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Movement On, Obesity Off: Multiprofessional program for patients eligible for bariatric surgery

Movimento *On*, Obesidade *Off*: Programa multiprofissional para pacientes elegíveis à cirurgia bariátrica

AUTHORS

Fabiano Ferreira de Lima[1,3]
Daniel Rogério Petreça[1]
Ingred Rhayane Rago Gomes[1]
Thaiana Marcelino Lima[2]
Laila Barbosa de Santana[2]
Rinaldo Silvino dos Santos[1,3]
Rodrigo Montenegro Wanderley[1,3]
Layane Sobral Araújo[1]
Juliana Ellen Santana[1]
Daniel Mendonça da Silva Júnior[1]
Sérvio Fidney Brandão de Menezes Correia[4]
Danielle Teti Magalhães[5]
Pedro Cavalcanti de Albuquerque[6]
Igor Henriques Fortunato[1,3]
Aline de Freitas Brito[1,3]

1 University of Pernambuco, Recife, Pernambuco, Brazil.
2 University of Pernambuco, Graduate Program in Rehabilitation and Functional Performance, Recife, Pernambuco, Brazil.
3 Federal University of Paraíba, University of Pernambuco, Joint Graduate Program in Physical Education, Pernambuco, Brazil.
4 Agamenon Magalhães Hospital, Recife, Pernambuco, Brazil.
5 Professor Fernando Figueira Institute of Integral Medicine, Recife, Pernambuco, Brazil.
6 Oswaldo Cruz University Hospital, Recife, Pernambuco, Brazil.

CORRESPONDING

Aline de Freitas Brito
alineebrito@gmail.com
Av. Gov. Agamenon Magalhães, Santo Amaro, Recife, Pernambuco, Brazil.
ZIP Code: 50100-010.

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ABSTRACT

Introduction: Severe obesity is a complex condition that increases the risk of comorbidities and may pose challenges during the waiting period for bariatric surgery. The "Movimento On, Obesidade Off" program is a remote, multiprofessional intervention for patients eligible for bariatric surgery, aiming to improve physical fitness, nutritional profile, and psychological status in the preoperative period. Objective: This study describes the program's logic model, outlining its phases, challenges, and expected impact. Methods: The intervention combines physical exercise, nutritional counseling, and cognitive behavioral therapy, in addition to health education, seeking to promote 5% to 10% improvements in health parameters essential for surgical success, along with gains related to quality of life and health behaviors. Results and discussion: Key challenges include low adherence to in person post intervention assessments and the need to validate reliable remote measures. The absence of public policies for surgical prehabilitation also limits program expansion. As a future perspective, the goal is to consolidate the program within Brazil's Unified Health System, broaden accessibility, and strengthen effectiveness. Final considerations: The program demonstrates feasibility as a remote, multiprofessional preoperative care strategy for bariatric surgery candidates. Priorities include increasing adherence to in person assessments, validating remote evaluations, and building partnerships for incorporation into Unified Health System prehabilitation protocols.

Keywords: Morbid obesity; Bariatric surgery; Patient care team; Physical activity; Behavioral therapy.

RESUMO

Introdução: A obesidade severa é uma condição complexa que aumenta os riscos de comorbidades e pode impor desafios na fila de espera para a cirurgia bariátrica. O programa Movimento On, Obesidade Off é uma intervenção multiprofissional remota voltada para pacientes elegíveis à cirurgia bariátrica, com o objetivo de melhorar sua aptidão física, perfil nutricional e psicológico no período pré-operatório. Objetivo: Este estudo descreve o modelo lógico do programa, apresentando suas fases, desafios e impacto esperado. Métodos: A intervenção combina exercícios físicos, acompanhamento nutricional e terapia cognitivo-comportamental, além da formação em educação em saúde, buscando promover mudanças de 5% a 10% em parâmetros de saúde essenciais para o sucesso cirúrgico, somado à fatores relacionados à qualidade de vida e questões comportamentais. Resultados e discussão: Entre os desafios, destacam-se a baixa adesão às avaliações presenciais e a necessidade de validar medidas remotas confiáveis. A ausência de políticas públicas voltadas para a pré-habilitação cirúrgica também limita sua expansão. Como perspectiva, busca-se consolidar o programa no Sistema Único de Saúde, ampliar sua acessibilidade e fortalecer sua efetividade. Considerações finais: O programa mostra viabilidade como cuidado remoto multiprofissional no pré-operatório de candidatos à cirurgia bariátrica. Prioridades incluem aumentar a adesão às avaliações presenciais, validar avaliações remotas e articular parcerias para sua incorporação aos protocolos do Sistema Único de Saúde.

Palavras-chave: *Obesidade mórbida; Cirurgia bariátrica; Equipe de assistência ao paciente; Atividade física; Terapia comportamental.*

Introduction

Obesity has become a pandemic. Characterized as a chronic, multifactorial, complex, and recurrent condition, it increases the risk of developing other chronic diseases, raises financial costs for both individuals and healthcare systems, and represents a significant risk factor for premature death[1]. In this context, it is important to highlight that in more severe forms of obesity, such as severe obesity (body mass index ≥ 35 kg/m^2), these factors may be even further exacerbated[2].

In 2015, it was estimated that approximately 200 million adults were already living with this degree of obesity. By 2030, projections indicate that this number will surpass 400 million adults. In Brazil specifically, it is estimated that more than 10 million adults will be in this condition by the same year[1].

Given the severity of severe obesity, individuals with this condition are already eligible for bariatric surgery. In this context, according to data from the Brazilian Society of Bariatric and Metabolic Surgery, between 2020 and 2024 approximately 400,000 bariatric procedures were performed in Brazil, of which just over 30,000 were conducted within the Unified Health System (*Sistema Único de Saúde* - SUS)[3]. In this scenario, it is evident that only about 0.2% of the population eligible for surgery had access to this intervention. Furthermore, many individuals do not recognize bariatric surgery as a safe and effective treatment option due to a lack of adequate information. Additionally, within the public health system, the waiting time for the procedure may extend for months or even years in some cases, which can worsen already existing comorbidities[4,5].

Thus, international recommendations highlight the adoption of multiprofessional interventions for the prevention and treatment of obesity[6,7], emphasizing approaches that promote behavioral changes related to eating habits, increased physical activity levels, and improvements in social and psychological well-being[8]. Added to this is the long waiting period for bariatric surgery, which may worsen the morbidities affecting this population and compromise surgical prognosis, as well as the lack of national public policies that encourage such strategies.

The present study aims to describe the logic model of a program titled Movement On, Obesity Off, developed through a multiprofessional telehealth intervention designed to promote body mass loss, improve or maintain physical and metabolic fitness, mental health, diet, and quality of life among individuals eligible for bariatric surgery, while also integrating health education and the training of specialized human resources. The study will outline the operational flow of this multiprofessional telehealth intervention, which includes physical exercise sessions, nutritional counseling, and cognitive-behavioral therapy, intended for patients eligible for bariatric surgery in the state of Pernambuco, Brazil.

Program history and activities

Created in 2021, the program aims to develop a multiprofessional telehealth intervention to promote body mass loss and improve or maintain physical and metabolic fitness, mental health, diet, and quality of life in individuals eligible for bariatric surgery, while integrating health education and the training of specialized human resources.

The program brings together 44 members, including healthcare professionals from hospital outpatient services, graduate students, undergraduate students in Physical Education, Nutrition, and Psychology, as well as participants involved in research initiation, extension activities, and volunteers. In addition to being linked to a university extension program, it is also part of a research project (CAAE 46710821.8.0000.5192; approval no. 4.848.599).

Its activities operate through an institutional partnership between the University of Pernambuco (UPE), Brazil, via the Human Performance Assessment Laboratory at the School of Physical Education, and the Oswaldo Cruz Hospital, Agamenon Magalhães Hospital, and the Professor Fernando Figueira Institute of Integral Medicine, in Recife, Pernambuco, Brazil.

The program recruits participants through health education meetings, invitations made by hospital professionals, active searches in specific outpatient clinics (such as bariatric surgery clinics), and referrals from current participants to peers who are also on the surgical waiting list.

As candidates are recruited, they are informed about the program's objectives. They then complete the consent forms and an electronic registration containing sociodemographic information. Subsequently, participants are contacted to schedule the assessments listed in Table 1.

During the initial assessment, aspects such as musculoskeletal conditions, pain, and psychotic disorders that may prevent safe remote supervision are evaluated. When such conditions are identified, participants are advised to seek specialized in-person care. It is

Table 1 – Measures and Assessments Conducted with Participants Recruited for the "Movement On, Obesity Off" Program

Indicator	Tests / Methods	Performed by
User characterization	Sociodemographic questionnaire	Physical therapist; physical education professional; physical education students
Quality of life	SF-36 (Short Form Health Survey 36)	
Physical activity	IPAQ (International Physical Activity Questionnaire)	
Barriers and facilitators to engaging in physical exercise	Regular Physical Exercise Adherence Scale (REPEAS)	
Motivation for exercise participation	Exercise Regulations Questionnaire (BREQ-3)	
Physical fitness	Body composition measures (weight, height, body circumferences, DEXA); strength assessments (30-second and 60-second sit-to-stand tests, and handgrip strength); and cardiorespiratory fitness tests (6-minute walk test, treadmill ramp protocol, and 2-minute step-up test)	Physical education professional; Physical Education students
Cardiovascular assessment	Resting heart rate, systolic and diastolic blood pressure, heart rate variability, heart rate recovery, and flow-mediated dilation (ultrasound)	Physical therapist; Physical Education professional; Physical Education students
Biochemical assessment	Blood collection (analysis of oxidative stress, inflammatory profile, and lipid profile)	Nurse
Nutritional assessment	Dietary recall; Binge Eating Scale	Nutritionist
Psychological assessment	Beck Anxiety Inventory; Beck Depression Inventory; and the Body Shape Questionnaire	Psychologist

important to highlight that one of the inclusion criteria is having a mobile phone, computer, or tablet with internet access, as the multiprofessional follow-up is conducted via video calls.

After completing all assessment stages, participants enter the 12-week intervention, followed by reassessments at the end of the intervention cycle.

The activities of the Movement On, Obesity Off program occur continuously throughout the year. Figure 1 presents the program's logic model, providing an organized overview of its essential components, their interconnections, and the expected outcomes.

Physical exercise protocol

The physical exercise sessions are conducted in groups, three times per week, lasting 40 minutes, following a functional circuit format under the supervision of a Physical Education professional. Training begins with a warm-up (three sets of five exercises performed in sequence, with 30 seconds of execution and 30-second intervals), including movements such as arm elevation and rotation, lateral stepping, and stationary jogging.

Next, participants perform four exercise blocks with two to three sets each. Each block consists of two exercises performed in sequence, lasting 20 to 30 seconds each, with rest intervals of 10 to 30 seconds. Both execution time and rest intervals progress throughout the weeks as part of the training advancement. The blocks include: front support with punching, squats with alternating hip flexion, deadlift and knee push-ups, squat combined with shoulder press, and alternating knee strikes.

After the first exercise of each block, the number of repetitions is recorded, and at the end of each block, rating of perceived exertion is assessed using the Borg scale (0–10). Following the circuit, stretching exercises are performed to support muscle recovery and flexibility. Figure 2 presents the organization of the physical exercise session.

Nutritional counseling protocol

Nutritional follow-up is conducted individually, once a month, by appointment with a nutritionist. The first consultation, lasting 60 to 90 minutes, focuses on diagnostic assessments of eating patterns (Dietary Recall) and the identification of eating disorders (Binge Eating Scale). Based on these findings, behavioral strategies are developed to support the adoption of higher-quality eating habits.

The monthly consultations, lasting 30 minutes, address the previously defined strategies, necessary adjustments, and new goals, with the updated plan sent via WhatsApp. The topics covered include: the importance of nutrition beyond weight loss; differences between food types; general nutritional recommendations; building a healthy plate; self-monitoring in nutrition; organizing an eating routine; the influence of the environment on food choices; mindful eating; among others.

At the end of the process, a reassessment is conducted after 3 months, repeating the initial evaluations to verify potential changes.

Cognitive-behavioral therapy protocol

Cognitive-behavioral therapy is conducted individ-

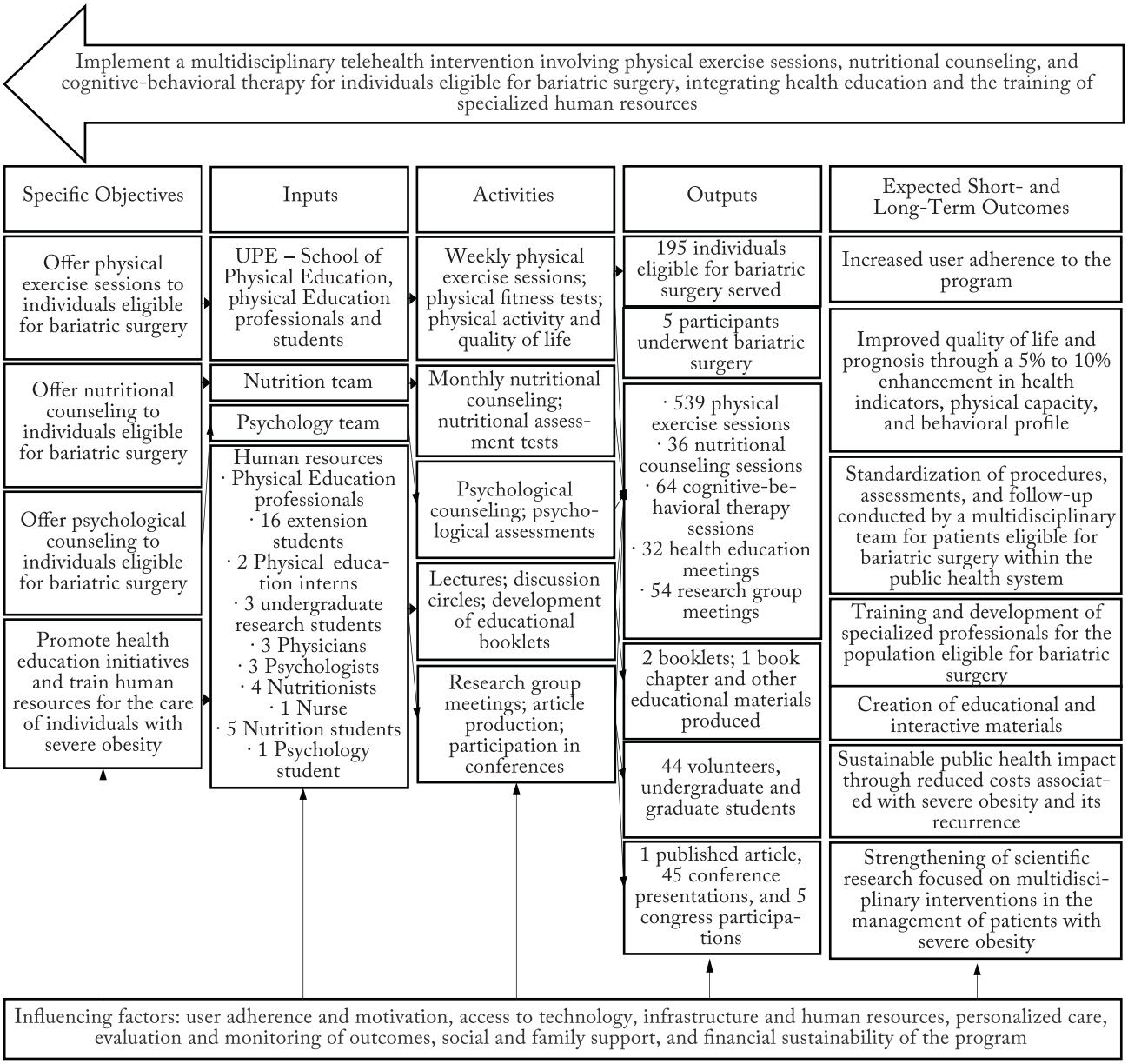

Figure 1 – Logic Model of the "Movement On, Obesity Off" Program

ually, weekly for 40 minutes and in groups, biweekly for 60 minutes, by appointment with a psychologist. Individual sessions focus on comprehensive care and behavioral modification, addressing social, emotional, cognitive, and psychological dimensions. The initial intake emphasizes qualified listening and explores the participant's engagement within the context of obesity treatment, followed by techniques aimed at self-awareness and behavior change.

During this stage, validated instruments such as the Beck Anxiety Inventory[9], the Beck Depression Inventory[10], and the Body Shape Questionnaire[11] are administered to assess psychological status and body perception.

In group sessions, themes related to health promotion and the prevention of conditions associated with severe obesity are addressed.

Health education protocol

Biweekly training meetings on health promotion and the prevention of conditions related to obesity are conducted by a multiprofessional team (nutritionist, psychologist, physical therapist, and physical education professional). These sessions address topics such as motivation for behavior change, emotional and healthy eating, physiotherapeutic care, associated diseases, and the importance of physical exercise and its relationship

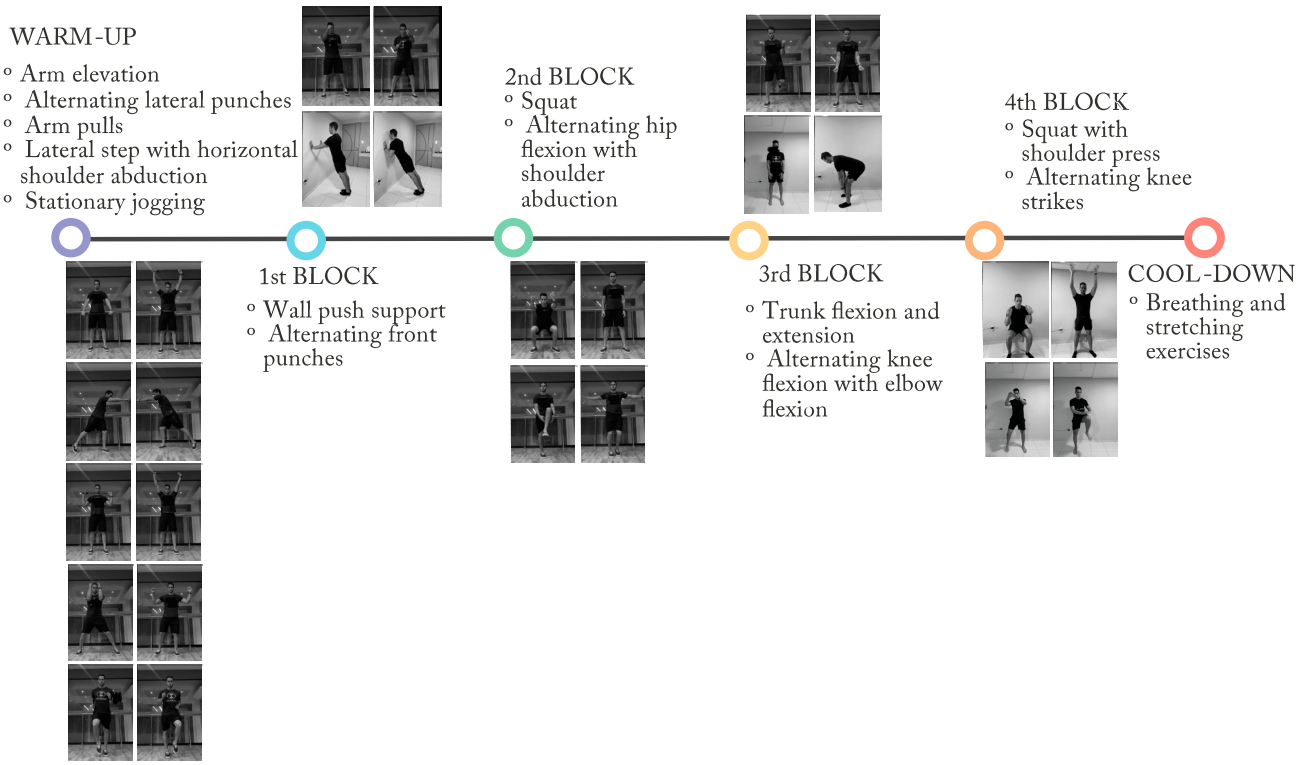

Figure 2 – Structure of the Physical Exercise Session

with improved bariatric surgery outcomes.

Participants also receive educational materials produced by the team through a WhatsApp group, including behavioral change tips to support the adoption of an active lifestyle.

Research study meetings

Once a week, scientific meetings are held with article presentations, assessment protocol reviews, and case discussions led by the program's collaborators. The goal is to promote continuous and specialized training in the management of participants with severe obesity, ensuring familiarity with assessment methods and strengthening multiprofessional care. Additionally, these meetings are dedicated to planning future program activities, defining upcoming tasks, developing scientific manuscripts, and organizing participation in academic conferences.

Goals

Among the expected goals, improvements of 5% to 10% are anticipated in body composition parameters, physical capacity, cardiovascular measures, psychological aspects, nutritional status, and quality of life. These outcomes are considered key determinants for enhancing bariatric surgery prognosis and improving the overall quality of life of this population[12-18]

Furthermore, the program aims to consolidate itself as part of prehabilitation initiatives within the SUS, strengthen the production of informational materials, and develop more effective strategies for the management of patients eligible for bariatric surgery. In addition, it seeks to enhance the training of professionals and researchers, promoting more qualified and efficient practice with this population.

Results and discussion

Since its implementation, the program has served 195 individuals, predominantly women (83%), with a mean age of 42.5 ± 10.6 years and a body mass index of 46.4 ± 8 kg/m^2. A significant proportion (72.3%) reside in cities outside Recife, underscoring the importance of the program's remote format to ensure continued access to care.

Regarding adherence to the interventions, participation in the exercise program has averaged 63%, with absences primarily explained by joint pain, difficulties accessing video calls, and, in some cases, complete non-participation. In psychological counseling, adherence has reached 80%, while nutritional counseling has averaged 70%. Finally, participation in health education

meetings has averaged 40%.

Despite this, regarding adherence, it is important to highlight that, in the post-intervention in-person assessments, the confirmation and actual completion of the different measurements proposed by the program have been lower than expected. To date, the average return rate for follow-up assessments is only 5%, which may be partially explained by the difficulties participants face when traveling back to Recife for these evaluations an issue that does not align with the adherence and engagement reported in other studies involving the same population[19-21].

However, several factors help explain this discrepancy and limit comparability with previous findings. First, there is a selection and motivation bias: unlike trials with stricter screening and exclusion criteria, our recruitment was broader and more representative of real-world conditions, which likely included participants with greater barriers and lower readiness to return for in-person reassessments. Additionally, the logistics of the preoperative period exams, consultations, rescheduling, and the unpredictability of surgical preparation directly competed with reassessment time windows, further compounded by the need to travel to Recife.

Finally, the absence of financial incentives for completing follow-up assessments an approach used in the aforementioned studies may have reduced the attractiveness of returning when the perceived benefit was limited to measurement alone. Taken together, these factors support the hypothesis that the low attendance at the final assessment reflects logistical constraints and regarding human resource development, the program currently functions as a space for professional practice, research, extension activities, and internships for professionals and students from various multiprofessional fields. Notably, it has contributed to the development of six doctoral dissertations, two master's theses, and three undergraduate research projects, highlighting its academic relevance. The program includes 44 collaborators, comprising faculty members, graduate students, extension students, interns, undergraduate research fellows, and other contributors. To date, one scientific article has been published, another has been submitted, nine additional manuscripts are in progress, one book chapter has been published, and 45 presentations have been delivered at national and international conferences.

Considering that most participants reside in cities different from where the assessments are conducted and that a significant portion of this population has low income and reduced educational levels the program faces several challenges. These include: developing interactive digital materials to improve dissemination and enhance comprehension among participants; creating valid evaluation protocols that can be reliably measured remotely; and obtaining funding while strengthening the program as an essential strategy during the waiting period for bariatric surgery.

As a final consideration, the Movement On, Obesity Off program represents an innovative and feasible strategy for remote multiprofessional care of patients eligible for bariatric surgery. Its implementation has shown promising indications of positive impacts on participants' physical fitness, nutritional profile, and psychological well-being, while offering an accessible and scalable alternative to optimize the preoperative waiting period. However, several challenges still need to be addressed, such as low adherence to post-intervention in-person assessments, difficulties in participants' access to technological resources, and the need to validate reliable remote assessment tools. Additionally, the absence of public policies focused on surgical prehabilitation continues to limit the expansion of the program within the scope of the SUS.

Given these challenges, future perspectives for the program include implementing strategies to increase participant adherence, developing more accessible and interactive digital tools, and strengthening institutional partnerships to consolidate the initiative as part of bariatric prehabilitation protocols in SUS referral hospital outpatient clinics. Moreover, the scientific output generated by the program contributes not only to validating the intervention but also to training professionals and researchers in the multiprofessional management of severe obesity.

Thus, Movement On, Obesity Off is expected to continue evolving and positively impacting patients' trajectories, promoting more efficient, accessible, and evidence-based care.

Conflict of Interest

The authors declare no conflicts of interest.

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Author Contributions

Lima FF: Conceptualization; Methodology; Software develop-

ment, implementation, and testing; Data and experimental validation; Investigation; Supervision; Writing – review and editing; Approval of the final version of the manuscript. Petreça DR: Conceptualization; Methodology; Software development, implementation, and testing; Data analysis; Investigation; Data curation; Supervision; Data presentation design; Writing – original draft; Writing – review and editing; Approval of the final version of the manuscript. Gomes IRR: Conceptualization; Methodology; Software development, implementation, and testing; Data analysis; Investigation; Data curation; Supervision; Data presentation design; Writing – original draft; Approval of the final version of the manuscript. Lima TM: Methodology; Software development, implementation, and testing; Data analysis; Investigation; Writing – original draft; Approval of the final version of the manuscript. Santana LB: Methodology; Software development, implementation, and testing; Data analysis; Investigation; Supervision; Writing – original draft; Approval of the final version of the manuscript. Santos RS: Conceptualization; Methodology; Investigation; Supervision; Writing – review and editing; Approval of the final version of the manuscript. Wanderley RM: Conceptualization; Methodology; Software development, implementation, and testing; Investigation; Supervision; Writing – review and editing; Approval of the final version of the manuscript. Araújo LS, Santana JE, and Silva Júnior DM: Software development, implementation, and testing; Investigation; Supervision; Writing – review and editing; Approval of the final version of the manuscript. Correia SFBM, Magalhães DT, and Albuquerque PC: Software development, implementation, and testing; Supervision; Writing – review and editing; Approval of the final version of the manuscript. Fortunato IH: Conceptualization; Methodology; Software development, implementation, and testing; Data and experimental validation; Data analysis; Investigation; Data curation; Supervision; Project administration; Data presentation design; Writing – original draft; Writing – review and editing; Approval of the final version of the manuscript. Brito AF: Conceptualization; Methodology; Software development, implementation, and testing; Data and experimental validation; Investigation; Data curation; Supervision; Writing – review and editing; Approval of the final version of the manuscript.

Declaration on the Use of Artificial Intelligence Tools in the Writing Process of the Manuscript

The authors did not use artificial intelligence tools for the preparation of this manuscript.

Availability of Research Data and Other Materials

The contents underlying the research text are contained within the manuscript.

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Reviewers' assessment

The reviews of this article were originally conducted in Portuguese. This version has been translated using ChatGPT and subsequently reviewed by the Chief Editors.

Reviewer A

Anonymous

- After a detailed analysis of the revised content, I believe the article presents relevant advances in the field and brings an approach of interest to the journal's audience. However, I think there are some points that require additional attention before the article can be considered for publication. In this case, it is extremely important to pay close attention to the following aspects:
- Clearly define which terminology is used in the project. For instance, throughout the text, two different terms are employed: multiprofessional approach and interdisciplinary approach. When it is stated that "ensuring familiarity with assessment methods and strengthening interdisciplinarity in participant care," this type of methodology seems to be implemented from the beginning to the end of the intervention, not only in research study meetings.
- Another important point would be to highlight in the section "Nutritional Guidance Protocol" which initial assessments are used during this process so that the reader clearly understands the methods applied.

Final Decision

- Mandatory corrections

Reviewer B

Anonymous

- The topic is extremely relevant to the Brazilian population. The program deserves congratulations for the initiative and for the complexity involved in providing care to this population. I have some comments intended to improve the manuscript.

Abstract

- Page 1, lines 7–8: In the sentence "Severe obesity is a complex condition that increases the risks of comorbidities and poses challenges to surgical treatment," which surgical treatment is being referred to?

Introduction

- Page 2, lines 16–18: In the sentence "In this context, it is noteworthy that in more severe cases of obesity, such as severe obesity (body mass index ≥ 35 kg/m^2), these factors may be further aggravated2," the word severe is repeated. I suggest using a synonym for one of them.
- Pages 2–3, lines 27–1: "In this scenario, it is observed that only about 0.2% of the Brazilian population who need surgery have had access to this intervention." I suggest also considering that many patients do not want to undergo surgery, often due to lack of information and/or fear of complications.
- Page 3, lines 5–16: The paragraph is very long. I suggest splitting it, making one paragraph focused on the objective, which should already include the name of the program being described.

Program Background and Objectives

- Page 3, line 19: "The program aims to…" (instead of "The program has as objective…")
- The expression "through" (por meio de) is repeated often. The excessive use should be revised.
- Page 4, lines 1–2: "The program recruits participants through health education meetings, invitations made by professionals from the unit,…" Which unit is being referred to?
- Page 4, lines 4–6: "It is important to note that to participate in the intervention, users must have a cell phone, computer, or tablet with internet access, as the multiprofessional follow-up is conducted via video calls."
- I suggest stating, as inclusion criteria, that participants must have…
- The text mentions Table 1 and Figure 1 but does not indicate where they will appear in the final manuscript. It is always necessary to show where they will be placed throughout the text.

Physical Exercise Protocol

- The exercise descriptions should be improved or include images. People who do not work with exercise should also be able to understand the protocol based on the description.
- Pages 4–5, lines 26–4: "Next, four blocks of exercises are performed, with two to three sets of 30 seconds, and intervals that vary over the weeks be-

tween 30 and 10 seconds. The blocks include: front plank with punches, squats with alternating hip flexion, deadlifts and knee push-ups, thrusters and knee strikes. After the first exercise of each block, the number of repetitions is recorded, and at the end of each block, perceived exertion is assessed."
- Were there four blocks, each consisting of a series of the four exercises mentioned? Or four blocks, each corresponding to one exercise with two or three sets? The concept of block needs to be better defined so that the timing of perceived exertion assessment is clear.
- Which scale was used to assess perceived exertion?

Cognitive-Behavioral Therapy Protocol

- Page 5, lines 19–20: "The initial reception involves active listening and explores the participant's commitment in the context of obesity…"
- Wouldn't it be more appropriate to say the participant's commitment in the context of obesity treatment/prevention?

Results Achieved

- The authors state that "So far, the average return rate of users for evaluation is only 5%, which may be partially explained by the difficulties faced in returning to the city of Recife for assessments." However, the table indicates that there was an improvement in quality of life due to a 5%–10% improvement in health, physical capacity, and behavioral indicators. I would like these data to be better explained. What was the time interval between pre- and post-tests? What was the absolute n assessed pre and post? What statistical method was used to report these improvements?
- Table 1 is in a very small format for the reader. I could only read it by cropping and enlarging the image.

Final Considerations

- Without the answers to the previous comments, it is not possible to affirm the positive impacts on participants' physical fitness, nutritional, and psychological profiles.
- Table 1 - I suggest indicating: strength (30-second and 60-second sit-to-stand tests and handgrip strength).

Final Decision

- Mandatory corrections