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Opinion article

#TrainingInHome - training at home during the COVID-19 (SARS-CoV-2) pandemic: physical exercise and behavior-based approach

#TreineEmCasa - treinamento em casa durante a pandemia de COVID-19 (SARS-CoV2): exercício físico e abordagem baseada em comportamento

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ABSTRACT

Coronavirus is part of a group of viruses responsible for seasonally causing acute respiratory syndromes that can be accompanied from mild symptoms to severe conditions with a significant mortality rate. In addition to hygiene care, social distance is one of the most efficient strategies to mitigate the spread of the virus and reduce impacts on the world. Therefore, government strategies have directed efforts to ensure the isolation at home of much of the world's population. One of the strategies that has been considered an important tool to facilitate adherence to isolation is the encouragement of regular physical exercise, especially due to its ability to reduce feelings of anxiety and stress in the population. Thus, in parallel with the expansion of coronavirus in the world, the search for exercise at home has gained prominence on the internet, demonstrating the emerging need to think of strategies that can lead to an effective home practice in promoting adherence to a physically active lifestyle. On the other hand, some pertinent questions may arise, such as: how will the exercise prescription and follow-up of the population be carried out during this period? What guidelines should be followed for a safe and efficient prescription? What types of exercises should be prioritized? What are the criteria for this selection? Based on these questions, this study aimed to present a proposal, integrating the physiological and psychobiological aspects, of how physical exercise could be prescribed at home, considering the barriers faced by the population in the face of social isolation worldwide. In summary, here we suggest a prescription model that estimates the weekly performance of at least 150 minutes of aerobic exercises, as well as strength exercises for the main muscle groups. In addition, we guide the use of tools that allow the assessment of physical effort and personal satisfaction in training, with the aim of improving adherence and maintenance to a physical exercise program and thus contributing to health promotion during the COVID-19 pandemic.

Key-words: exercice prescription, home training, lifestyle, pandemic Covid-19.

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RESUMO

O coronavírus faz parte de um grupo de vírus responsáveis por causar síndromes respiratórias agudas sazonalmente que podem ser acompanhadas de sintomas leves a condições graves, com uma taxa de mortalidade significativa. Além dos cuidados de higiene, a distância social é uma das estratégias mais eficientes para mitigar a disseminação do vírus e reduzir os impactos no mundo. Portanto, as estratégias do governo direcionaram esforços para garantir o isolamento em casa de grande parte da população mundial. Uma das estratégias que tem sido considerada uma ferramenta importante para facilitar a adesão ao isolamento é o incentivo ao exercício físico regular, principalmente devido à sua capacidade de reduzir sentimentos de ansiedade e estresse na população. Assim, paralelamente à expansão do coronavírus no mundo, a busca por exercícios em casa ganhou destaque na internet, demonstrando a necessidade emergente de pensar em estratégias que possam levar a uma prática de treino em domicilio eficaz na promoção da adesão a um estilo de vida fisicamente ativo. Por outro lado, algumas questões pertinentes podem surgir, como: como será realizada a prescrição e o acompanhamento da população durante esse período? Quais diretrizes devem ser seguidas para uma prescrição segura e eficiente? Que tipos de exercícios devem ser priorizados? Quais são os critérios para esta seleção? Com base nessas questões, este estudo teve como objetivo apresentar uma proposta, integrando os aspectos fisiológicos e psicobiológicos/comportamentais, de como o exercício físico pode ser prescrito em casa, considerando as barreiras enfrentadas pela população diante do isolamento social em todo o mundo. Em resumo, aqui sugerimos um modelo de prescrição que estima o desempenho semanal de pelo menos 150 minutos de exercícios aeróbicos, bem como exercícios de força para os principais grupos musculares. Além disso, orientamos o uso de ferramentas que permitam avaliar o esforço físico e a satisfação pessoal no treinamento, com o objetivo de melhorar a adesão e a manutenção de um programa de exercícios físicos e, assim, contribuir para a promoção da saúde durante a pandemia do COVID-19.

Palavras-chave: prescrição de exercício, treinamento em casa, estilo de vida, pandemia do Covid-19.

Introduction

Coronavirus (CoV) is part of a group of viruses responsible for seasonally triggering acute respiratory syndromes (Sars) in both humans and animals [1]. According to data from the World Health Organization [2] this virus reached significant mortality numbers. In Hong Kong (China) in 2003, the virus induced 8,098 cases with 774 deaths (9.6% mortality) and 858 deaths (34.0% mortality) in Saudi Arabia (Middle East). At the present time, a "new" coronavirus (Sars-CoV-2) has gained prominence in the scientific community for its faster spread on a significant global scale.

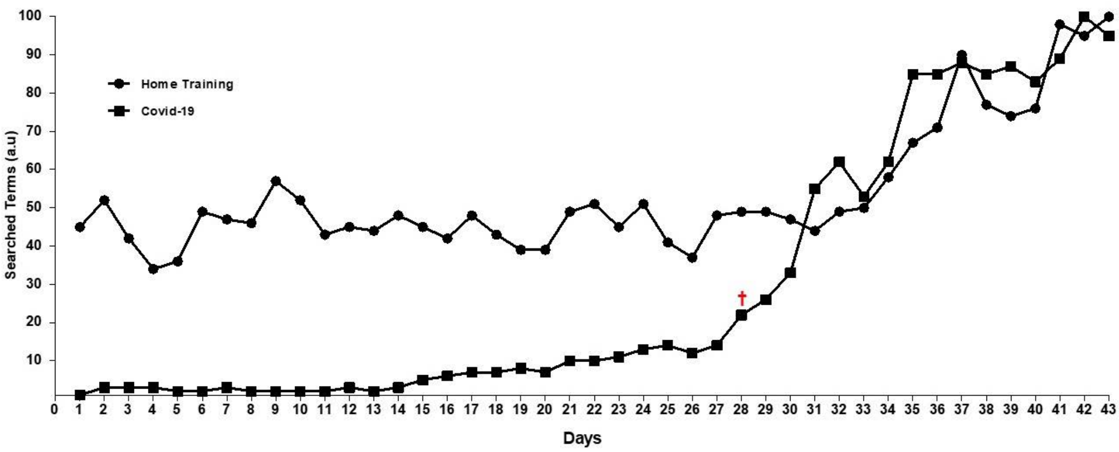
A Sars-CoV-2 infection (also termed Covid-19) that started in November of 2019 in China was declared a Public Health and International Interest Emergency on January 30, 2020 and a month later there were more than 80,000 confirmed cases worldwide, with nearly 3,000 deaths (3.4% mortality) [2]. Also, the World Health Organization declared this infection a pandemic on 11th March 2020. The mortality rate is still uncertain, as epidemiological data are increasing exponentially throughout the world. For this reason, increased progression in the number of deaths, can be difficult to predict [3]. In fact, COVID-19 has a high power of transmissibility from human to human and one person infected can transmit, on average, to four other individuals [4].

Several protective measures should be taken. First, an awareness of appropriate and vigorous hygiene practices (i.e. consistent hand washing). Second, surveillance of cases from epicenter regions for the spread of the virus. Third, social isolation to inhibit spread of the virus is the most efficient strategy to reduce impact in the world [5].

In addition, to facilitate adherence and implementation of social isolation measures, several recommendations are encouraged to manage and improve anxiety and stress levels that are expected to increase during this period of social isolation. Furthermore, social isolation was able to significantly modify the behavior of the world population, regarding all routines, such as work, family management and physical activity. Interestingly, one of the barriers to physical activity was time. Now, this reality has changed.

However, how should these exercises be performed, considering that social isolation was also accompanied by the closure of sports and leisure facilities around the world, such as training centers and gyms?

As we can see in Figure 1, the worldwide growth in the search for the term "home training" in Google occurred in parallel to the growth in the search for the term "COVID-19".



Note: †= Date declared COVID-19 pandemic
Figure 1 – Search for the terms "home training" and "COVID-19" in Google trends.

Data related to this search was acquired on Google Trends on March 27, 2020 (https://trends.google.com/trends/) using the terms "home training" and "COVID-19" under "worldwide" with the period category "last 90 days". The values are presented in arbitrary units (a.u.) and represent the daily search compared to the entire period used in the search. The value referring to 100 is that day when there was the greatest number of internet searches. From there, the other days are compared as a percentage of this maximum. For analysis, the first day on which the Google Trends logarithms were sensitive to perceive the first search for the term COVID-19 in the world was November 2, 2019.

The internet is used by millions of people and most common search platform is Google, which is responsible in 2020 for 82.9% of searches distributed across computers, mobile phones, and tablets (https://www.netmarketshare.com). Google Trends is a tool that allows you to monitor searches performed by certain keywords or subject. Thus, we can verify and compare the seasonality of the search for any term during a previously stipulated period of time. In fact, this is a tool that is widely used to study the global public interest in various topics related to the health area [6].

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Using this analysis model, we were able to verify that the growth in the search for home training is closely related to the search and spread of COVID-19 around the world. For this, we applied a bivariate Pearson correlation between the terms "home training" and Covid-19 and found a R-squared [$r2 = 0.737$ ($p < .0001$)].

However, will this search generated by the exercises at home meet the prescription demands necessary for the population, in this delicate period of global health? What guidelines should we follow for a safe and effective training prescription? What physical activities should we prioritize? What criteria for selecting the exercise? In addition to physical exercise strategies, it is also important to insert behavioral strategies. For this reason, behavioral strategies are fundamental for the participant/client to adhere to an exercise program with routine establishment, that is, habit of exercising.

The objective of this manuscript is to present a proposal, integrating the physiological and psychobiological aspects. Our study will explore: 1) How should physical exercise at home be prescribed?; 2) Considering the barriers faced by the population in the face of social isolation (stay at home) worldwide; 3) Propose strategies on how to overcome the difficulties caused by the COVID-19 pandemic. Thus, we will bring an approach that uses the training variables necessary to accomplish what is recommended by the scientific literature in order to promote an improvement in the health situation. In addition, this proposal aims to help transform the practice of physical exercise into a habit, favoring maintenance (for physically active people) or change (for physically inactive people).

Physical approach

A brief communication from Joy to the American College of Sports Medicine (ACSM) [7] provided some general recommendations for those who intend to remain active during the COVID-19 pandemic. The author reported to those who are in social isolation, but do not present any symptoms, there are no recommendations to limit the practice of physical activity. However, performing 150 to 300 minutes of aerobic exercise per week and 2 sessions per week of moderate intensity muscle strength training should be encouraged [7].

On the other hand, we have a challenge, which is to adapt the training prescription to be performed at home. For this reason, we have two major barriers to be faced: (a) we do not have a variety of equipment available for training (b) the training should be carried out at a distance, which makes it difficult to manage training variables. Thus, what criteria should we take into consideration in order to be able to adapt these facets to the recommended criteria for regular training practice?

To realize the aerobic exercise in home training we have many possibilities, like stationary gait or stair climbing. The use of domestic ergometers, such as bicycles, treadmills and rowing, also becomes an option for those who have this equipment. Exercises popularly known as jumping jacks, jumping rope, among others are also options, if the musculoskeletal condition allows. These activities can be carried out continuously (e.g. 30 minutes continuously) or in blocks of 2, 5, 10 and 15 minutes, provided that the total accumulated in the week is ≥150 minutes, as suggested by the ACSM [7,8].

In general, the maintenance or implementation of aerobic activities during the period of social isolation does not seem to face substantial barriers, because as mentioned, the exercises have low complexity and are already well known by the world population. However, guidance on the intensity of stimuli is necessary, since the general recommendation that the intensity be moderate. In this sense, considering the feasibility, practicality and low cost of the instruments used for intensity control, we suggest the use of the perceived exertion scale from 0 to 10 (figure 2), with the perceived effort during the exercises to be between 3-4 zone (moderate).

0	- Nothing at all
0,5	- Extremely weak (just noticeable)
1	- Very weak
2	- Weak (light)
3	- Moderate
4	- Somewhat strong
5	- Strong (heavy)
6	- Very strong
8	
9	
10	- Extremely strong (almost max)
•	- Maximal

A

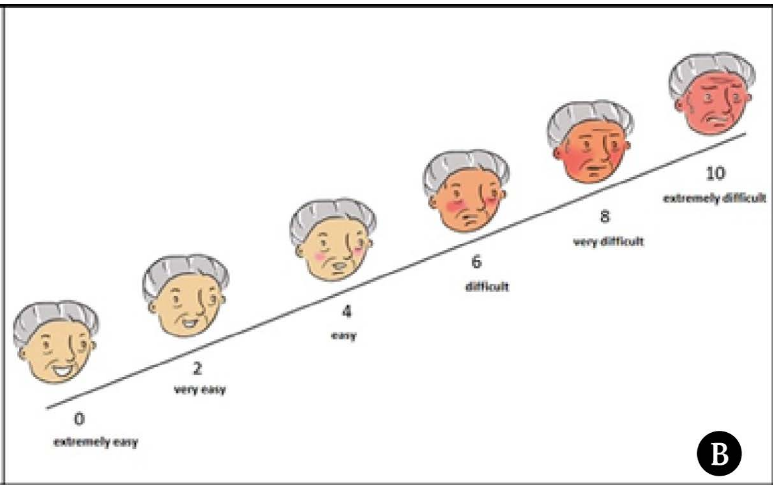


Figure 2. A- Borg CR10 scale (Borg 1982) [37]; B- OMNI-GSE scale Da Silva-Grigoletto *et al*. [9].

Regarding strength training, ACSM recommends the training of the main muscle groups should be stimulated 2-3 times a week with uni- or multi-articular exercises. In each exercise, it is recommended to perform 1 to 4 sets of 8 to 20 repetitions, not necessarily until the concentric failure [8], however, interrupting the set close to the concentric failure (e.g. 2-3 repetitions before). In addition to the use of a variety of exercise equipment, the ACSM's stand position also suggests the use of body weight exercises, an option that seems more suitable for the application of home-based resistance exercises, in view of the recommendation of social isolation due to the COVID-19 pandemic. Table I shows a sequence of bodyweight exercises following the ACSM's recommendations.

There is also a need to assess the exercise intensity for the elderly. Considered the main mortality risk group for COVID-19, it is a fact that elderly individuals must also remain active during the pandemic, using both aerobic exercises and strength exercises at home. For load control in strength training for the elderly, the use of the OMNI-GSE scale is suggested [9].

Table I - Calisthenics strength training program based on ACSM's recommendation

Body segment	Exercise	Regression variations	Progression variations
Lower trunk (Core)	Plank	Knee Plank	Plank arm raises
	Side bridge	Knee Side bridge	Side bridge leg lift
	Bird-dog	Single-Leg Bird Dog	Bird-dog dynamic
Upper trunk and upper limbs	Push-ups	Wide Push-ups	Chest touch push-ups
	Suspended/Towel row	Towel row less slope	Single arm towel row
	Shoulder push-ups	Wide Shoulder push-ups	Close shoulder push-ups
Lower limbs	Squats	Supported Squat	Jump squats
	Lunges	Supported lunges	Walking Lunge
	Good morning (hands on waist)	Good morning (hands on the thigh)	Good morning (hands on the nape)
	Unilateral calf raise	Calf raise	Calf raise jump

The exercise selection must consider the level of training of the practitioner. Our suggestion is that people with little experience in strength training use the exercises located in "regression variations" on table 1 and at the other extreme, experienced practitioners can take advantage of "progression variations".

In addition, exercises based on the application of manual resistance [10,11] or self-resistance exercises [12] can be alternatives for calisthenics, both to vary physiological stimuli, as well as to break psychological monotony.

In summary, the ACSM (2020) recommendation for physical training in the face of the COVID-19 pandemic is clear about the frequency and intensity necessary for the maintenance and improvement in the population's health status. Thus, we follow a prescription model that encourages the performance of at least 150 minutes of aerobic exercise and considers the possibility of performing strength exercises for the main muscle groups.

Behavioral approach

Considering the motivational aspects in parallel with the physiological variables is one of the great challenges given the need to carry out training with weak supervision or without face-to-face communication, which can increase the behavioral difficulties (e.g. habit) to engage in physical exercise programs.

Most of the population consists of people who are physically inactive or who have not yet established a consistent routine or habit of active behavior, which makes a consistent routine imperative for exercise prescription. Thus, in addition to the exercises proposed above, we have included guidelines to make training sessions positive experiences, thus increasing the possibility of becoming a daily habit [13,14]. In this way, we believe a training prescription should not be only efficient (physiological aspects), but mainly effective (psychobiological aspects), that is ideal for the current world scenario in which we are living.

In the prescription of physical exercise at home, an initial challenge is to adapt the level of difficulty of the proposed exercises to people's capacity. This process is more difficult by the distance between participant and personal trainer in this period of social isolation. Self-efficacy is the degree of confidence or belief that the individual has in performing a certain activity and has been indicated by socio-cognitive theories as an important variable in the behavior change process [15,16]. In this perspective, when a person has a low self-efficacy in performing a specific or a sequence of exercises, there is a greater propensity for an experience of frustration (instead of overcoming), which negatively impacts behavioral engagement and training maintenance [17]. It was pointed out that individuals with higher levels of self-efficacy in performing exercises are 50% more likely to be involved in training programs [18].

Although we have presented a pedagogical sequence for the training, as shown in Table I, it is necessary to observe the perception of competence for each of the prescribed exercises and the whole training program session, for workouts that will be held (Do you feel able to do the "X" exercise? Do you feel able to carry out this training session?) or a workout that has already been done (Did you feel able to perform the "X" exercise? Did you feel able to carry out the training session? Thus, the professional must manage this individual's perception for each exercise and align with the recommended level of effort intensity and training volume.

Particularly for individuals who still do not regularly practice physical exercise, the expectation of personal effectiveness to perform a certain training, determines whether your client will propose to start it, how much effort he/she will spend, and for how long he/she will keep exercising in the face of obstacles or aversive experiences [19]. The prescription of workouts that are subjectively threatening (i.e., perceived as a demand exceeding their capacity), should be considered only in conditions where there is the real interest of a challenge and in an extremely safe way. Thus, through the experience of conquering a challenge and carrying out the proposed training, there will be an improvement in self-efficacy and a reduction in defensive behavior [19].

Physical exercise options with different levels of difficulty (particularly those with a lower level of complexity) favor a more assertive selection. It is plausible that in order to identify the level of difficulty that suits the participants' reality (the one that he/she perceives themselves competent), variations ranging from extremely simple to more complex models need to be presented. This process also favors the perception of progression throughout the training sessions. Thus, regardless of the skill level and perception of competence of the participants, the exercise would serve the entire spectrum of possibilities.

In addition, the perception of pleasure during physical exercise is another aspect that must be considered in order to maintain active behavior [20]. Exercise intensity has been indicated as the factor that most impacts the perception of pleasure [20]. In this way, controlling the intensity based on a pre-established level of pleasure can facilitate the induction of a more positive experience. The intensity of physical exercise is indirectly regulated at levels where the impact on positive feelings and emotions would be minimal. For this, we propose the use of the feeling scale (Figure 3) to select a number that will represent the desired emotional state.

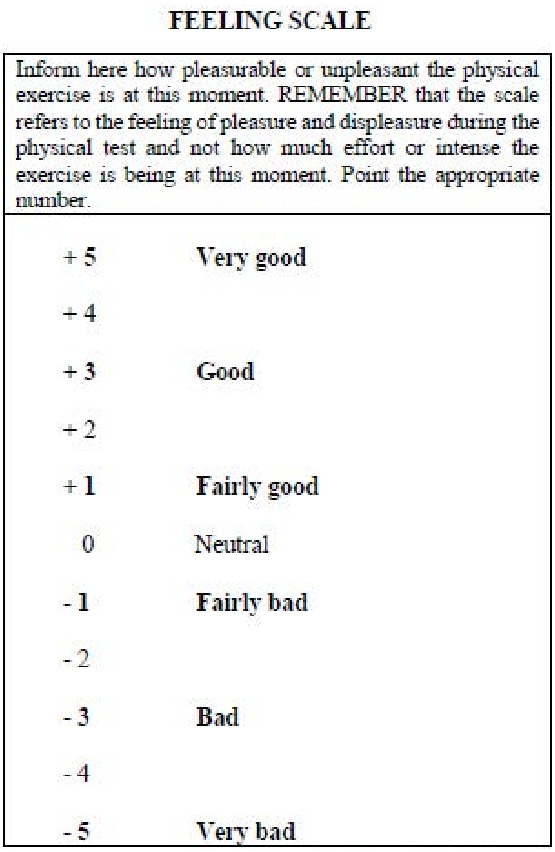
Some studies have shown that prescription of exercise intensity based on affective factors, that is, on the perception of pleasure ranging from +1, “fairly good” to +5, “very good”, generates physiological stimuli that improves cardiorespiratory fitness [21-23], muscle strength [24,25] and health markers [26]. Thus, it is plausible to consider the selection of positive states of the scale to prescribe the intensity of physical exercise of individuals who are not yet regularly active.

In practical terms, it is necessary to propose a point or a zone on the scale and give the following orientation: “During the performance of exercise “X” your perception of pleasure must remain between the +5 and +1 zone, that is, between “very good” and “fairly good”. If you feel that during the exercise your perception of pleasure leaves this zone, just adjust the effort or even stop to recover.”

Additionally, there are behavioral strategies that facilitate the participant to establish the training as a habit. Habit is defined as “a learned sequence of acts that have become automatic responses to specific cues and are functional in achieving goals or final states” [27]. When using tools that help the individuals transform the practice of physical exercises into a daily habit, it favors the maintenance of behavior [28].

The weekly frequency and consistency in which the training is performed is directly related to the maintenance of behavior, where participants with an average monthly frequency equal to or greater than eight days were more than 50% likely to become regular, regardless of the age group [29]. For this reason, it is proposed that the training variables cannot affect the weekly frequency in the initial phase of the training program (for example, a training session that generates an exacerbated delayed onset muscle soreness, can inhibit the individual from performing one or more workouts of the week).

Setting the goals involves developing an action plan designed to motivate and guide a person towards the goals [30]. Initially, the goal cannot be too challenging, but it should gradually promote small challenges that are attainable in the short term [31]. Difficult goals should be set ideally for those who are already in an advanced condition to perform the training but need extra motivation to perform this level of training [32].


FEELING SCALE

Inform here how pleasurable or unpleasant the physical exercise is at this moment. REMEMBER that the scale refers to the feeling of pleasure and displeasure during the physical test and not how much effort or intense the exercise is being at this moment. Point the appropriate number.

+ 5	Very good
+ 4	
+ 3	Good
+ 2	
+ 1	Fairly good
0	Neutral
- 1	Fairly bad
- 2	
- 3	Bad
- 4	
- 5	Very bad

Figure 3 – Feeling Scale.

The goal should be focused on the process necessary to achieve the primary goal (e.g., if the volume of training is important to reach the goal, and the participant can already perform 7 repetitions for each exercise, the new goal could be to reach 10) and not on the final result (if the goal is to lose weight, propose to lose 10 kg in a month) [31]. This perspective change to determine the goals makes them more palpable and attainable, in addition, provide the participant with a perceptible progression throughout the training program. It has been proposed that goals should be specific, measurable, achievable, realistic and with a pre-determined time, helping the participant to focus their efforts and increase the chances of reaching that goal [33].

Considering that the proposal is to perform exercises at home, it is essential to use social support (family) that boosts motivation for training and can increase up to 35% more adherence to a physical exercise program [34]. Proposing the use of social support, involving the other components of the family (e.g., training with a couple or parents and children) can be an additional strategy to make the moment more interactive and less dissociated from afferent body responses (heart rate, breathing), increasing the positive aspects of the training experience [35,36].

In summary, particularly for sedentary individuals or who still do not exercise regularly, the selection of the complexity of the exercises that will be included in training should take into account the individuals' self-efficacy. The use of the perception of pleasure (feeling scale) can be considered to guide the intensity of physical exercise. In addition, we suggest the determination of attainable short-term goals, guided by the process, carried out consistently and that incorporate maximum social interaction.

Conclusion

In summary, the ACSM (2020) recommendation for physical training in the face of the COVID-19 pandemic is clear about the frequency and intensity necessary in the search for improvement in the population's health status. Thus, we follow a prescription model that encourages the performance of at least 150 minutes of aerobic exercise and considers the possibility of performing strength exercises for the main muscle groups.

However, in view of this exceptional situation where a large portion of the world population is in social isolation, it requires that the prescription consider this condition. Thus, the psychobiological variables of training deserve to be highlighted and are essential in the assembly of an efficient training prescription. In general, for sedentary individuals a prescription based on exercises and intensities that promote a pleasurable sensation during their practice should be stimulated. For this group, variables such as number of sets, repetitions, rest interval and exercise time can and should be manipulated to maintain the sensation of pleasure during the practice of prescribed physical exercises. In addition, small and tangible goals must also be encouraged. When possible, family support for the practice should be encouraged, with members of the same home.

Finally, exercises that effectively seek physical and aesthetic results can also be stimulated, if you are already familiar with this physical demand and have experience with the proposed training.

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