and is considered up-to-date and reliable. It's important to remember that guidelines and recommendations may change over time as new scientific evidence is discovered, so it's important to stay updated and seek guidance from healthcare professionals.</p>	<p>Not applicable</p>	<p>Not applicable</p>

Source: authors.

#### 4 Discussion

This study aimed to analyze ChatGPT's responses when questioned about physical activity recommendations for health based on characteristics of users attended by PHC



in Brazil's public health system. Thus, the responses provided by this artificial intelligence were moderately satisfactory, with 23.1% of responses not aligned with the information from the reference documents, 46.2% moderately aligned, and 30.7% highly aligned.

National documents containing information on physical activity promotion with accessible and inclusive language for different socioeconomic and cultural contexts are more likely to contribute to population behavior changes (Bergeron *et al.* 2019). Studies reinforce the challenges related to communicating information and attempts to help the population become more physically active, even with numerous evidence on the benefits of regular physical activity (Williamsin *et al.* 2020; Dumuid; Olds; Sawyer, 2021). As an example, the Physical Activity Guidelines for the Brazilian Population were developed considering different realities and contexts to guide safe and progressive physical activity practices (Umpierre *et al.* 2022).

In this exploratory study, we investigated ChatGPT's ability to generate responses that could contribute to physical activity counseling based on simple and contextualized questions about living conditions, which seemed to provide evidence-based guidance with simple language, as used in the guidelines mentioned above. However, caution is necessary when using this information solely for behavior changes instead of consulting a healthcare professional or, when indicated, a physical education professional.

It should be noted that there are differences between the documents used as a reference to analyze the artificial intelligence responses, the GAF, and the WHO-GPASB. While the WHO-GPASB aims to reach policymakers in health, education, youth, sports, and social or family welfare ministries, increasing physical activity and reducing sedentary behavior in population groups through guidance documents (World Health Organization, 2020), the GAF has more straightforward language to reach and indicate physical activity recommendations for the population (Umpierre *et al.* 2022).

Regarding the differences between concepts, ChatGPT suggests that physical exercises are generally performed with specific goals and at a higher intensity. In contrast, physical activity can be more casual and integrated into daily activities, aligned with the GAF and WHO-GPASB. Furthermore, there is a suggestion to combine physical activity and exercise in a balanced way, which can benefit individuals. The concept of physical activity has been updated in recent years, moving from a specific mechanistic act to a deeper appreciation and more subtle understanding of behavior (Piggin *et al.* 2020), which can already be observed in physical activity recommendations guidelines.



Regarding the benefits derived from physical activity, ChatGPT relates to both physical and mental benefits. This relationship aligns with those indicated in the WHO-GPASB. Additionally, the GAF focuses on social benefits, such as promoting pleasure, relaxation, enjoyment, and disposition, social inclusion, creating and strengthening social ties, bonds, and solidarity, and rescuing and maintaining aspects of local culture.

In the question about sedentary behavior, there are conceptual differences related to the term sedentary behavior (Tremblay *et al.* 2017) and insufficient physical activity. Some authors use the term "insufficient physical activity" instead of "physical inactivity" or even synonymously use the term sedentary behavior. ChatGPT presents a concept of "sedentary behavior" similar to "sedentary behavior" in the GAF and WHO-GPASB. However, in international guidelines, there is an indication of energy expenditure (below 1.5 METs), which ChatGPT did not indicate. There is a consensus that high levels of sedentary behavior are unfavorably associated with significant health outcomes (Saunders *et al.*, 2020). ChatGPT indicated that "even people who consider themselves active can be sedentary if they spend long periods sitting or lying down without taking a break to move and stretch." Evidence shows that despite increased physical activity compensating for the adverse effects of sedentary behavior, the compensatory effect is more evident in people with little physical activity (Park *et al.* 2020). Time spent sitting showed a dose-response relationship with all-cause mortality and cardiovascular disease mortality risk in the less active group (Ekelund *et al.* 2016). ChatGPT also did not present a relationship between time and sedentary behavior. For example, the GAF determines that for every hour of sedentary behavior, it is necessary to move for at least 5 minutes by changing positions, standing up, going to the bathroom, drinking water, and stretching the body.

Regarding physical activity recommendations according to life cycles, ChatGPT brings values for children under five that align with the Guidelines on physical activity, sedentary behavior, and sleep for children under five years of age and the GAF. It also suggests combining light, moderate, and vigorous activities. In contrast, the physical activity guidelines are more specific regarding intensity. For example, of the recommended 3 hours of physical activities per day, at least 1 hour should be of moderate to vigorous intensity, which can be accumulated throughout the day. For children and adolescents, the time aligns with the guidelines analyzed in these documents, but differences in intensity presentations are observed again. ChatGPT indicates light, moderate, and vigorous physical activities. However, in the analyzed guidelines, the



preference for practicing physical activities is for those of moderate to vigorous intensity throughout the week, with most being aerobic. ChatGPT also recommends activities such as "muscle strength exercises." However, there is no definition of frequency, intensity, and volume. Physical activities for flexibility, coordination, and balance for this audience are also indicated but are not present in the GAF and WHO-GPASB. For adults, the recommendations proposed by ChatGPT are aligned with the GAF and WHO-GPASB. ChatGPT recommends aerobic physical activities and strength training. However, muscle strength exercises do not have frequency and volume. The same occurs in physical activity recommendations for the elderly, pregnant women, and postpartum women proposed by artificial intelligence.

When asked about support networks, practice locations, and physical activity promotion in the SUS, ChatGPT provides viable options and suggests and highlights the existence of the Health Academy Program (PAS). Established in 2011, PAS is a health promotion strategy promoting care and healthy lifestyles for the population. Actions are developed in the centers, which are PHC establishments built with federal government resources. Although PAS is mentioned, ChatGPT does not mention the Physical Activity Incentive in Primary Health Care (IAF). IAF is a recent strategy for promoting physical activity in PHC and was established through GM/MS Ordinance No. 1,105, dated May 15, 2022, and aims to implement physical activity actions in PHC by hiring physical education professionals in health at PHC; acquiring consumable materials; and qualifying environments related to physical activity; and improving care for people with NCDs by incorporating physical activity into their routine.

It is worth noting that natural language processing models, such as ChatGPT, the software used in this study, are capable of generating content and are poised to become an essential source of information in the health field, democratizing the way people obtain knowledge (Johnson *et al.* 2023). AI has shown applications in research and practice in health, being used in the treatment of obesity (Bays *et al.* 2023), mental health (Imran; Hashmi; Imran., 2023), providing information on public health issues, health promotion strategies, disease prevention, and healthy lifestyle choices (Biswas *et al.* 2023). However, it is emphasized that despite ChatGPT producing seemingly reliable results, caution is necessary due to its limited accuracy and engagement and the need for more direct interaction with healthcare professionals (Biswas *et al.* 2023).

## 5 Conclusion





Based on the analyses conducted in this study, ChatGPT appears to be a tool that can assist in advising on physical activity in public health. However, caution is necessary when implementing it institutionally, as the regulations for developing responses are not public. Future studies should monitor the evolution of the information provided by ChatGPT and test its use in a real-world context.

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