FOOD AND NUTRITION IN PUBLIC HEALTH
DOI: 10.12957/demetra.2026.94230

DEMETRA
Alimentação, Nutrição & Saúde
e-ISSN:2238-913X

Luciana Gonçalves de Orange[1]
Bianca de Almeida-Pititto[2]
Cybelle Rolim de Lima[3]
Rebeca Gonçalves de Melo[4]
Renan Souto Pereira[5]
Marcelo Marcos Piva Demarzo[6]

[1] Universidade Federal de Pernambuco, Centro Acadêmico de Vitória. Vitória de Santo Antão, PE, Brasil.

[2] Universidade Federal de São Paulo, Escola Paulista de Medicina, Departamento de Medicina Preventiva. São Paulo, SP, Brasil.

[3] Universidade Federal de Pernambuco, Centro Acadêmico de Vitória. Vitória de Santo Antão, PE, Brasil.

[4] Secretaria de Educação do Estado de Pernambuco. Recife, PE, Brasil.

[5] Universidade Estadual do Ceará, Programa de Pós-Graduação em Nutrição e Saúde. Fortaleza, CE, Brasil.

[6] Universidade Federal de São Paulo, Escola Paulista de Medicina, Departamento de Medicina Preventiva. São Paulo, SP, Brasil

This study is the result of the completion of the Post-Doctoral Program in Public Health at the *Universidade Federal de São Paulo*, carried out by author Luciana Gonçalves de Orange, from 2019 to 2021, linked to the project entitled "Mindfulness for improving the quality of life of individuals with chronic conditions in primary healthcare in the state of São Paulo. São Paulo, SP, Brazil".

Correspondence
Luciana Gonçalves de Orange
luciana.orange@ufpe.br

Editor
Renata Brum Martucci

Brazilian mindfulness protocol promotes improvements in eating behavior, self-care and life style of primary health care users with chronic conditions

Protocolo brasileiro de *mindfulness* promove melhorias no comportamento alimentar, autocuidado e estilo de vida de usuários da atenção primária à saúde com condições crônicas

Abstract

Mindfulness-based interventions have been adopted and demonstrated effectiveness in improving chronic conditions. This study assessed the effectiveness of a Brazilian mindfulness-based health promotion (MBHP) protocol, in in-person – control (IC) and intervention (II) – and online – control (OC) and intervention (OI) formats, on the nutritional status, eating behavior, and lifestyle (eating practices, level of physical activity, and self-efficacy for physical exercise) of primary healthcare users with chronic conditions in São Paulo. The study was a pilot, controlled, and randomized trial.The results showed that most participants were overweight or obese. The IC group had the lowest mean Body Mass Index, and the OI group had the highest. Comparing nutritional status before and after the interventions revealed weight loss in the IC, II, and OI groups, with no significant differences among them. Improvements in eating habits were observed in all groups, albeit to varying degrees. The IC and OI groups showed the greatest progress, while the II group demonstrated a reduction in inadequate practices. The assessment of eating behavior revealed that only uncontrolled eating significantly decreased in the OC group. No changes were observed in parameters related to physical exercise or self-efficacy. MBHP improved the eating behavior, self-care, and lifestyle of assessed users, with results varying depending on the intervention format and assessment time.

Keywords: Eating-Related Behavior. Lifestyle Factors. Management of Chronic Conditions. Mindfulness. SUS.

Resumo

As intervenções baseadas em *mindfulness* vêm sendo adotadas e têm demonstrado efetividade na melhora das condições crônicas. Esta pesquisa avaliou a efetividade de um protocolo brasileiro de *mindfulness* para

promoção da saúde (MBHP), nos formatos presencial – controle (PC) e intervenção (PI) – e *on-line* – controle (OC) e intervenção (OI) – no estado nutricional, comportamento alimentar e estilo de vida (práticas alimentares, nível de atividade física e autoeficácia para o exercício físico) de usuários da atenção primária à saúde com condições crônicas, na cidade de São Paulo, através de um estudo piloto, controlado e randomizado. Os resultados demonstraram que,em relação ao estado nutricional, a maioria dos participantes se encontrava com sobrepeso e obesidade, sendo o menor valor médio de IMC no grupo PC e o maior no grupo OI. Na comparação do estado nutricional antes e após as intervenções, observou-se perda de peso nos grupos PC, PI e OI, sem diferenças entre os grupos. Foram verificadas melhoras nas práticas alimentares em todos os grupos, de forma diferenciada entre eles, sendo os melhores avanços nos grupos PC e OI e redução de práticas inadequadas no grupo PI. Na avaliação do comportamento alimentar, apenas o descontrole alimentar apresentou redução significativa no grupo OC. Não foram verificadas mudanças nos parâmetros relacionados à prática e autoeficácia do exercício físico. O MBHP melhorou o comportamento alimentar, o autocuidado e o estilo de vida dos usuários avaliados, diferenciando-se a depender do formato das intervenções e do momento da avaliação.

Palavras-chave: Comportamento Relacionado à Alimentação. Fatores de Estilo de Vida. Manejo de Condições Crônicas. *Mindfulness*. SUS.

INTRODUCTION

In recent decades, the focus of healthcare and lifestyle management for people with chronic conditions has primarily been on controlling food intake through restrictions on certain foods and/or food groups. Physical exercise has also been encouraged to create a calorie deficit, promote weight loss, and manage these conditions. However, these strategies appear to be ineffective in the medium to long term. People may change their habits and lifestyle by following dietary and exercise prescriptions, but they do not address the behavioral issues involved in making these changes sustainable.[1-3]

Eating behavior (EB) is defined[4] as attitudes related to food choices and practices associated with sociocultural characteristics of individuals or societies involved with eating and/or food itself. It encompasses the subjective aspects surrounding food that extend beyond "what we eat" or "how much we eat". It is also important to understand "how", "where", "when", "why", and "with whom" we eat.[5-7]

In this regard, it is necessary to develop strategies that consider not only the biological aspects of eating but also the psychosocial, emotional, and environmental factors that influence food consumption. This is crucial for addressing the growing prevalence of chronic conditions and their associated healthcare service complications in the general population.[1,8]

Innovative tools for behavioral change, such as mindfulness-based interventions (MBIs), have proven effective in the nutritional management of various clinical conditions, including obesity, diabetes mellitus, hypertension, and physical and mental illnesses such as anxiety and depression.[9-12]

From the perspective of lifestyle changes for better management of chronic conditions, physical exercise stands out due to its numerous physical, social, and mental health benefits. Hence, although these benefits are well-established, some factors can hinder adherence. These factors include prescriptions based solely on conditioning data without considering emotional and psychological issues involved in exercising and restrictive, traditional, and rigid prescriptions that decrease motivation and are challenging for many people.[13]

It should also be noted that spaces intended for physical exercise are not always adapted to or welcoming of people with chronic conditions, especially those who do not meet socially established "body standards". This hinders adherence to these practices further, negatively impacting these individuals' physical and mental health.[14]

In this scenario, the present study aimed to assess the effectiveness of a Brazilian mindfulness-based health promotion (mindfulness-based health promotion - MBHP) on the EB, self-care, and lifestyle of primary healthcare (PHC) users with chronic conditions.

METHODS

Study design

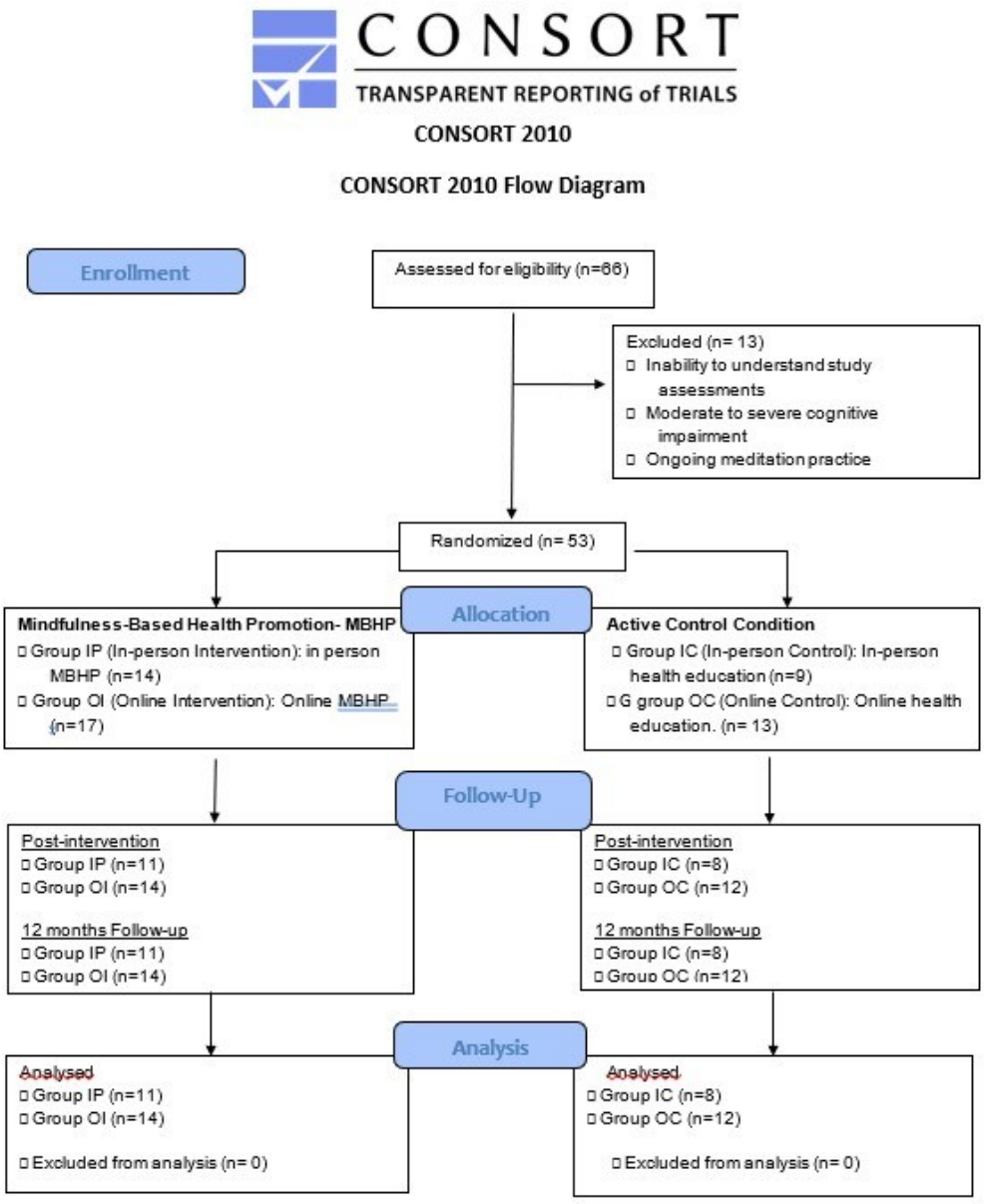
This pilot study was designed to verify the feasibility and effects of a Brazilian mindfulness-based health promotion protocol (MBHP) on the EB, self-care, and lifestyle of Brazilian Unified Health System (In Portuguese, *Sistema Único de Saúde* - SUS) users with chronic health conditions. The study was registered under number RBR-107wh2sv in the Brazilian Registry of Clinical Trials (ReBEC) platform to support and justify the execution of a definitive randomized and controlled study. The comparative effects of two delivery modalities for the same intervention—in-person and online—were also assessed.

Participant recruitment and research field

Individuals of both sexes, ranging in age from 18 to 70 years, who had been diagnosed with a pre-existing chronic condition and who were users of a PHC service in the state of São Paulo, Brazil, were recruited. Those who could not read or write, could not understand the assessment questionnaires, or had moderate to severe cognitive impairment, exacerbations, or acute complications of chronic conditions were excluded. Also excluded were pregnant women, individuals with serious psychopathology who were not receiving treatment, and individuals who were already practicing meditation at the time of the study.

The non-probabilistic sample included 66 individuals. After applying the eligibility criteria, 53 individuals were selected. Of these, 45 completed the research study. The individuals were then randomly assigned to one of four groups (intervention and control, both in-person and online) using the random.org program (Figure 1).

Figure 1.



Nutritional status was assessed using Body Mass Index (BMI), according to the original technique recommended by Lohman et al.[15] and Lipichitz[16] for older adults. Classification for adults was based on the World Health Organization (WHO) reference standard[17] and for older adults on the WHO publication and the document "Protocols of the Food and Nutrition Surveillance System" from the Ministry of Health.[18]

EB was analyzed using the Three Factor Eating Questionnaire (Appendix VI) – 21-item reduced version (TFEQR21), which was translated and validated for Brazil by Natacci & Ferreira.[19]

The lifestyle assessment analyzed dietary practices using the "How is your diet?" questionnaire from the Ministry of Health,[20] based on the Dietary Guidelines for the Brazilian Population.[21] Users' physical activity level was assessed using the short version of the International Physical Activity Questionnaire (IPAQ), which was validated in Brazil by Matsudo et al.[22] To assess self-efficacy and adherence to exercise, we used the Physical Exercise Self-Efficacy Scale. This scale was developed by Schwarzer and Renner[23] and translated and adapted into Portuguese by Martins et al.[24] It analyzes an individual's confidence in performing physical exercise according to different emotional states.

All variables were assessed at pre-intervention (T0), post-intervention (T1), and follow-up (T2 - six months after the intervention).

Intervention

The research took place in two phases and two formats: an in-person intervention from October to December 2019 with a follow-up in June 2020, and an online intervention from September to November 2020 with a follow-up in May 2021. The groups formed were as follows: in-person intervention (IP): Users underwent a MBHP protocol[25] plus conventional treatment guidelines (diet, encouragement to exercise, and medication use); in-person active control (IC): Users received health and education guidance (nutrition education, healthcare, and encouragement to exercise); online intervention (OI): Users underwent an online MBHP protocol plus conventional treatment guidelines (diet, exercise, and medication use); online active control (OC): Users received online health and education guidance (nutrition education, healthcare, and exercise encouragement).

The Brazilian mindfulness intervention protocol used in this study is an eight-week program consisting of eight sessions. Participants meet weekly for one and a half hours to experience mindfulness practices called MBHP. The program was inspired by the original model developed by Jon Kabat-Zinn,[26] Mindfulness-Based Stress Reduction, and was created, developed, and culturally adapted by the research and outreach group "Open Mind" (Brazilian Center for Mindfulness and Health Promotion) for the Brazilian and Latin American population (https://mindfulness.unifesp.br/mindfulness/protocolos). The active control group was structured and adapted according to the instructions in the "Methodology for Working in Groups for Food and Nutrition Actions in Primary Care" document,[27] with the same number of meetings and activity duration.

Excel 2010 and SPSS version 23.0 for Windows (SPSS Inc., Chicago, IL, USA) were used for statistical analysis of the data. Means and standard deviations were calculated for continuous variables and absolute and relative frequencies were calculated for categorical variables. MANOVA was used for initial and final comparisons of continuous variables, as well as intergroup comparisons. Pillai's trace was used since the assumptions of multivariate normality and/or the absence of multivariate outliers were violated. Spearman's correlation test was used to assess the correlation between continuous variables. To assess possible differences in outcome frequencies in the domains of the used questionnaires, we calculated the absolute risk reduction (ARR) or absolute risk increase, along with their respective 95% Confidence Intervals. Then, we assessed the number needed to treat (NNT) or the number needed to harm. The significance level was set at 5% ($p<0.05$) for all tests.

This study was approved by the *Universidade Federal de São Paulo* Research Ethics Committee according to Certificate of Presentation for Ethical Consideration 27889219.0.0000.5505 and Final Opinion 4230619. The study was conducted in accordance with the Consolidated Standards of Reporting Trials recommendations for randomized pilot and feasibility trials prior to a definitive randomized controlled trial and was registered in ReBEC under the number RBR-107wh2sv.

RESULTS

A total of 53 people participated in this study and were distributed among the following groups:II (n=14); IC (n=9); OI (n=17); OC (n=13).The mean age was 45.91±14.37, 52.50±14.60, 49.57±13.00, and 51.25±11.75, respectively. Most were female (42; 93.3%), retired (12; 26.7%), and/or unemployed (16; 35.5%). Most identified as white (25; 55.5%), had a high school degree (17; 37.7%), and had a higher education degree (15; 33.3%). The groups were homogeneous, as can be seen in Table 1.

Table 1. Descriptive analysis of the characteristics of primary healthcare users in the state of São Paulo affected by chronic conditions, with or without mindfulness-based interventions. São Paulo-2020-2021.

Variable	Group				P-value[a]
	IC	II	OC	OI	
Participants	8	11	12	14	
Age *(mean±SD)*	52.50±14.60	45.91±14.37	51.25±11.75	49.57±13.00	0.71
Sex *(M:F)*	0:8	1:10	2:10	0:14	0.33
BMI*(mean±SD)*	27.22±6.34	30.03±6.25	30.20±9.07	31.33±7.80	0.68
BMI category *n (%)*[b]					0.64
Low weight					
Eutrophic	5 (62.5)	3 (27.3)	3 (25.0)	3 (21.4)	
Overweight	1 (12.5)	3 (27.3)	5 (41.7)	4 (28.6)	
Grade I obese		3 (27.3)	2 (16.7)	5 (35.7)	
Grade II obese	2 (25.0)	3 (27.3)	1 (8.3)	1 (7.1)	
Grade III obese			1 (8.3)	1 (7.1)	
Color/race *n (%)*					0.61
White	5 (62.5)	6 (54.5)	8 (66.7)	6 (42.9)	
Black	1 (12.5)	1 (9.1)	2 (16.7)	3 (21.4)	
Yellow	1 (12.5)	2 (18.2)			
Brown	1 (12.5)	2 (18.2)	2 (16.7)	5 (35.7)	
Indigenous					
Marital status *n (%)*					0.69
Single		2 (18.2)	1 (8.3)	5 (35.7)	
Married/common-law marriage	6 (75.0)	5 (45.5)	8 (66.7)	6 (42.9)	
Separated/divorced	2 (25.0)	4 (36.4)	2 (16.7)	2 (14.3)	
Widow			1 (8.3)	1 (7.14)	

IC - in-person control; II - in-person intervention; OC - online control; OI - online intervention; SD - standard deviation; [a]P-value was calculated using analysis of variance (ANOVA). M:F - male: female; Kg - kilograms; M - meters; [b]Source: World Health Organization (2000). Obesity: preventing and managing the global epidemic. Geneva: WHO.

Regarding nutritional status, the mean BMI ranged from overweight to obesity. The lowest mean BMI was in the IC group (27.22±6.34), and the highest was in the OI group (31.33±7.80). The largest number of participants in the eutrophic category were in the IC group (Table 1).

Table 2 shows that the mean BMI decreased in the IC (Δ=-1.72), II (Δ=-1.83), and OI (Δ=-0.35) groups when comparing the nutritional status classification according to BMI before and after the interventions. In other words, participants in these groups lost weight progressively over time (p=0.016). This decrease in BMI was more pronounced in the II group. However, no difference between the groups was confirmed in multivariate descriptive analysis (p=0.068).

Table 2. Descriptive, univariate and multivariate analysis of BMI in primary healthcare users with chronic conditions, with or without mindfulness-based interventions. São Paulo-2020-2021.

Variable	Descriptive				Univariate					
	IC (n=7)	II (n=8)	OC (n=12)	OI (n=11)	Time effect			Time*group effect		
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	F	P-value	Partial Eta²	F	P-value	Partial Eta²
BMI										
T_0	27.54±6.77	28.36±5.58	30.20±9.07	31.55±8.85						
T_1	27.15±6.87	28.26±5.56	30.12±9.18	31.88±9.16	5.323	0.010	0.135	2.542	0.035	0.183
T_2	25.82±5.58	26.53±4.76	30.71±10.29	31.20±8.74						
Δ	-1.72	-1.83	0.51	-0.35						
Multivariate[a]	MANOVA (time) Pillai's trace=0.222. F=4.709.*p*=0.016									
	MANOVA (time*group) Pillai's trace=0.309. F=2.069.*p*=0.068									

IC - in-person control; II - in-person intervention; OC - online control; OI - online intervention; Δ Difference between the means of $T_0$and T_2. BMI - Body Mass Index; [a]Pillai's trace was used because the assumption of multivariate normality and/or the absence of multivariate outliers was violated.

The NNT analysis verified that the best outcome for BMI reduction in the in-person format was for mindfulness II (NNT=4). In other words, one out of every four participants in the MBHP II group benefited, with an ARR of 30.36% and an adverse outcome rate of 12.5%.

In NNT assessment, based on the impact of the interventions on online groups, there was a reduction in BMI (NNT=3) in the OI group. However, the OI group had higher adverse outcomes (27.27%) and a higher ARR (39.39%) than the in-person groups, although the NNT was lower.

In relation to lifestyle and diet-related issues, Table 3 shows that users' dietary practices improved over time in all groups. However, there were differences between groups and their respective classifications based on the instrument used and the Dietary Guidelines for the Brazilian Population. The groups that showed the greatest progress were IC and OI, with increases of 32.1% and 29.8%, respectively, in excellent dietary practices, and a 33% reduction in inadequate dietary practices in the II group. However, no difference was found among the assessed groups.

Table 3. Descriptive analysis of the dietary practices of primary healthcare users with chronic conditions, whether or not they have undergone mindfulness-based interventions. São Paulo-2020-2021

Variable	Group				P-value [a]
	IC	II	OC	OI	
Number of participants					
T_0	8	11	12	14	
T_1	7	8	12	14	
T_2	7	8	12	11	

Table 3. Descriptive analysis of the dietary practices of primary healthcare users with chronic conditions, whether or not they have undergone mindfulness-based interventions. São Paulo-2020-2021.(Continues)

Variable	Group				P-value [a]
	IC	II	OC	OI	
Number of participants					
T_0					0.203
Up to 31 points	3 (37.5)	5 (45.5)	1 (8.3)	2 (14.3)	
Between 31 and 41 points	3 (37.5)	1 (9.1)	3 (25.0)	6 (42.9)	
Above 41 points	2 (25.0)	5 (45.5)	8 (66.7)	6 (42.9)	
T_1					0.713
Up to 31 points	2 (28.6)	1 (12.5)	1 (8.3)	2 (14.3)	
Between 31 and 41 points	1 (14.3)	3 (37.5)	2 (16.7)	4 (28.6)	
Above 41 points	4 (57.1)	4 (50.0)	9 (75.0)	8 (57.1)	
T_2					0.590
Up to 31 points	1 (14.3)	1 (12.5)	1 (8.3)	0	
Between 31 and 41 points	2 (28.6)	3 (37.5)	2 (16.7)	3 (27.3)	
Above 41 points	4 (57.1)	4 (50.0)	9 (75.0)	8 (72.7)	
Δ (%) between $T_0$and T_2					
Up to 31 points	-23.2	-33.0	0	-14.3	
Between 31 and 41 points	-8.9	28.4	8.3	-15.6	
Above 41 points	32.1	-4.5	8.3	29.8	

IC - in-person control; II - in-person intervention; OC - online control; OI - online intervention; SD - standard deviation; [a]P-value was calculated using analysis of variance (ANOVA).

In assessing dysfunctional EBs among users (analysis of online groups), a decrease was observed in scores related to emotional eating (Δ=-5.91) and uncontrolled eating (Δ=-6.02) in the OC group. Additionally, an increase in cognitive restriction was observed in both the OC and OI groups, with a more pronounced increase in the OI group (Δ=4.17).Although changes in the assessed behaviors were observed, multivariate analysis showed that only uncontrolled eating significantly decreased between T0 and T2 in the OC group (p=0.015) (Table 4). An NNT of 5 was also observed for cognitive restriction behavior in the OC group, though it had a high rate of adverse outcomes (60%).

Table 4. Descriptive, univariate and multivariate analysis of dysfunctional eating behavior in primary healthcare users with chronic conditions, with or without mindfulness-based interventions. São Paulo-2020-2021.

Variable	Descriptive		Univariate					
	OC (n=12)	OI (n=9)	Time effect			Time*group effect		
	Mean±SD	Mean±SD	F	P-value	Partial Eta²	F	P-value	Partial Eta²
TFEQ-R21								
Cognitive restraint								
T_0	63.54±13.19	61.57±12.29						
T_1	68.40±7.21	66.20±12.58	1.634	0.212	0.079	0.114	0.869	0.006
T_2	65.63±9.59	65.74±17.40						
Δ	2.09	4.17						
Emotional eating								
T_0	56.60±21.87	49.07±15.14						
T_1	52.08±18.76	48.61±16.80	0.327	0.637	0.017	0.577	0.502	0.029
T_2	50.69±19.77	50.46±20.88						
Δ	-5.91	1.39						
Uncontrolled eating								
T_0	49.54±15.84	47.84±13.73						
T_1	50.00±14.01	44.44±14.57	0.399	0.638	0.021	5.247	0.015	0.216
T_2	43.52±15.28	50.62±16.65						
Δ	-6.02	2.78						

Table 4. Descriptive, univariate and multivariate analysis of dysfunctional eating behavior in primary healthcare users with chronic conditions, with or without mindfulness-based interventions. São Paulo-2020-2021. (Continues)

Variable	Descriptive		Univariate				
	OC (n=12)	OI (n=9)	Time effect			Time*group effect	
	Mean±SD	Mean±SD	F	P-value	Partial Eta²	F	P-value	Partial Eta²
TFEQ-R21								
Cognitive restraint								
Multivariate[a]	MANOVA (time) Pillai's trace=0.366. F=1.347.*p*=0.301							
	MANOVA (group) Pillai's trace=0.044. F=0.259.*p*=0.854							
	MANOVA (time*group) Pillai's trace=0.528. F=2.610.*p*=0.065							

OC - online control; OI - online intervention; Δ Difference between the means of $T_0$and T_2. [a]Pillai's trace was used because the assumption of multivariate normality and/or the absence of multivariate outliers was violated.

Using the IPAQ to analyze exercise in terms of increase and frequency, an increase in scores was observed in the IC group (Δ=1.00) in the time comparison (p=0.002). However, there was no difference in the time-group analysis for any of the groups(p=0.176)

Table 5. Descriptive. univariate, and multivariate analysis of IPAQ and PESES scores of primary healthcare users with chronic conditions, with or without mindfulness-based interventions. São Paulo-2020-2021.

Variable	Descriptive				Univariate					
	IC (n=7)	II (n=8)	OC (n=12)	OI (n=11)	Time effect			Time*group effect		
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	F	P-value	PartialEta²	F	P-value	Partial Eta²
IPAQ										
Score										
T_0	2.14±0.90	2.88±0.99	2.83±0.83	2.45±1.13						
T_1	2.00±0.58	1.88±1.13	2.75±1.14	2.18±1.25	4.976	0.001	0.1997	1.567	0.171	0.121
T_2	3.14±1.07	2.88±1.13	2.83±1.19	2.91±1.22						
Δ	1.00	0.00	0.00	0.46						
Multivariate[a]	MANOVA (time) Pillai's trace=0.310. F=7.410.*p*=0.002									
	MANOVA (time*group) Pillai's trace=0.240. F=1.549.*p*=0.176									
PESES										
Score										
T_0	12.14±5.64	10.43±3.91	11.83±2.79	12.44±4.69	1.396	0.255	0.043	1.123	0.359	0.098
T_1	13.00±4.08	13.43±4.79	11.75±3.67	13.00±3.91						
T_2	10.00±4.58	11.29±3.68	13.00±4.07	12.44±3.40						
Δ	-2.14	-0.86	1.17	0.00						
Multivariate[a]	MANOVA (time) Pillai's trace=0.084. F=1.369.*p*=0.270									
	MANOVA (time*group) Pillai's trace=0.199. F=1.140.*p*=0.350									

The InternationalPhysicalActivityQuestionnaire- IPAQ;PhysicalExercise Self-EfficacyScale – PESES;IC - in-person control; II - in-person intervention; OC - online control; OI - online intervention; Δ Difference between the means of $T_0$and T_2. [a]Pillai's trace was used because the assumption of multivariate normality and/or the absence of multivariate outliers was violated.

The analysis of self-efficacy for physical exercise revealed that although the in-person groups (IC and II) showed an increase in scores after the intervention, this trend did not continue during the follow-up period. In fact, scores decreased in the final assessment. A greater increase in self-efficacy was observed at the end of the study for the OC group compared to the other groups. However, there were no significant differences between time points (p=0.255) or between groups (p=0.359) regarding this parameter, as seen in Table 5.

DISCUSSION

This study found that the MBHP program had a positive impact on EB, self-care, and lifestyle change parameters across different groups and assessment times, albeit differentiated. However, it did not affect physical exercise or self-efficacy.

It is well-known that MBIs are not intended to promote weight loss. This finding has not always been verified in studies using this approach with overweight and obese individuals. However, it is likely that this result demonstrates an indirect relationship between mindfulness practices and body weight effects, as evidenced in some studies. In other words, these practices can promote mindful eating, which involves paying attention to physiological cues related to hunger, satiety, and satisfaction. They can also help individuals identify external and internal triggers for disordered eating, including emotional ones. This positively impacts EB and food choices, as verified in the present study. In turn, this can impact changes in body weight.[7,28]

This study observed that individuals in groups that received MBIs, either in-person or online, showed greater reductions in body weight, as identified by participants' BMI.

The aforementioned associations have already been investigated and sometimes confirmed in national and international studies. One such study was conducted by Salvo et al.[9] It aimed to verify and compare the effectiveness of a mindful eating program (MB-EAT), the MBHP protocol (studied in the present research), and a control group (waiting list) on psychological, biochemical, EB, and anthropometric data in overweight and obese women receiving PHC in the municipality of São Paulo. The aforementioned study did not observe significant weight loss in any of the groups. However, the mindful eating protocol showed a favorable trend in weight measurements at the post-intervention and three-month stages, confirmed for women who participated in all stages of the study.

International studies, such as those by Hanson et al.[29] and Daubenmier et al.,[30] which used MBIs in obese individuals, showed significant weight loss compared to the pre-intervention period after six, 12, and 18 months, respectively. The authors state that changes in EB resulting from mindfulness practices are the main drivers of the observed weight and metabolic changes.

It is also worth noting that the 2022 Position Statement on the Nutritional Treatment of Overweight and Obesity, published by the Brazilian Association for the Study of Obesity and Metabolic Syndrome, recommends MBI-focused mindful eating as an effective behavioral treatment strategy for obesity.[31]

Concerning the investigated users' dietary practices, relevant findings were verified. This study identified improvement in food choices across all groups. Notably, although no differences were found among groups, those who received the mindfulness intervention in person or online showed significant changes.

It is also worth noting that this research was conducted with individuals who have chronic conditions. Additionally, the Dietary Guidelines for the Brazilian Population is an official document from the Brazilian Ministry of Health that has been recommended for use in dietary practices by the general population, including individuals with chronic diseases such as diabetes mellitus.[21]

In an experimental study comparing the effects of MBIs associated with cooking workshops and dietary prescriptions on the level of dispositional mindfulness and macronutrient intake of adults with type 1 diabetes, Reis et al.[12] found a reduction in the intake of these nutrients, especially carbohydrates, that remained within recommended standards.

This research also verified the hypothesis that MBIs can impact EB and food choices, and how these changes affect weight loss. The results presented above indicate that all online groups experienced a

reduction in dysfunctional EBs (eating in response to emotions and loss of control over eating) and an increase in cognitive restraint, particularly in the MBI group. These findings suggest that the reduction in body weight observed in this group (OI) was influenced by changes in body composition. Decreased impulsivity, improved emotion management, and enhanced skills such as "mindful and intuitive eating" are behavioral modifications that foster a healthier relationship with eating and the body. These modifications have been confirmed in several studies that employed mindfulness with individuals of various weight statuses.[9,32,33]

This study did not find any significant changes in parameters related to physical exercise practice and self-efficacy. These findings were likely influenced by the period during which much of the research took place: the time of the COVID-19 pandemic. During the pandemic, urgent measures were adopted in social and health public policies, including social isolation and quarantine. Thus, social interactions were restricted to reduce transmission of the SARS-CoV-2 virus. Thus, physical activity and exercise were limited or avoided to minimize contamination among individuals.[34,35]

Probably, the positive effects of the interventions on physical exercise and self-efficacy could not be verified or sustained in the short or medium term (follow-up) due to health concerns that were then a priority. However, some studies have shown that mindfulness is positively related to these aspects.[36,37]

Despite the importance and originality of this study's results, its limitations are evident. For instance, the number of individuals analyzed did not represent the population of São Paulo affected by chronic conditions. Additionally, the period during which the study was conducted was marked by a global pandemic that impacted societies' lifestyles and health.

However, given the scarcity of intervention studies using mindfulness protocols, particularly in PHC, which is the gateway to the SUS, the importance of this research is clear.

CONCLUSION

This research confirmed the positive effects of a Brazilian mindfulness-based health promotion (MBHP) on the EB, nutritional status, and lifestyle of chronic condition patients in PHC in São Paulo. These effects varied depending on the intervention format and assessment time.

This study's initial hypotheses were partially confirmed, opening up the possibility of conducting a larger study to prove the effectiveness and benefits of mindfulness in both intervention formats. Such a study could improve the self-care, lifestyle, and health of people with chronic conditions treated by the SUS.

REFERENCES

1. Barbosa MR, Penaforte FRO, Silva AFS. Mindfulness, mindful eating and intuitive eating in the approach to obesity and eating disorders. SMAD Rev Eletrônica Saúde Ment Álcool Drog. 2020;16(3):118-35. https://doi.org/10.11606/issn.1806-6976.smad.2020.165262

2. Freire R. Scientific evidence of diets for weight loss: Different macronutrient composition, intermittent fasting, and popular diets. Nutrition. 2020;69:110549. https://doi.org/10.1016/j.nut.2019.07.001

3. Mann T, Tomiyama AJ, Westling E, Lew AM, Samuels B, Chatman J, et al. Medicare's search for effective obesity treatments: diets are not the answer. AmPsychol. 2007;62(3):220–33. https://doi.org/10.1037/0003-066x.62.3.220

4. Garcia RWD. Representações sociais da alimentação e saúde e suas repercussões no comportamento alimentar. Physis. 1997;7(2):51-68. https://doi.org/10.1590/S0103-73311997000200004

5. Crockett AC, Myhre SK, Rokke PD. Boredom proneness and emotion regulation predict emotional eating. J Health Psychol. 2015;20(5):670-80. https://doi.org/10.1177/1359105315573439

6. Spoor STP, Bekker MHJ, van Strien T, van Heck GL. Relations between negative affect, and emotional. Appetite. 2007;48:368-76. https://doi.org/10.1016/j.appet.2006.10.005

7. Tylka TL. Development and psychometric evaluation of a measure of intuitive eating. J CounsPsychol. 2006;53(2):226–40. https://doi.org/10.1037/0022-0167.53.2.226

8. World Health Organization. Non communicable diseases country profiles 2018 [Internet]. Geneva: WHO; 2018. [Internet]. [Acesso 19 jan. 2021]. Disponível em: https://www.who.int/nmh/publications/ncd-profiles-2018/en/

9. Salvo V, Curado DF, Sanudo A, Kristeller J, Schveitizer MC, Favarato ML, et al. Comparative effectiveness of mindfulness and mindful ating programmes among low-income overweight women in primary health care: a randomised controlled pragmatic study with psychological, biochemical, and anthropometric outcomes. Appetite. 2022;177:106131. https://doi.org/10.1016/j.appet.2022.106131

10. Matsuhisa T, Fujie R, Masukawa R, Nakamura M, Mori N, Ito K, et al. Impactof a Mindfulness Mobile Application on Weight Lossand Eatin Behavior in People with Metabolic Syndrome: a Pilot Randomized Controlled Trial. Int J Behav Med. 2024;31:202-14. https://doi.org/10.1007/s12529-023-10173-2

11. Mouzinho L, Costa N, Alves T, Silva S, Limas L. Contribuições do mindfulness às condições médicas: uma revisão de literatura. Psicol Saúde Doenças. 2018;19(2):182-96. https://doi.org/10.15309/18psd190202

12. Reis AL, Kikuchi JLD, Brasil HAC, Galvão OF, Gomes DL. Efeitos de intervenção focada no comportamento alimentar e de prescrição dietética em pacientes com Diabetes Tipo 1: um estudo piloto. Ver Bras Ter Comport Cogn. 2022;24:1–26. https://doi.org/10.31505/rbtcc.v24i1.1603

13. Telles TCB, Araruna LC, Almeida MS, Melo AK. Adesão e aderência ao exercício: um estudo bibliográfico. Ver BrasPsicol Esporte. 2016;6(1):1-12. https://doi.org/10.31501/rbpe.v6i1.6725

14. Mattos RS, Luz MT. Sobrevivendo ao estigma da gordura: um estudo socioantropológico sobre obesidade. Physis. 2009;19(2):489-507. https://doi.org/10.1590/S0103-73312009000200014

15. Lohman TG, Roche AF, Martorell R. Anthropometric Standardization Reference Manual. Champaign: HumanKinetics Books; 1988.

16. Lipschitz DA. Screening for nutritional status in the elderly. PrimCare. 1994;21(1):55-67. https://doi.org/10.1016/S0095-4543(21)00452-8

17. World Health Organization (WHO). Obesity: preventing and managing the global epidemic. Geneva: WHO; 2000. (WHO TechnicalReport Series, 894)

18. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Protocolos do Sistema de Vigilância Alimentar e Nutricional – SISVAN na assistência à saúde. Brasília: Ministério da Saúde; 2008. [Internet]. [Acesso 25 mar 2025]. Disponível em: http://189.28.128.100/dab/docs/portaldab/publicacoes/protocolo_sisvan.pdf

19. Natacci LC, Ferreira Júnior M. The three factor eating questionnaire-R21: tradução para o português e aplicação em mulheres brasileiras. Rev Nutr. 2011;24:383-94. https://doi.org/10.1590/S1415-52732011000300002

20. Brasil. Ministério da Saúde. Como está sua alimentação? Brasília: Ministério da Saúde; 2018. Ministério da Saúde; 2008. [Internet]. [Acesso 27 mar 2025]. Disponível em: https://bvsms.saude.gov.br/bvs/folder/10006000072.pdf

21. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Guia alimentar para a população brasileira. 2ª ed. Brasília: Ministério da Saúde; 2014. 156 p. [Internet]. [Acesso 02 jan 2025]. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/guia_alimentar_populacao_brasileira_2ed.pdf

22. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. Questionário Internacional de Atividade Física (IPAQ): estudo de validade e reprodutibilidade no Brasil. RevBrasAtivFís Saúde. 2001;6(2):5-18. https://doi.org/10.12820/rbafs.v.6n2p5-18

23. Schwarzer R, Renner B. Escalas de autoeficácia específicas para saúde [Internet]. Berlim: Universidade Livre de Berlim; 2009. [Internet]. [Acesso 05 abr 2025]. Disponível em:https://www.researchgate.net/publication/322500631_Escala_de_Autoeficacia_para_o_Exercicio_validacao_para_a_populacao_portuguesa

24. Martins AC, Silva C, Moreira J, Rocha C, Gonçalves A. Escala de autoeficácia para o exercício: validação para a população portuguesa. In: Conversas de Psicologia e do Envelhecimento Ativo. 1ª ed. Coimbra: Associação Portuguesa Conversas de Psicologia; 2017.

25. Demarzo MMP, Cebolla A, Garcia-Campayo J. The implementation of mindfulness in health care systems: a theoretical analysis. GenHospPsychiatry. 2015;37(2):166–71. https://doi.org/10.1016/j.genhosppsych.2014.11.013

26. Kabat-Zinn J. An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfullness meditation: theoretical considerations and preliminary results. GenHospPsychiatry. 1982;4(1):33–47. https://doi.org/10.1016/0163-8343(82)90026-3

27. Brasil. Ministério da Saúde; Universidade Federal de Minas Gerais. Instrutivo: metodologia de trabalho em grupos para ações de alimentação e nutrição na atenção básica. Brasília: Ministério da Saúde; 2016. [Internet]. [Acesso 07 fev 2025]. Disponível em:https://bvsms.saude.gov.br/bvs/publicacoes/instrutivo_metodologia_trabalho_alimentacao_nutricao_atencao_basica.pdf

28. Hawks S, Madanat H, Hawks J, Harris A. The relationship between intuitive eating and health indicators among college women. Am J Health Educ. 2005;36(6):331-6. https://doi.org/10.1080/19325037.2005.10608206

29. Hanson P, Shuttlewood E, Halder L, Shah N, Lam FT, Menon V, et al. Application of mind fullness in a Tier 3 obesity service improves eating behavior and facilitates successful weight loss. J ClinEndocrinolMetab. 2019;104(3):793-800. https://doi.org/10.1210/jc.2018-00578

30. Daubenmier J, Moran P, Kristeller J, Acree M, Bacchetti P, Kemeny ME, et al. Effects of a mindfulness-based weight loss intervention in adults with obesity: a randomized clinical trial. Obesity (Silver Spring). 2016;24(4):794-804. https://doi.org/10.1002/oby.21396

31. Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica (ABESO). Posicionamento sobre o tratamento nutricional do sobrepeso e da obesidade. 1ª ed. São Paulo: ABESO; 2022.

32. Brisotto M, Andretta I. Relações entre *mindfulness*, alimentação intuitiva e emocional em adultos. Psicol Saúde Doenças. 2021;22(1):302-13. https://doi.org/10.15309/21psd220125

33. Díaz-Tendero D, Cruzat-Mandich C, Jiménez T, Martínez P, Saravia S, Ulloa V. Mindfulness in the control of binge eating, the perspective of a Chilean adult group. Ver MexTrastorAliment. 2019;10(1):75-84. https://doi.org/10.22201/fesi.20071523e.2019.1.483

34. Martinez EZ, Silva FM, Morigi TZ, Zucoloto ML, Silva TL, Joaquim AG, et al. Physical activity in periods of social distancing due to COVID-19: a cross-sectional survey. CiênSaúde Colet. 2020;25(suppl 2), p. 4157-68. https://doi.org/10.1590/1413-812320202510.2.27242020

35. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Guia de vigilância epidemiológica: secretarias estaduais e municipais de saúde — painel COVID-19 [Internet]. Brasília: Ministério da Saúde; 2020. [Internet]. [Acesso 13 out 2024]. Disponível em: https://covid.saude.gov.br/

36. Neace SM, Hicks AM, DeCaro MS, Salmon PG. Trait mind fullness and intrinsic exercise motivation uniquely contribute to exercise self-efficacy. J Am Coll Health. 2020;70(1):13-7. https://doi.org/10.1080/07448481.2020.1748041

37. Ruffault A, Bernier M, Juge N, Fournier JF. Mindfullness may moderate the relationship between intrinsic motivation and physical activity: a cross-sectional study. Mindfulness. 2016;7(2):445-52. https://doi.org/10.1007/s12671-015-0467-7

Contributors

Orange LG participated in the research conception, design, and execution; Pititto BA participated in data conception, analysis, and statistical interpretation; Lima CR, Melo RG, and Pereira RS participated in the review and approval of the final version; Demarzo MMP participated in the work guidance, supervision, and execution, review, and approval of the final version.

Conflict of interests: The authors declare no conflict of interest.

Received: September 20, 2025
Accepted: December 9, 2025