Nutrition 67–68 (2019) 110568

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Applied nutritional investigation

Barriers to and facilitators for adherence to nutritional intervention: Consumption of fruits and vegetables

Raquel de Deus Mendonça Ph.D. [a], Larissa Morelli Ferraz Guimarães M.Sc. [a], Suely Aparecida Mingoti Ph.D. [b], Kelly Alves Magalhães Ph.D. [c], Aline Cristine Souza Lopes Ph.D. [a,*]

[a] Nutrition Department, Federal University of Minas Gerais, Belo Horizonte, Brazil
[b] Institute of Exact Sciences, Federal University of Minas Gerais, Belo Horizonte, Brazil
[c] Núcleo de Apoio a Saúde da Família, Secretaria Municipal de Saúde de Belo Horizonte, Research Group on Nutrition Interventions, Belo Horizonte, Brazil

ARTICLE INFO

Article History:
Received 13 September 2018
Received in revised form 25 June 2019
Accepted 12 August 2019

Keywords:
Primary health care
Health promotion
Intervention studies
Patient adherence

ABSTRACT

Objectives: The aim of this study was to investigate the barriers and facilitators for the adherence of participants to a nutritional intervention.
Methods: A randomized controlled trial was carried out with participants from the Health Academy Program in Belo Horizonte, MG, Brazil. The intervention (7 mo) was based on the Transtheoretical Model and on Paulo Freire's pedagogy and offered 12 education activities with the purpose of promoting the consumption of fruits and vegetables. Adherene was determined by calculating the participation percentage (attendance at activities/number of activities).
Results: In all, 1483 individuals participated and the average adherence was 58.3%. Low adherence was demonstrated by 24.3%, medium adherence by 26.5%, and high adherence by 49.2% of the participants. Adherence was associated with aging (odds ratio [OR], 1.97; 95% CI, 1.33–2.94), being unemployed (OR, 0.75; 95% CI, 0.58–0.95), not being under psychiatric treatment (OR, 0.77; 95% CI, 0.63–0.95), participant body satisfaction (OR, 1.27; 95% CI, 1.02–1.58) and participant attendance at the Health Academy Program for >1 y (OR, 2.78; 95% CI, 2.17–3.56). The qualitative analysis revealed the following facilitators for adherence: service structure, intervention methodology, bond-building among users and professionals, family support, and patient-associated aspects. The barriers to adherence included work, self-care, and care for another.
Conclusion: Adherence to the intervention was high, and the patient-associated aspects, the logistics of the Health Academy Program, and the methodology appeared to contribute to adherence. However, the timetable was a barrier for those who were working and for those who support their families.

Introduction

Over the past few decades, the need for health programs and policies aimed at treating non-communicable chronic diseases, especially the creation of health-promoting environments such as health services, schools, and companies, has increased. Those spaces are regarded as ideal for the implementation of health interventions [1] because they can serve and are available to a large number of individuals, promote participation, and enable the continuity of interventions.

In Brazil, health interventions are carried out by the Unified Health System, which has goals that go beyond controlling chronic diseases. Health interventions aim to empower individuals and groups so that they care about their own health. Additionally, health interventions can contribute to reducing health inequalities because of an increase in access to information and health

This work was supported by Fundação de Amparo à Pesquisa de Minas Gerais (grant no. 21618/2013, 23004, APQ-03376-12, and PPM-00254-15) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (grant no. 476686/2013-0 and for a research productivity scholarship to ACSL). LMFG assisted in the generation, collection, assembly, analysis, and interpretation of the data; drafting of the manuscript; and approval of the final version of the manuscript. RDM assisted in the conception and design of the study; collection, assembly, analysis, and interpretation of data; drafting of the manuscript; and approval of the final version of the manuscript. SAM assisted in the conception and design of the study; interpretation of data; revision of the manuscript; and approval of the final version of the manuscript. KAM assisted in the analysis and interpretation of data; revision of the manuscript and approval of the final version of the manuscript. ACSL assisted in the conception and design of the study; generation and interpretation of data; revision of the manuscript; and approval of the final version of the manuscript.
* Corresponding author: Tel.: +55 31 3409 9179; Fax: +55 31 3409 9860.
E-mail address: Alinelopesenf@gmail.com (A.C.S. Lopes).

https://doi.org/10.1016/j.nut.2019.110568
0899-9007/

services [2]. However, it is necessary to monitor and assess the scope and adherence of users, families, and/or communities so that the interventions achieve these goals [3].

Adherence may be defined differently according to the subject of research. It can be assessed by following a health professional's recommendations regarding drug therapy, diet, changes in lifestyle [4] or attendance at health interventions [5]. Although the level of adherence/participation is one of the defining elements for proper health counseling, studies addressing this theme and its influencing factors are limited.

Previous studies have shown a low percentage of adherence, especially to nutrition interventions (ranging from 22.7 to 56%) [6–9], which prevents participants from achieving effective, sustainable results [6–8]. A 3-mo nutritional counseling program directed to overweight adults identified a 45.8% adherence rate [9]. As for research on individual treatments for obesity, over the course of 1 y, only 22.7% of the participants concluded the study and 69.2% left during the first 3 mo [9].

In general, the low rate of adherence to health interventions has been associated with age, program duration and timetables, the perceived health condition, the absence of physical activity, overweight, low motivation for changing lifestyle [7–11], and lack of confidence in social and economic systems to support changes and health service [11–13]. However, these studies were limited to investigating individual aspects, and did not seek to understand the subjectiveness that is involved in adherence to a certain interventions. To that end, this study was aimed at investigating adherence (facilitators and barriers) to nutritional intervention for the promotion of fruit and vegetable consumption. Knowledge about adherence to nutritional interventions, and its influencing factors, may improve and rationalize planning, efficiency, and effectiveness of health promotion programs.

Methods

This study is an integral part of a randomized controlled community trial that is conducted on a representative sample of a Brazilian Primary Health Care (PHC) service called Health Academy Program (Programa Academia da Saúde - PAS - in portuguese), in Belo Horizonte, the sixth largest city of Brazil, which has a population of >2million residents.

The PHC is the first level of Brazil's Unified Health System, which offers universal coverage and attends to ~75% of the Brazilians. However, PHC has had difficulty developing health promotion interventions (physical activity and nutrition). To control for this failure, the PAS was implemented in Brazil [14].

The PAS is aimed at the development of health interventions to promote healthy lifestyles (physical activity and healthy dietary habits). The PAS offers free regular exercise and educational activities on healthy nutrition, prevention of chronic diseases, leisure, and citizenship [13]. Currently, the PAS is present in 2847 municipalities and serves >51% of the Brazilian municipalities with 3790 units being constructed [14]. In Belo Horizonte, the PAS is preferably located at socially vulnerable areas and municipalities have 77 units that serving an average of 35 000 individuals. The PAS is mostly attended by low-income women with little education, who have important inadequacies in food consumption (low consumption of fruits and vegetables, high consumption of soft drinks, and processed-meat products) and a high prevalence of obesity [15]. Because the PAS is a health promotion service with high capillarity in cities, we chose to implement the nutritional intervention object of study in this research.

Study design and participants

A study with mixed methods, with both quantitative and qualitative approaches, was conducted to enhance understanding regarding adherence to nutritional interventions and to capture the dynamic and complex reality of adherence in varying social contexts that is in compliance with the theoretical assumptions [16]. The qualitative approach complements the quantitative analysis, deepening the social character and the difficulties of partial and incomplete knowledge [16] for which adherence is affected.

The unit of randomization was PAS units. In each geographic stratum, formed according to the nine administrative regions of the municipality, two units were selected from low-income areas. Among the 50 units in the municipality during 2012, 42 were eligible for the sampling process. Those that had participated in nutritional interventions during the past 2 y and those located in areas with higher incomes were excluded because there were insufficient numbers of units for pairing. Afterward, two PAS units per administrative region were randomly selected (n = 18; average 250.9 ± 72.9 individuals/unit), one randomly located as a control group and the other as the intervention group. In this study, only the intervention group units (n = 9; average 178.2 ± 63.6 individuals/unit) were investigated. Those units were representative of service users of the municipality, with 95% reliability.

The quantitative approach aimed at characterizing the profile of all users ≥20 y of age in the research scenario who were regular participants at PAS (i.e., individuals who performed physical activity during the month preceding the start of data collection and excluding pregnant women and individuals with such mental conditions as to disable them from answering the questions). Further details about the project, sampling process, and recruitment of participants can be obtained from Menezes et al. [15].

The purpose of the qualitative approach was to understand the subjectivity that involves adherence to a given intervention, and the eligible participants were those who participated in each intervention group [17]. In each intervention group, participants were selected by PAS units according to each person's demographic category (i.e., sex and age range: 20–39, 40–59, and ≥60 y), because these characteristics can influence adherence [7,9–12]. We excluded those who missed the interview (previously scheduled) three times, those unavailable after three phone calls, those who died, and those who did not authorize recording the interview. Participants were selected until data saturation criterion determined the final sample size. Data saturation is defined as the moment when a study can no longer obtain significant information about the object of study that would add new elements for theoretical reflection [18]. The data saturation was verified through attentive listening to interviews, transcription, floating reading, preanalysis, and annotations of the researcher's field diary.

To verify the perception of the participants regarding the elements that influence adherence, semi-structured interviews were carried out 6 mo after conclusion of the intervention. This time was used because the Transtheoretical Model considers 6 mo to be a minimum period for participants to maintain a new behavior [19]. Moreover, a better understanding of the changes and experiences is expected after that period.

The interview script covered issues related to the intervention; more specifically about the educational techniques used to understand the learning, questions, motivations, barriers, and facilitators to participation and their meaning for the participant, as well as the possibility of extending the intervention to other people and also to collect information about the individual's participation in similar interventions and suggestions. The interviews were conducted by a single researcher and had an average duration of 13 min.

Nutritional intervention: Consumption of fruit and vegetables

The intervention focused on promoting the intake of fruit and vegetables (FV) by closely relating FV to health construction and maintenance. The intervention was carried out for 7 mo and referred to the Transtheoretical Model [19] and was based on the problematization methodology by Paulo Freire [20].

The themes in this intervention were identified, a priori, from a qualitative-type exploratory study performed in one of the PAS units [17] and through a literature review. Themes were structured according to the assumptions of the Transtheoretical Model [18]. The qualitative study conducted allowed the identification of subject matters according to participant needs: food portions, nutritional information, and obstacles to changing FV consumption (cost, flavor, the time required to buy and prepare food, and difficulties in shopping for good-quality FV).

The following educational techniques were used: workshops, flashcards with motivational messages, and interventions in the environment, with plays and movies and the delivery of brochures. Twelve educational activities were carried out and repeated in the different groups at each PAS unit being studied to reach all participants. The educational sessions were conducted with ≤20 participants per session and were separated by each group of Transtheoretical Model. To establish the feasibility of the development of the intervention, the participants were regrouped according to the stages of change with respect to FV consumption: pre-action (precontemplation and contemplation stages) or decision and action (action and maintenance stages) [18]. Further details about nutritional intervention can be obtained from Menezes et al. [21].

Adherence to the intervention

Adherence was obtained by calculating the percentage of attendance at the intervention, measured by dividing the number of attendances (at the actions) by the total number of actions offered. The participation was computed with a record of the names of each participant in the different activities.

$$Adherence = \frac{number\ of\ attended\ actions}{total\ number\ of\ actions\ offered} \times 100$$

Given the lack of studies that include a consolidated cut point to define the ideal level for adherence to an intervention, this study considered the following cut points: low adherence: ≤30% participation (1–3 actions), medium adherence: 31% to 70% (4–7 actions), and high adherence: >70% participation (8–11 actions).

Other variables

Socioeconomic, health, and nutrition characteristics, and residence time in PAS (months) were investigated. The socioeconomic variables were sex, age, education (years), and employment. The health-related data included the self-reporting of hypertension, diabetes, dyslipidemia, and currently under treatment for psychiatric diseases (nervousness, anxiety, or depression). The health profile of each participant was assessed based on self-report for non-communicable diseases using criteria similar to Brazilian national studies [22].

The nutritional characteristics assessed were proper consumption of FV (daily intake of five or more portions), classification of the changing stages of eating behavior (according to the Transtheoretical Model) [18], and body mass index (BMI).

The consumption of FV (g) was assessed using questions (Brief Questionnaire of FV consumption evaluation) adapted from the National Risk Factor Surveillance System for Chronic Diseases [22]. Participants were asked about the frequency of consumption of fruit (excluding fruit juice) and vegetables (excluding potatoes, yams, and cassavas), specifying the portion size (fruits in units and vegetables in tablespoons). Six frequency possibilities were offered, from *never* to *every day* (i.e., *never, almost never, 1 to 2 d/wk, 3 to 4 d/wk, 5 to 6 d/wk,* or *every day*). A study comparing the relative validity Brief Questionnaire of FV consumption evaluation to 24-h dietary recall had shown correlation coefficients for fruit intake ($r = 0.44$), for vegetables ($r = 0.34$), and FV consumption ($r = 0.37$) [23].

The stage of change, Transtheoretical Model, was measured by an algorithm for fruits and vegetables separately that assessed readiness to change consumption with the following response options corresponding to stages of change: precontemplation (not intending to increase consumption of FV in the next 6 mo), contemplation (intending to increase consumption of FV in the next 6 mo), preparation (intending to increase consumption of FV in the next 30 d), action (current, proper consumption of FV, but for <6 mo), and maintenance (current, proper consumption of FV for ≥6 mo) [18].

Anthropometric measurements included body weight and height. Weight was measured with a calibrated digital scale, with an accuracy of 0.1 kg. Height was measured using a stadiometer with a fixed vertical backboard and adjustable headboard, with an accuracy of 0.1 cm. The weight and height were measured with individuals wearing light clothing and barefoot, without props or objects on the head and pockets. BMI was calculated as the weight in kilograms divided by the square of height in meters.

All data were collected at the PHC units, face-to-face by unblinded nutrition students and dietitians who were periodically trained by the researchers. A pilot test identified the adequacy of the research instruments for the population studied; further details about the data collection can be obtained from Menezes et al. [15,21].

Statistical analysis

The quantitative relationship between the variables and adherence to the intervention were analyzed using an ordinal logistic regression and the results are presented by the odds ratios (OR), with a respective 95% CI.

To identify potential variables for a multivariate model of ordinal regression (proportional odds model), two criteria were used: theoretical criteria (based on the literature), in which this study is supported, and the statistician. Therefore, to be included in the model, these variables should have an association at a significance level of 0.20 [24].

The variables were included in the multivariate model through the backward method and variables with a significance level of 5% remained in the final model. The ordinal regression was used with the proportional odds model because it is suitable to analyze ordinal variables coming from a continuous variable, assuming that the OR values are similar to all answer categories. The analyses were performed using software Stata version 14 (StataCorp, College Station, TX, USA).

For the analysis of the semi-structured interviews, the thematic-type content analysis technique was used, and this involved three stages: pre-analysis, exploration of material and processing of results, and interpretation [16,25]. Software NVIVO (version 10) was used to assist with the analysis process.

The research was approved by the university's and city hall's Ethics Committees, and registered in the Brazilian Registry of Clinical Trials. To preserve identities, the interviewees were referred to as the letter "E" followed by the number adopted in the random drawing.

Results

There were 1483 individuals who participated in the study. These included mostly women and middle-aged adults. The average adherence was 58.3%, 24.3% having low adherence; 26.5% medium adherence; and 49.2% having high adherence.

Compared with participants with low adherence, those with higher adherence to the intervention were predominantly men, were older, had lower education levels, were not employed, and were not in treatment for psychiatric diseases. Additionally, they were in the action and maintenance stages for the consumption of FV according to the Transtheoretical Model. They were satisfied with their weight and had attended the PAS for >7 mo (Table 1).

In the multivariate analysis (adjusted by sex), the participants' odds of having high adherence remained higher among those who were older, unemployed, and were not being treated for psychiatric diseases; satisfied with their weight; and attended the PAS ≥7 mo. The highest magnitudes of association were related to an increase in age, especially among older individuals (OR, 1.97), and having attended PAS for >1 y (OR, 2.78; Table 2).

Participants responding to the semi-structured interviews (n = 45) presented characteristics similar to the total sample; female (57.8%), >40 y of age (84.5%), <8 y of schooling (60%), and having no employment relationship (84.4%).

The respondents perceived that the development of the interventions in the service routine was a facilitator for attending the health intervention (Fig. 1). Issues such as living next to the health care center and the strategy offered, preferably in the habitual time of attendance, were related as facilitators:

> "*[For] all those reasons and because it is here, at class time, which would not be a problem and I do not have to take another moment of my day (. . .), I saw no difficulty to participate.*" E45

The bond building among PAS professionals, intervention participants, and the research team was also related to the facilitator for adherence:

> "*Thank you for [being] willing to come to such a place [unit region] that many people despise, for showing affection and care, thank you. The opportunity of having you and learning for free. That was very good.*" E3

> "*So much appeared there, only, (. . .) but the colleagues also help, one helping the other, you were a blessing in my life and in somebody else's, I assure. I am sure, we have learned many good things that we did not know.*" E42

The methodology used in the intervention was differential according to participants. The highlighted aspects were the form of invitation to attend the educational activities (printed and phone call); duration of meetings; flexibility to participate at different times; punctuality; empowerment; interactivity; and simple, feasible guidelines to everyday life.

> "*Because of the proposed theme for the meeting, nutrition, that the project would be explained, the way it was offered for us to learn, how to store food, how to prepare it, all of this.*" E45

> "*When they called me to invite me here I was excited. Like yesterday, you called me, I was like, I have a meeting with the nutritionist tomorrow! I want to know what it is. We get curious, we want to know what will happen. That was very good, it was wonderful, you should come back later [laughter].*" E34

Therefore, subject-associated factors, such as access to information, interest in the learning opportunity, commitment to participate in the interventions, availability, and concern about self-care, which extended to others, particularly relatives, were highlights for adherence.

> "*It helped, especially for us, women, who are responsible for feeding, we engage everybody, and also in the end, with the contest*

Table 1
Characteristics of participants according to adherence to nutritional intervention

	Adherence						OR (95% CI)	*P*-value
	Low (n = 361)		Medium (n = 393)		High (n = 729)			
	n	%	N	%	n	%		
Sex								
Female	330	91.4	344	87.5	617	84.6	1.00	
Male	31	8.6	49	12.5	112	15.4	1.59 (1.18–2.13)	0.002
Age,y								
20–39	58	16.1	46	11.7	41	5.6	1.00	
40–59	191	52.9	179	45.6	329	45.1	2.00 (1.44–2.79)	<0.001
≥60	112	31.0	168	42.7	359	49.3	3.08 (2.20–4.30)	<0.001
Education, y								
0–4	125	34.6	159	40.6	321	44	1.00	
5–8	87	24.1	83	21.2	167	22.9	0.83 (0.64–1.07)	0.15
≥9	149	41.3	150	38.3	214	33.1	0.70 (0.57–0.88)	0.002
Employment*								
Without employment	215	59.6	258	65.6	535	73.4	1.00	
With employment	146	40.4	135	34.4	194	26.6	0.61 (0.49–0.75)	<0.001
Arterial hypertension								
No	187	51.8	177	45.0	322	44.2	1.00	
Yes	173	48.0	216	55.0	407	55.8	1.17 (0.97–1.41)	0.11
Dyslipidemia								
No	219	60.7	221	56.2	385	52.8	1.00	
Yes	139	38.5	168	42.8	337	46.2	1.11 (0.98–1.25)	0.11
Diabetes								
No	302	83.7	328	83.5	603	82.7	1.00	
Yes	58	16.1	62	15.8	125	17.2	0.98 (0.83–1.16)	0.82
Treatment for psychiatric diseases								
No	280	77.6	307	78.1	616	84.5	1.00	
Yes	79	21.9	85	21.6	112	15.4	0.75 (0.62–0.91)	0.003
Consumption of FV								
Inadequate	247	68.4	281	71.9	478	65.7	1.00	
Adequate	114	31.6	110	28.1	250	34.3	1.16 (0.95–1.43)	0.15
Strategic stage groups								
Pre-action	77	21.3	71	18.1	131	18.0	1.00	
Preparation	152	42.1	145	36.9	218	29.9	0.86 (0.65–1.13)	0.27
Action	132	36.6	177	45.0	380	52.1	1.46 (1.12–1.90)	0.005
Satisfaction with body								
No	241	66.8	228	58.0	364	49.9	1.00	
Yes	120	33.2	165	42.0	365	50.1	1.69 (1.39–2.06)	<0.001
Nutritional status								
Underweight	10	3.1	18	4.8	27	3.8	1.00	
Appropriate weight	71	21.8	128	34.4	272	38.0	1.35 (0.80–2.27)	0.26
Overweight	244	75.1	226	60.8	417	58.2	0.80 (0.48–1.33)	0.39
Attendance at PAS, mo								
0–6	161	46.1	112	29.4	130	18.2	1.00	
7–12	67	19.2	50	13.1	115	16.1	1.93 (1.42–2.63)	<0.001
≥13	121	34.7	219	57.5	468	65.6	3.15 (2.51–3.96)	<0.001

FV, fruits and vegetables; PAS, Health Academy Program
*Employment: Without employment (housewife/retired/pensioner/unemployed); with employment (employee).

(intervention that included a food contest to conclude the strategy), one engages everybody, because when a person looks for a plate, other person asks: 'what are you doing that for and why?', so you engage everybody." E45

As for all the barriers identified (Fig. 1), work, self-care, and care for others were related to the PAS working hours, and therefore, to the interventions timetable. Low and medium adherence to the strategy were due to the participants' abandonment or absence in the PAS (60.5%), starting a new job or currently working (13.6%), and personal family problems or their family members (8%), which were incompatible with the attendance at the intervention. One of the highlights was work, whether external or domestic:

"*It happens in the afternoon, so I don't know if more people would attend in the afternoon, because in the morning we have to prepare lunch, and this is not quick, right? And we have to get the kid ready to go to school, and small children, and there are kids who arrive to have lunch, to go out, to go to school and work.*" E3

"*I'm not participating in the Academy because I work from Tuesday to Saturday, so I don't have time. The only time I have is on Monday, and it's when I clean my house, so I don't (. . .)*" E19

Care for others was also a barrier to adherence, relating to health/sickness situations, whether temporary or extended, such as caring for children and grandchildren, accompaniment to medical appointments, examinations, and hospitalization. Finally, users mention the need for self-care and other personal commitments that made them absent or late to the activities:

Table 2
Factors associated to adherence to nutritional intervention

Variable	OR (95% CI)	*P*-value
Age, y		
20–39	1.00	
40–59	1.57 (1.09–2.27)	0.02
≥60	1.97 (1.33–2.94)	0.001
Employment*		
Without employment	1.00	
With employment	0.75 (0.58–0.95)	0.02
Treatment for psychiatric diseases		
No	1.00	
Yes	0.77 (0.63–0.95)	0.01
Satisfaction with body		
No	1.00	
Yes	1.27 (1.02–1.58)	0.03
Attendance to PAS, mo		
0–6	1.00	
7–12	1.82 (1.04–2.54)	0.001
≥13	2.78 (2.17–3.56)	<0.001

FV, fruits and vegetables; PAS, Health Academy Program.
*Employment: Without employment (housewife/retired/pensioner/unemployed); with employment (employee).

"*Because it was impossible to leave her [sick sister], sometimes it was necessary to take her to the doctor. She had a medical appointment, I had to go to the hospital with her, sometimes she needed hospitalization.*" E20

"*I have been absent because, sometimes, one needs to be absent, there is a medical appointment, sometimes an examination.*" E12

However, independent of the mentioned barriers, some people said they continued attending because they have strategies to tackle the barriers such as waking up earlier, advancing domestic chores, rearranging timetables or even taking children or grandchildren to the meetings, in addition to the flexibility of the intervention timetable.

"*Sometimes, there was a coincidence and I could come a little earlier, sometimes they [children] participated, but this was a little complicated.*"E13

Discussion

Adherence to the intervention carried out at the Brazilian Primary Health Care service was high. Such results may have been due to subject-related factors, the research scenario (health care service: Health Academy Program), the intervention methodology, and/or the bond building among participants, professionals, and the research team. On the other hand, adherence seems to have been reduced for issues related to incompatibility of situations that included work, self-care and care for the other(s), and service working hours (morning).

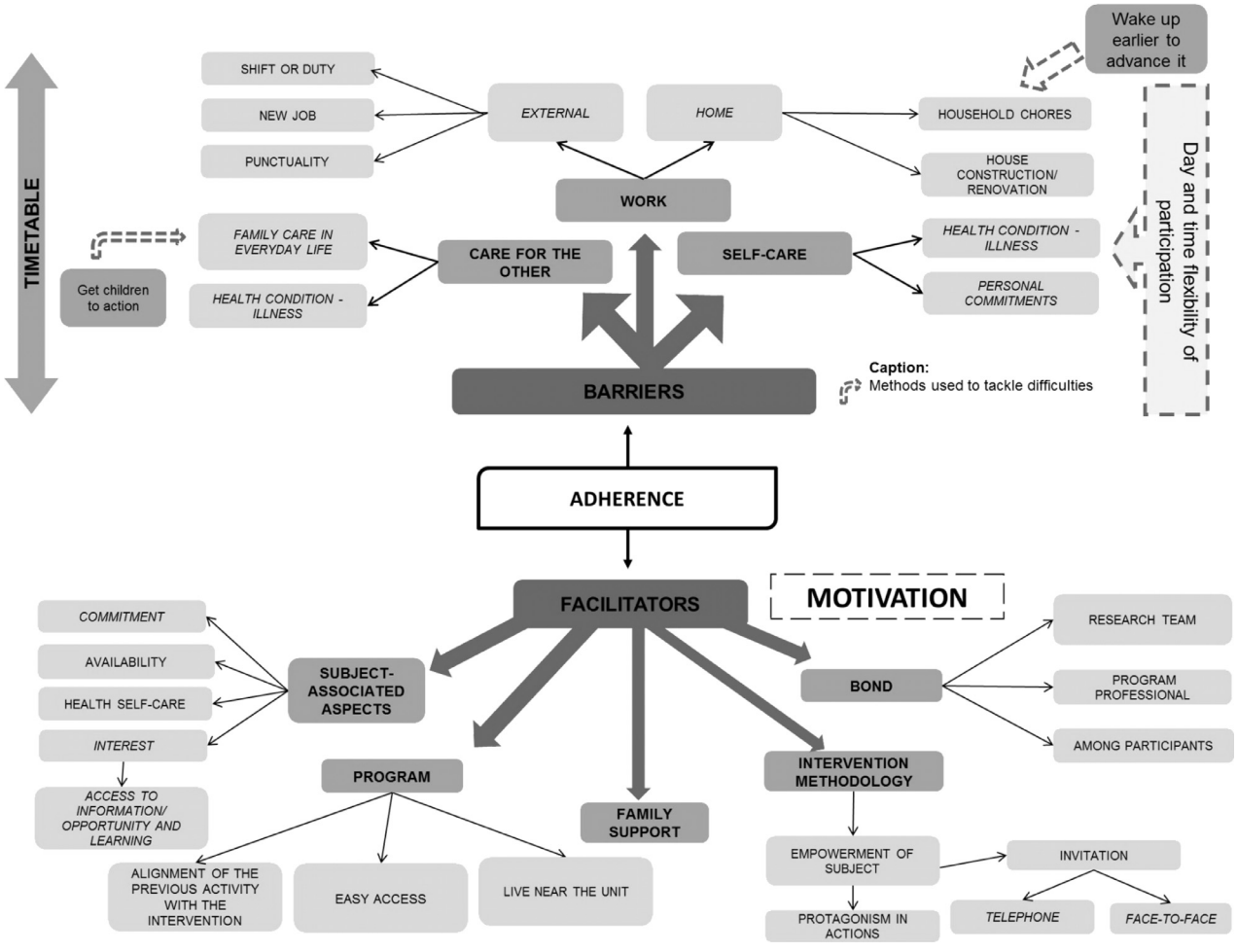

Fig. 1. Barriers and facilitators for adherence to nutritional intervention

Published studies on adherence that primarily focus on attendance at nutritional interventions are scarce. Most articles concern following a health professional's recommendations for drug therapy, diet, and lifestyle changes [4]. Therefore, it is challenging to expand the results and fill the gap as to why there is low adherence in nutritional interventions [5,6,8–11].

The adherence was higher than the values shown for national and international works: 22.7% to 56% [5–7,9,10,26]. These studies had different durations (2.5–12 mo) and methodologies, which may impair the comparability of the adherence percentage. However, the lower and higher percentages refer to 12-mo studies, demonstrating that, in addition to time, there are other possible elements that contribute to adherence [4,6,8–11].

Literature indicates that social, individual, health, and health care service characteristics are factors that facilitate adherence [10–13] and converge with the results of the study herein. However, we also have identified other facilitators, such as the intervention methodology and the building of bonds between the different actors involved.

The modus operandi of the health care service and the methodology used in the intervention seems to interact and forms a byproduct that favors adherence, participant bonds. Bonding is an important aspect of collective interventions and occurs when one assumes one purpose and leaves indifferences aside to create an affective interaction [27]. The health care service, specifically PAS, is comprised of individuals and the community, with an innovative interaction space as a tool that is capable of acting on the lifestyles. Easy access is an important element. When the intervention is located next to home or work, it acts as a facilitator for adherence [28]. Those data seem to corroborate the dose–response gradients found between residence time in the service and the higher adherence to the intervention.

The bond consists of building (through time) confidence and affection. This aspect is also observed when analyzing the perception of the participants on the method for inviting them to these educational activities (printed material and phone contact). It is considered a demonstration of care. Similarly, a study carried out in Colombia with hypertensive individuals showed that the method of work, activities developed, quality of interpersonal relationships, and communication among professionals and the patient were the main facilitators for adherence [29].

The intervention methodology also affects the level of adherence. The methodology based on theories, such as the Transtheoretical Model and Paulo Freire's pedagogy, and the use of educational techniques with a multidimensional approach, including subjective and objective aspects related to access, preparation, and consumption of food, such as cooking, may have contributed to the results [19,20]. The active participation in the activities allowed the participants to feel like main characters in the process and enabled further reflection on the knowledge and practices and an increase in their interpretation capacity. This allowed the participants to recognize possibilities and decision making [20]. Moreover, the intervention sought to promote simple, feasible changes, in accordance with reality, building a rich, bidirectional educational process among the participants and the research team in promoting health care [20,27,29].

The approach and interaction among participants, professionals, and the research team was influenced by affection. Affection involves the emotional and relational field built through each experience in the intervention, and is capable of giving a new meaning to the meetings with the other participants, with the service and with oneself [20,27,28].

Care is a political fact, a sociocultural category, that takes place in people's daily lives at different spaces and in different contexts [30]. Care implies the *meeting* among those involved, from welcoming to the humanized, integral health practices that bring techno-sciences closer to human happiness and human values. To do so, the care practice claims (re)signification, not only of health, but also of the individual's life plans, the service, professional praxis and, as a consequence, of the design of health strategies and programs.

On the other hand, the modus operandi of the health care service and of the intervention is also mentioned as a barrier to higher adherence. The morning working hours have not favored adherence by those who work, attend courses, or have personal commitments. Time flexibility in educational and welfare activities is crucial for the participation of economically active participants. A study of an intervention in Primary Health Care has also identified that lack of time or inadequate timetables of the interventions as main reasons for dropping out the by the older individuals, probably because they have more availability of time.

A qualitative study with the objective to investigate the reason for non-participation or participation in cardiac rehabilitation programs in Scotland showed that facilitators for adherence were subject aspects, methodology of the program (social support and structuring), and practical factors (accessibility). As in the present study, social support and the research team, company, and support of the participants also affected adherence to the intervention. The main limiters were the structure of the rehabilitation sessions (times and fixed days), work commitments, and accessibility [31].

Family issues can contribute in a different way to adherence as these parameters can act as support or as an obstacle for self-care [32]. Caring for another, especially extended and aimed at people with higher degrees of dependence, interfered (negatively) with adherence to the interventions and possibly on other life aspects, such as physical, psychological, and social matters. Therefore, the social support network is affected, making it difficult for participants to establish care for their own health [33].

Another aspect that was associated negatively with adherence was the participants' dissatisfaction with body weight. This was also found in a study with overweight adults under dietary reeducation [7]. It seems that overweight participants are more likely to participate in interventions, but also to abandon them [9]. People dissatisfied with their body weight may be psychologically more fragile, whether by social stigma or by previous unsuccessful attempts to modify their food habits, which can decrease motivation for change [6,34]. Additionally, the strategy in the proposed approach, the consumption of FV, is closely related to health promotion, which is an aspect that is unattractive for the public.

Similarly, individuals under treatment for psychiatric diseases also had difficulty participating in the intervention [6]. Those results suggest the need to deploy strategies that cover their singularities, especially when considering an increasing association between food and psychiatric diseases [34].

Before the barriers to adherence to heath interventions, some participants developed strategies to overcome them. This corroborated the ability of the intervention and the service to promote empowerment in the construction of healthy lifestyles and for handling health inequities. Identifying those strategies may help to provide social support to individuals by promoting their collective sharing in the activities.

The strength of this study was that the interventions were prepared in accordance with the theoretical basis for interdisciplinary researchers. These aspects reinforce its ability to promote good results in other scenarios. Additionally, this study documented the development of an intervention that is evaluated in a real-world setting.

This study stands out for investigating adherence to the health intervention in a scenario with scarce studies. It used a quantitative

and qualitative approach and provided a methodological choice that is essential for expanding the understanding of the theme. Additionally, this was a randomized controlled trial with a strong strategy (that is based on theories) to promote health in a large sampling contingent. These characteristics make this study original, especially because of the need to investigate its potential for promoting public health. However, because this study was performed with primary care users, the results herein cannot be extended to the entire population. Because the health system covers a significant percentage of the Brazilian population (66.7%), this makes the results somewhat comprehensive.

There were some limitations in this study. The lack of consensus regarding the concept of adherence, the core of this study, was a limiting factor. Therefore, we created a classification that was used in this work, since there are no standardized criteria in the literature. Another issue is that the majority of studies discuss adherence to a treatment, whether a diet or medication [4], whereas the relative adherence to educational interventions, to the relational dimension, and to the bond between patients and health professionals has not been explored, to our knowledge. We approached these topics by investigating adherence-related factors of the expression of facilitators and barriers. Another limitation was the time after the intervention ended when the semi-structured interviews were completed. This delay was due to the Transtheoretical Model used in intervention nutritional. The Transtheoretical Model considers 6 mo to be a minimum period for individuals to adopt a new behavior. This timeframe may have influenced the responses regarding adherence, but the objective of semi-structured interviews were to understand participation for interventional nutritional programs after that period, and this study did not evaluate the contents apprehended, but instead evaluated the experience of the participant, which demanded less recollection.

Good adherence is crucial to achieving effective health intervention strategies. Non-attendance at the educational interventions compromises important learning and changing processes. We are unfinished beings, always ready to learn [20], so it is crucial to develop health interventions, especially in health care services, but with acceptable degrees of participation.

Conclusions

Participation in an intervention developed in a Brazilian Primary Care service was high. Socioeconomic, health, and work factors, together with elements related to the timetable and participation in the health service, and the intervention methodology were important influences for adherence. The identification and consideration of facilitators and barriers in the conduction of health strategies and interventions may lead to higher adherence and allow for more effective results.

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