

Primary Health Care Research & Development
Physical activity promotion by health practitioners: A distance-learning training component to improve knowledge and counseling
--Manuscript Draft--

1

Physical activity promotion by health practitioners: A distance-learning training component to improve knowledge and counseling

Running title: physical activity training for health professional

2

Alex A Florindo, Associate Professor, School of Arts, Sciences and Humanities, University of Sao Paulo, Sao Paulo, Brazil

Douglas R Andrade, Professor, School of Arts, Sciences and Humanities, University of Sao Paulo, Sao Paulo, Brazil

Paulo H Guerra, Professor, Federal University of Fronteira Sul, Santa Catarina, Brazil

Jorge Mota, Professor, University of Porto, Porto, Portugal

Diane Crone, Professor, University of Gloucestershire, Cheltenham, England

Ana C C N Mafra, Statistician, Hospital Israelita Albert Einstein, Sao Paulo, Brazil

Mario Maia Bracco, Professor, Center of Studies and Research Dr. João Amorim, Sao Paulo, Brazil.

Correspondence:

Alex A Florindo, Rua Arlindo Bettio, 1000 CEP: 03828-000, São Paulo, SP, Brazil, Phone: +55 11 3091-8157 - E-mail: aflorind@usp.br

Abstract

Aim: To report an evaluation of health professionals' participation in a distance-learning physical activity training course developed in a low socioeconomic region of São Paulo city, Brazil. **Background:** In countries with public universal health systems, physical activity promotion in primary health care settings can reap results, particularly given that such interventions have the potential to reach a large percentage of the population. However, few studies proposed physical activity training for health professionals in low and middle income-countries. Brazil is a continental country and has the Unified Health System which incorporates family health teams in over 85% of Brazilian cities. **Methods:** The physical activity training was part of the fifth module of an educational intervention throughout a distance-learning course focusing on health professionals at M'Boi Mirim district in Sao Paulo city. The training totaled three hours and had five themes of physical activity: 1. Concepts, definitions benefits; 2. Evaluation; 3. Recommendation; 4. Interventions; 5. Physical activity counseling. The opinion of health professionals was evaluated after training by two open questions. **Findings:** Out of 106 professionals who took part of the course, only 22.6% (n=24) had accessed the fifth module. These professionals were predominantly female (79.2%), nurses (66.7%) and with aged 30 years or older. Responses highlighted the course approach focused on physical activity for improving patient's quality of life and well-being, disease prevention and health improvements. Regarding the themes for improvement, health professional identified that there was a need to experience physical activity classes first-hand, and the need to link physical activity counseling to the local venues that provide structured physical activity programs. We recommend that further training courses can be conducted based on this model for health professionals to promote physical activity to the community in Brazil.

Key words: Physical activity training; Health professionals; Distance-learning training; Online course; Professional development.

The promotion of physical activity in primary health care settings is considered an effective intervention for high-income countries (Orrow *et al.*, 2012) and physical activity counseling is valuable in improving physical activity (The Activity Counseling Trial Research Group, 2001). However, a review published in 2012 showed that the mean effect size of interventions based on physical activity counseling given by professionals in primary health care settings is low (Heath *et al.*, 2012). Nevertheless, in countries with universal public health systems, this type of action can obtain good results for physical activity promotion, particularly given that such interventions have the potential to reach large proportions of the population.

In Brazil, the Unified Health System (or Sistema Único de Saúde, SUS in Portuguese) is public, universal, integral, decentralized and incorporates family health teams in over 85% of Brazilian cities (Paim *et al.*, 2011). The encouragement to undertake physical activity comprises one of the actions of the SUS for health promotion. Since 2006, the Brazilian Policy for Health Promotion and the health promotion network has worked closely with SUS in encouraging physical activity. Through a number of initiatives supported the Ministry of Health, such as the implementation of Family Health Support Units in 2008, and the “Health Gym Program” in 2011 (or “Academia da Saúde” in Portuguese) (Malta and Barbosa Da Silva, 2012), physical activity promotion within the SUS has been encouraged in primary health care. However, a recent survey involving a nationally representative sample of primary health care units showed that only 39.5% provided physical activity interventions or promotions (Ramos *et al.*, 2014). However, despite those findings, it is interesting to note that a large proportion of physicians and nurses practicing at these primary care units have reported delivering regular physical activity counseling to their patients (Florindo *et al.*, 2013).

This disparity between physical activity promotion interventions and counseling in practice reveals both a discrepancy and an opportunity for development of a more strategic approach to physical activity promotion in these settings. Moreover, the majority of these professionals lack knowledge in the physical activity field, such as on the global recommendations for physical activity promotion (Florindo *et al.*, 2013). Therefore, tailored professional development training focused on health professionals is an unmet goal to improve physical activity counseling to attain greater population effect sizes to increase physical activity among the SUS users.

Since the 1900s a number of training programs for physical activity promotion counseling have been implemented and made available in range of countries. These include “Patient-Centered Assessment and Counseling for Exercise (PACE)” in the United States (Long *et al.*, 1996; Calfas *et al.*, 1996), as well as programs in other countries such as Japan (Miura *et al.*, 2004), the Netherlands (van Sluijs *et al.*, 2004), the “Green Prescription” in New Zealand (Swinburn *et al.*, 1998; Elley *et al.*, 2003). Notably, the “Exercise is Medicine”, initiative was launched in 2007 as a counseling strategy in the United States, and was also adopted elsewhere in other countries (Sallis, 2011; Blair *et al.*, 2012; Lobelo *et al.*, 2014).

Through a European funded project titled “HELP - Healthy Europe Through Learning and Practice”, a group of European researchers in 2012 developed an on-line training module for health professionals (Crone, 2011). The aim of this project was to develop an online training program for physicians and nurses with the ambition to increase their confidence and knowledge in order to enable them to advise patients on healthy weight, healthy eating and the promotion of physical activity.

It is important for countries with national health systems to provide health professionals with training in promoting physical activity promotion, (including counseling), that empowers them to promote physical activity in primary health care settings. In Latin American countries, there is a dearth of studies assessing physical activity interventions in primary health care (Hoehner *et al.*, 2013). More specifically, in Brazil, studies proposing and assessing strategies for physical activity promotion counseling through training of health professionals are scarce. In response to this deficit, the Physical Activity Epidemiology Group at University of Sao Paulo developed a training model for physicians and nurses to support the provision of physical activity counseling. This was published as part of the physical activity promotion interventions in primary health care called “Active Environment” (Florindo and Andrade, 2015). The model developed for Brazil was based upon content from the “HELP-Healthy Europe Through Learning and Practice” project (Crone, 2011). In addition, in continental countries such as Brazil, it is important that distance-learning based educational training for health professionals can be evaluated by using online platforms. Therefore, the objective of this study was to investigate the perspectives and opinions of health professionals regarding the distance-learning physical activity training developed in a low socioeconomic region of São Paulo city, Brazil.

Methods

This paper describes the perspectives and opinions of health professionals on a physical activity training called: “Active Environment”. The training was part of the research project “Implementation of hospital integration strategies with the primary health care system in the health care outreach of M’Boi Mirim in São Paulo city”. This project developed an educational intervention (a distance-learning course) that comprised five modules, each of 8 weeks in duration. Content included the Brazilian Ambulatory Care Sensitive Conditions list: respiratory, cardiovascular, diabetes, gastroenterology and mixed infectious diseases (Alfradique *et al.*, 2009), and major health risk factors including smoking, alcoholism, illegal drugs, pain, nutrition and physical inactivity.

The physical activity component was part of the risk factors module and was delivered during the last three weeks of the course. A full report of the methods is available in Bracco *et al.* (2016), but briefly, classes were delivered weekly, by specialists, through one-hour internet-based video-conferences which were followed by a discussion involving a general practitioner. All classes were transmitted online and were therefore interactive with the audience using the Adobe Connect™ interface. Health professionals could take part directly, but the recorded conferences were also made available at the course platform, which could be accessed at any time. In addition, discussion forums guided by mentors were also made available for discussions and for the provision of didactic support materials.

All staff ($n=359$), who included physicians, nurses, and multi-professional staff, who were working at primary care units ($n=18$) and at the Hospital Municipal Dr. Moyses Deutsch were invited to take part in the course. These primary care units form the regional health care network of M’Boi Mirim, a peripheral district in the southern zone of São Paulo City. Therefore, no sample size calculation was performed, but from 359 eligible health professionals, $n=170$ were enrolled in the course.

Physical activity training

As noted above, the physical activity component was called “Active Environment”. It was based on both previous studies on physical activity promotion interventions in primary health care conducted in the eastern region of São Paulo city (Florindo and Andrade, 2015) <www.each.usp.br/ambienteativo> and from the physical activity promotion content devised by the “Healthy Europe Through Learning and Practice” project <<http://www.help-project.com/>>.

The duration of the training totaled three hours, consisting of the five themes outlined in Table 1 applied over a three-week period. Themes 1 to 4 had duration of 30 minutes each, comprising 15 minutes of explanatory class and 15 minutes for discussion. Theme 5 had duration of 60 minutes, comprising 30 minutes of explanatory content and 30 minutes of discussion.

Table 1. Description of themes addressed in the physical activity training

	Themes addressed in the “Active Environment” physical activity training module
Theme 1 Duration: 30 minutes	<p>Definition of physical activity and benefits of participation including:</p> <ul style="list-style-type: none"> • Concepts of physical activity in different domains (leisure, transportation, work and household activities) and sedentary behavior (time sitting). • Prevalence of physical activity in the World and specifically to Brazil. • Benefits of physical activity for chronic disease prevention (for example cancer, cardiovascular disease, obesity) and, for quality of life (mental health and psychological wellbeing).
Theme 2 Duration: 30 minutes	<p>Evaluation of physical activity including:</p> <ul style="list-style-type: none"> • Understanding the process of physical activity evaluation (classification of intensity, frequency and duration), types of activities (aerobics and strength) and physical fitness. • Evaluation of physical activity through the use of questionnaires, pedometers and accelerometers.
Theme 3 Duration: 30 minutes	<p>Recommendation of physical activity for health including:</p> <ul style="list-style-type: none"> • Activity recommendation from the World Health Organization for children, adolescents, adults and elderly. • Types of physical activities most important for promotion, specific to Brazil (in leisure time and active transport, i.e. travel and transportation). • Recommendations for reducing sedentary behavior.

<p>Theme 4</p> <p>Duration: 30 minutes</p>	<p>Interventions for physical activity promotion including:</p> <ul style="list-style-type: none"> • Evidence based practice regarding targeted physical activity promotion interventions. • Examples of interventions from primary health care settings and models of physical activity counseling/advice. • Overview of physical activity promotion programs from primary health care settings in Brazil.
<p>Theme 5</p> <p>Duration: 60 minutes</p>	<p>Physical activity counseling including:</p> <ul style="list-style-type: none"> • Underpinning principles of physical activity counseling based on associated factors such as, demographic, social, barriers, social support, self-efficacy, built environment and perceived environment. • Specific advice for primary health care settings including activities to put into practice in everyday life, activities that have connections with culture, and more formal forms of referral for physical activity programs within the community.

Evaluation of physical activity training

To assess the opinion of health professionals about physical activity training we used two questions and to verify professional conduct for physical activity counseling we used one question (Table 2).

Physical activity counseling including:

- Underpinning principles of physical activity counseling based on associated factors such as, demographic, social, barriers, social support, self-efficacy, built environment and perceived environment.
- Specific advice for primary health care settings including activities to put into practice in everyday life, activities that have connections with culture, and more formal forms of referral for physical activity programs within the community.

Table 2. Questions used for evaluation

Open questions on assessment of physical activity course:

Regarding the physical activity training taught in the health promotion module, what strengths would you cite?

And what points do you think should be improved on the physical activity training?

These questions took part of the questionnaire completed by participants to evaluate the whole distance-learning course at the concluding session, held a month after the module containing the physical activity training (Bracco *et al.*, 2016). Questions were analyzed only in the group that accessed the fifth module (that had the physical activity training).

Discourse analysis (Câmara, 2013, Bardin, 2011) was used to analyze data from the two open questions (Table 2). We created categories from the answers about the positive points and suggestions to improve the training. We calculated how many times the responses that were contained in each category and each respondent may have cited responses for more than one category.

For the question about professional practice for physical activity counseling, the responses were analyzed using descriptive statistics (%) and thematically categorized in six options.

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0.

Ethical Issues

The study was approved by the Research Ethics Committee of the Secretariat for Health of São Paulo city (permit CAAE 26981514.3.0000.0086). All professionals who took part in the study signed the Free and Informed Consent Form.

Results

Of the 170 who were enrolled in the course, 28 left their positions during the course. Of those that completed the course (n=142), 106 completed the final course evaluation after one year. Of the 106 professionals, 22.6% (n=24) accessed the fifth module (or watched some classes, or participated in the discussion forum).

The professionals who accessed the fifth module (n=24) were predominantly female (79%), nurses (67%), aged > 30 years (75%), had been professionally practicing in the national health system for over 5 years.

Table 3. Characteristics of health professionals that accessed the 5th module of the course (major health risk factors) and answered the questions about physical activity training (n=24).

Variables	n	%	mean	sd
<i>Gender</i>				
Female	19	79.2		
Male	5	20.8		
<i>Age</i>				
			37.2	8.7
≤ 30 years old	6	25.0		
31-40 years old	11	45.8		
≥ 41 years old	7	29.2		
<i>Professional category</i>				
Nurses	16	66.7		
Physicians	6	25.0		
Others	2	8.3		
<i>Years practicing in health care settings*</i>				
≤ 5 years	8	34.8		
> 5 years	15	65.2		
<i>Access of the online course during all intervention*</i>				
2-10 times	10	43.5		
11-30 times	9	39.1		
> 30 times	4	17.4		
<i>Access in the discussion forum of fifth module</i>				
Yes	22	91.7		
No	2	8.3		
<i>Participation in the classes of the fifth module**</i>				
Yes	20	90.9		
No	2	9.1		
Total	24	100		

*1 missing information; **2 missing information

We had 14 responses to positive points and 12 responses about negative points of the course (Table 4).

Table 4. Summary of positive and negative points reported by professionals who accessed the module containing the physical activity training.

Positive points = 14 professionals answered	Number of citations
Categories	
Physical activity associated with quality of life and well-being	7
Prevention of diseases and improve of health	7
Treatment and rehabilitation of diseases and risk factors	4
Physical activity in the aging process	3
Focus on physical activity promotion	2
Another topics as healthy food	2
Skills for physical activity counseling	2
Physical activity targeted for recreation centers	1
Physical activity for social support	1
Physical activity for self-esteem	1
Physical activity for self-care	1
Points for improvement = 12 professionals answered	
Categories	
Very good training and no changes required	3
Include physical activity sessions for health professionals	2
Link between counseling with public facilities for physical activity participation	2
Include teaching materials as CD-ROM and movies on other physical activities as dancing to improve adherence	1
Physical activity for different ages	1
Physical activity for different diseases	1

The professionals highlighted the course approach focused on patient's quality of life and well-being, disease prevention and health improvements. Other important topics raised by health professionals were information about physical activity in the aging process, and treatment and rehabilitation of diseases (Table 4).

Regarding the themes for improvement, these included the need for physical activity classes for professionals to experience physical activity practice first-hand, and the need to link physical activity counseling to the local venues that provide structured physical activity programs (Table 4).

Discussion

This study's objective was to report on the opinion of health professionals regarding an "Active Environment" training to physical activity promotion as part of the research project "Implementation of hospital integration strategies with the primary health care system in the health care outreach of M'Boi Mirim in São Paulo city". The results showed that the positive points were the focus in well-being and quality of life and the prevention of diseases and health improvements. The training had good acceptability by the professionals who have accessed the module. However, only 24 health providers accessed the health risk factors module. Among them, a request for first-hand practical classes on physical activity and also a more specific link with counseling and local venues where activity takes place. These were the both identified as potential improvements.

This training was delivered as an internet-based distance learning education model and had three hours divided in three weeks (1 hour per week). The main goal was to empower professionals by providing them with generalist content on physical activity and health for physical activity counseling in primary health care units.

Several interventions to empower professionals for physical activity counseling have employed a variety of strategies and contents. The "PACE" intervention introduced in the United States in the 1990s (Long *et al.*, 1996; Calfas *et al.*, 1996), a pioneering intervention for physical health promotion in primary health care, is based on 30-60 minutes training sessions. The sessions empower professionals to address the psychological and social factors influencing physical activity practice, such as social support of family and friends, self-efficacy or confidence, reduction of perceived barriers and raising awareness of the benefits of physical activity (van Sluijs *et al.*, 2004; Ainsworth and Youmans, 2002; Calfas *et al.*, 2002).

The “Green Prescription” intervention implemented in New Zealand recommends four hours of training for health professionals on motivational techniques to encourage patients to practice physical activity independently, with particular emphasis on walking. Subsequently, these patients receive follow-up telephone calls from the physical activity professionals as motivational support, specific counseling on physical exercises and on local communities to practice group physical activity (Swinburn *et al.*, 1998; Elley *et al.*, 2003). The “Exercise is Medicine” intervention, established in 2007 by the American Medical Association and American College of Sports and Medicine, encompasses six-to-eight-hours training courses based on behavioral models linked to primary health care, and also includes a clinical model for assessing, counseling, and referring patients for physical activity programs at the community level (Calle *et al.*, 2016; Lobelo *et al.*, 2014; Sallis, 2011).

A feature shared by some of these interventions is a scheme of counseling based on stages of change in behavior (Calfas *et al.*, 1996; Ainsworth and Youmans, 2002; Lobelo *et al.*, 2014). This was originally devised for behaviors deleterious to health such as smoking (Prochaska and Diclemente, 1992) but later adapted to other health behaviors such as the physical activity (Dumith *et al.*, 2008). Furthermore, physical activity counseling is based on social cognitive theory (Bandura 1986), because physical activity participation includes multifactorial determinants (Bauman *et al.*, 2012).

The “Active Environment” training for physicians and nurses was not based on closed, specific counseling models but seeks to empower health professionals to devise strategies according to their local practices, and to discuss and share ideas through the interactive forum. The social cognitive theory and stages of change in behavior are important because the “Active Environment” works with overcoming barriers and social support to improve physical activity, as already shown in training for community health workers (Florindo *et al.*, 2014). However, in Universal Health Systems implemented in large, culturally diverse countries like Brazil (Paim *et al.*, 2011), models must be adaptable to meet local conditions of health professionals. For example, Swiss based study reported that for physicians a structured procedure could be adapted for physical activity counseling according to work conditions and realities of the primary health care units (Schimd *et al.*, 2009).

With regard to improvements suggested by the professionals, there were calls for a link between the counseling delivered and public, structured physical activity programs, such as physical exercise classes. A pilot study to test the “Exercise is Medicine” intervention showed that when the counseling for physical exercise was directly linked with referral of patients to a recreation centres, the average effect of increase in moderate-to-vigorous-

intensity physical activity was larger compared to a group of patients receiving counseling alone after six months of the interventions (Heath *et al.*, 2015). In a national survey involving physicians and nurses working in primary health care in Brazil, Florindo *et al.* (2013) showed that the odds ratio of counseling on physical activity was higher when structured physical activity programs were provided at the primary health care units where the professionals were working. The “Green Prescription” intervention does the link between primary health care (by general practitioners or nurses) with physical exercise specialists (Hamlin *et al.*, 2016; Elley *et al.*, 2003). And this support was considered positive by general practitioners that working in primary health care settings in New Zealand (Patel *et al.*, 2011).

Clearly, physical activity promotion is an interdisciplinary field and physical activity is a habit that depends on numerous factors (Bauman *et al.*, 2012). For example, although 12 hours of training in a group of community health workers improved knowledge and skills for physical activity promotion in a primary health care unit in the eastern region of São Paulo (Florindo *et al.*, 2014), this outcome did not translate to changes in the level of physical activity among the population seen by these professionals (Costa *et al.*, 2015). Therefore, besides improving the knowledge of health professionals to counsel, counseling programs should also be linked with structured physical activity programs run within the communities where these practitioners operate and work. Brazil currently has a good setting to support this, particularly after implementation of the “Health Gym Program” (Malta and Barbosa Da Silva, 2012), which can provide environments and specialized professionals to run physical exercise classes in partnership with primary care units.

Another suggestion was the incorporation of physical activity sessions for the health professionals themselves. Because the course was 100% distance based this approach was not possible or envisaged. However, it is believed that in universal systems with multi-professional and interdisciplinary health teams such as Brazil’s (Paim *et al.*, 2011) that including a physical activity promotion professional within this team (Florindo *et al.*, 2016) would be a complement to this course can and as such is recommended from this study. Many studies have shown that health professionals practicing physical activity are more likely to counsel their patients, or to provide them with more counseling, on adopting physical activity (McDowell *et al.*, 1997; Frank *et al.*, 2007; Florindo *et al.*, 2015; Santos *et al.*, 2015). It is therefore important to also develop physical activity promotion interventions in primary health care settings for the self-care of the health professionals in addition to training, to support them in their work-life balance and mental well-being (Sá *et al.*, 2016). An intervention involving Community Health Workers in the eastern region of São Paulo city showed that physical activity can be linked with professional training for physical activity

promotion counseling in the Unified Health System (Florindo *et al.*, 2014; Florindo and Andrade, 2015).

Another suggestion that was less cited, but equally important, was the inclusion of guides to advise on the different types of physical activities available, for differing population likes and also clinical appropriateness, to enhance take up, suitability and ultimately adherence. The inclusion of this topic can be important because this type of physical activity is varied, for example it can be undertaken in group which contributes to improvements in social support, and also type of activity related to patient preferences (Florindo *et al.*, 2011). The focus on physical activity promotion through the social support of friends and family as well as the overcoming of barriers to practice is central part of all interventions suggested through the “Active Environment” training course (Salvador *et al.*, 2014; Costa *et al.*, 2015; Florindo and Andrade, 2015).

Two positive points of the training included: 1. the focus on the relationship between physical activity and well-being/quality of life, and 2. information on the prevention of disease and its role in health promotion. Beyond explanations of the biological benefits derived from physical activity practice, a focus on other variables related to well-being, such as improvement in perceived quality of life and psychological well-being related to intra and interpersonal factors are important factor in interventions to promote physical activity within primary health care. This was deemed an important focus for physicians and nurses in physical activity counseling as the focus is often more related to the patient’s risk factors for diseases (Patel *et al.*, 2011; Schmid *et al.*, 2009) and not for prevention, health promotion, and quality of life/well-being.

Other categories had less citations, but are worthy of note, for example the inclusion of additional topics such as healthy eating, and the role of physical activity in the aging process. In this case, we did not include a specific approach to these topics in the course, but they were worked in other themes of the fifth module regarding health risk factors (Bracco *et al.*, 2016). Other studies have adopted the training for physical activity and nutrition in the same intervention (Wilcox *et al.*, 2010; Calfas *et al.*, 2002) and this multidimensional focus is important for physicians in primary health care settings (Schmid *et al.*, 2009).

The focus on physical activity promotion and the skills required to advise patients were however, less cited. In this case we need to improve these themes, because the main objective of the training is to develop the empowerment the health professionals for physical activity counseling, according to other interventions such as “PACE” (Long *et al.*, 1996; Ainsworth and Yuomans, 2002) and “Green Prescription” (Hamlin *et al.*, 2016; Elley *et al.*, 2003). For this it is important to include practical counseling activities and examples of

patients in primary health care settings during the three weeks of this training, as it is done in “Exercise is Medicine” intervention (Calle *et al.*, 2016).

In addition, despite the high prevalence of physical activity counseling delivered by physicians and nurses in primary health care in Brazil (around 70%) (Florindo *et al.*, 2013), primary health care providers perceive that they lack adequate knowledge on physical activity and health (Hébert *et al.*, 2012). A cross-sectional study in a sample of professionals working in primary health care in Brazil showed that knowledge on physical activity recommendations for health was generally poor, but when professionals had more interest in this area (in the case of nurses) or involved in more specific content such as assessing patients’ level of physical activity (in the case of physicians), the frequency of counseling increased (Florindo *et al.*, 2013).

This detracts from the quality of counseling and, although interventions in primary health care through counseling are effective for increasing physical activity in adults (The Activity Counseling Trial Research Group, 2001), the mean effect size of this type of intervention to improve physical activity is low (Heath *et al.*, 2012). The poor quality of counseling provided by physicians and nurses can contribute to this low effect size in community interventions. Thus, counseling in itself may not be enough and must be of high quality in order to be effective.

The study had some limitations. Firstly, only 22.6% of the professionals accessed the fifth module. Therefore, we had a large dropout and a small sample to analyse the responses. Nevertheless, in the other course modules the participation was also low, suggesting that education for health providers is still challenging, as previously identified by other studies (Cervero and Gaines, 2015).

Secondly, we did not evaluate pre and post intervention regarding knowledge and skills for physical activity counseling of the health professionals that participated in this training. We tried to apply the questionnaire before of this training, but we had a very low response rate and it was not possible to analyze the data. These variables are very important to assess the results of the education process and the empowerment of professionals and has been used in studies in this field (Calle *et al.*, 2016; Long *et al.*, 1996)

Thirdly, it was not possible to examine barriers to the implementation of applying this physical activity training in practice. We tried to investigate possible barriers in the follow up questionnaire (Bracco *et al.*, 2016) but as this was self-reported, often incomplete with missing responses it was not possible to determine this. Understanding the barriers is critical to the development of training in respect to physical activity counseling in primary health care

settings (Florindo *et al.*, 2013; Dacey *et al.*, 2013; Patel *et al.*, 2011; Hébert *et al.*, 2012; van Sluijs *et al.*, 2004; Long *et al.*, 1996).

Finally, we used only two open questions after training to verify the opinion of professionals. Other studies had used specific questionnaires to assess the course satisfaction (Calle *et al.*, 2016) and individual face-to-face interviews (Patel *et al.*, 2011) to verify the opinions of health professionals about physical activity training.

In addition to limitations, we have some challenges. The “Active Environment” training followed an online model with different strategies including classes that were recorded, didactic material, in addition to forums with health professionals following recommendations that were pointed as effective in continuing medical education (Cervero and Gaines, 2015; Marinopoulos *et al.*, 2007). Wilcox *et al.* (2010) developed a method in CD-ROM for flexible and self-paced training and showed that the most of providers and nurses adopted the physical activity counseling for patients. However, Dacey *et al.* (2013) showed that two types of face-to-face health professional training that ranged one-day to two-and-a-half-day were effective to improve knowledge and confidence and to decrease barriers to promote a healthy lifestyle and to prevent risk factors. In addition, interventions considered effective as “PACE” were started and are based in face-to-face training (Long *et al.*, 1996; Calfas *et al.*, 1996). However, online training as “Active Environment” enables to achieve a large number of health professionals in a short time. In this case, we need more studies to compare online and face-to-face training and also have the support of physical education professional in primary health care units that could help in physician and nurses training (Florindo *et al.*, 2016).

Another challenge is to assess the skill development to advise on the effectiveness of this physical activity training in patient’s behaviours. The most of the clinical trials that assessed “PACE” and “Green Prescription” interventions showed significant results to improve physical activity in adults (Hamlin *et al.*, 2016; Elley *et al.*, 2003; Swinburn *et al.*, 1998; Miura *et al.*, 2004; Calfas *et al.*, 2002; Calfas *et al.*, 1996). This is an important criterion from “The Community Guide” to evaluate public health interventions (Briss *et al.*, 2000).

All these challenges provide practical implications to be addressed for the design, content and protocol of the “Active Environment” physical activity training prior to it being applied across primary health care within Brazil. However, few studies of the implementation of such training in physical activity with health professionals are available in Brazil. The findings of this study provide insight for the Unified Health System for physical activity

promotion and for other health systems in world that are similar to Brazilian health system that searching the developing of professional training for physical activity promotion by means of motivational interviews in primary health care settings.

Acknowledgements

Author AAF would like to thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq for the Research Productivity Grant (303527/2013-7) and the grant received from the Santander Universities/University of São Paulo/Bid 367/2013 for internship at the University of Porto/Portugal.

Author MMB would like to thank the Fundação de Amparo à Pesquisa do Estado de São Paulo - FAPESP for financial support of the research project “Implementation of hospital integration strategies with the primary care system, in the health care network of M’Boi Mirim, São Paulo city” within the PPSUS (12/51228-9).

Acknowledgments for the University of Gloucestershire for their support in the adaptation of the HELP modules used as part of this study.

Acknowledgments for the health teams and managers of the Hospital Municipal Dr. Moyses Deutsch and the 18 primary care units enrolled in the study, the Center of Studies and Research Dr. João Amorim (CEJAM), the São Paulo Municipal Health Secretary, and the Hospital Israelita Albert Einstein Research and Teaching Institute (IIEP).

Conflicts of Interest

None

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation (please name) and with the Helsinki Declaration of 1975, as revised in 2008.

References

Ainsworth, B. E. and Youmans, C. P. 2002: Tools for physical activity counseling in medical practice. *Obesity Research* 10, 69S-75S.

Alfradique, M. E.; Bonolo, P. F.; Dourado, I.; Lima-Costa, M. F.; Macinko, J.; Mendonça, C. S.; Oliveira, V. B.; Sampaio, L. F. R.; Simoni, C.; and Turci, M. A. 2009: Ambulatory care sensitive hospitalizations: elaboration of Brazilian list as a tool for measuring health system performance (Project ICSAP - Brazil). *Cadernos de Saúde Pública* 25, 1337-1349.

Bandura A. 1986: *Social Foundations of Thought and Action*. Englewood Cliffs, New Jersey: Prentice Hall.

Bardin, L. 2011: Análise de conteúdo. Edições 70, p. 280 <in portuguese>.

Bauman, A. E.; Reis, R. S.; Sallis, J. F.; Wells, J. C.; Loos, R. J.; Martin, B. W.; and Lancet Physical Activity Series Working Group. 2012: Correlates of physical activity: why are some people physically active and others not? *Lancet* 380, 258-271.

Blair, S. N.; Sallis, R. E.; Hutber, A. and Archer, E. 2012: Exercise therapy - the public health message. *Scandinavian Journal of Medicine & Science in Sports* 22, e24-e28

Bracco, M. M.; Mafra, A. C.; Abdo, A. H.; Colugnati, F. A.; Dalla, M. D.; Demarzo, M. M.; Abrahamsohn, I.; Rodrigues, A. P.; Delgado, A. V.; Dos Prazeres, G. A.; Teixeira, J. C. Jr. and Possa, S. 2016: Implementation of integration strategies between primary care units and a regional general hospital in Brazil to update and connect health care professionals: a quasiexperimental study protocol. *BMC Health Services Research* 16, 380.

Briss, P.A.; Zaza, S.; Pappaioanou, M.; Fielding, J.; Wright-De Agüero, L.; Truman, B. I.; Hopkins, D. P.; Mullen, P. D.; Thompson, R. S.; Woolf, S. H.; Carande-Kulis, V. G.; Anderson, L.; Hinman, A. R.; McQueen, D. V.; Teutsch, S. M. and Harris, J. R. 2000: Developing an evidence-based Guide to Community Preventive Services--methods. The Task Force on Community Preventive Services. *American Journal of Preventive Medicine* 18(1 Suppl):35-43.

Calle M. C. A.; Lobelo, F.; Jiménez, M. A.; Páez D. C.; Cortés, S.; Lima, A. and Duperly, J. 2016: One-day workshop-based training improves physical activity prescription knowledge in Latin American physicians: a pre-test post-test study. *BMC Public Health* 16, 1224.

Calfas, K. J.; Long, J. L.; Sallis, J. F.; Wooten, W. J. Pratt, M. and Patrick, K. 1996: A controlled trial of physician counseling to promote the adoption of physical activity. *Preventive Medicine* 25, 225-233.

Calfas, K. J.; Sallis, J. F.; Zabinski, M. F.; Wilfley, D. E.; Rupp J.; Prochaska, J. J.; Thompson, S.; Pratt, M. and Patrick, K. 2002: Preliminary evaluation of a multicomponent program for nutrition and physical activity change in primary care: PACE+ for adults. *Preventive Medicine* 34, 153-61.

Câmara, R. H. 2013: Content analysis from theory to practice in social research applied to organizations. *Gerai: Revista Interinstitucional de Psicologia* 6,179-191 <in portuguese>.

Cervero, R. M. and Gaines, J. K. 2015: The impact of CME on physician performance and patient health outcomes: an updated synthesis of systematic reviews. *The Journal of continuing education in the health professions* 35, 131-138.

Costa, E. F.; Andrade, D. R.; Garcia, L. M. T.; Ribeiro, E. H. C.; Santos, T. I. and Florindo, A. A. 2015: Evaluation of the effectiveness of home-based physical activity promotion by community health workers. *Cadernos de Saúde Pública* 31, 2185-2198.

Crone, D. 2011: Healthy Europe through Learning and Practice (2009-2011). EU Leonardo de Vinci funded project UK/11/LLP-LdV/TOI-449. Project lead University of Gloucestershire, UK. Retrieved 21 October 2016 from http://www.adam-europe.eu/adam/project/view.htm?prj=8225-.V_eNhU3bLct.

Dacey, M. L.; Arnstein, F.; Kennedy, M. A.; Wolfe, J. and Phillips, E. M. 2013: The impact of lifestyle medicine continuing education on provider knowledge, attitudes, and counseling behaviors. *Medical Teacher*, 35, e1149–e1156.

Dumith, S. C.; Domingues, M. R. and Gigante, D. P. 2008: Stages of change toward physical activity: a review of literature. *Revista Brasileira de Cineantropometria & Desempenho Humano* 3, 301-307.

Elley, C. R.; Kerse, N.; Arroll, B. and Robinson, E. 2003: Effectiveness of counselling patients on physical activity in general practice: cluster randomised controlled trial. *British Medical Journal* 326, 793.

Fleury, S. 2011: Brazil's health-care reform: social movements and civil society. *Lancet* 377, 1724-1725

Florindo, A. A. and Andrade, D. R. 2015: *Experiências de promoção da atividade física na estratégia de saúde da família*. São Paulo: Editora Sociedade Brasileira de Atividade Física e Saúde <in portuguese>.

Florindo, A. A.; Mielke, G. I.; Gomes, G. A.; Ramos, L. R.; Bracco, M. M.; Parra, D. C.; Simoes, E. J.; Lobelo, F. and Hallal, P. C. 2013: Physical activity counseling in primary health care in Brazil: a national study on prevalence and associated factors. *BMC Public Health* 13, 794.

Florindo, A. A.; Costa, E. F.; Sa, T. H.; Santos, T. I.; Velardi, M. and Andrade, D. R. 2014: Physical activity promotion in primary health care in Brazil: a counseling model applied to community health workers. *Journal of Physical Activity & Health* 11, 1531-1539.

Florindo, A. A.; Brownson, R. C.; Mielke, G. I.; Gomes G. A.; Parra, D. C.; Siqueira, F. V.; Lobelo, F.; Simoes, E. J.; Ramos, L. R.; Bracco M. M. and Hallal P. C. 2015: Association of knowledge, preventive counseling and personal health behaviors on physical activity and consumption of fruits or vegetables in community health workers. *BMC Public Health* 15, 344.

Florindo, A. A.; Salvador, E. P.; Reis, R. S. and Guimarães, V. V. 2011: Perception of the environment and practice of physical activity by adults in a low socioeconomic area. *Revista de Saude Publica* 45, 302-310.

Florindo A. A.; Nakamura P. M.; Farias Júnior, J. C.; Siqueira, F. V.; Reis, R. S.; Cruz D. K. A. and Hallal P. C. 2016: Promotion of physical activity, healthy eating and family health in municipalities with health gym. *Revista Brasileira de Educação Física e Esporte* 2016, 30, 925-36.

Frank, E.; Elon, L. and Hertzberg, V. A. 2007: Quantitative assessment of a 4-year intervention that improved patient counseling through improving medical student health. *Medscape General Medicine* 9, 58.

Hamlin, M.J.; Yule, E.; Elliot, C.A.; Stoner, L. and Kathiravel, Y. 2016: Long-term effectiveness of the New Zealand Green Prescription primary health care exercise initiative. *Public Health* 140,102-108.

Heath, G. W.; Kolade, V. O. and Haynes, J. W. Exercise is Medicine: A pilot study linking primary care with community physical activity support. *Preventive Medicine Reports* 2, 492-497.

Heath, G. W.; Parra, D. C.; Sarmiento, O. L.; Andersen, L. B.; Owen, N.; Goenka, S.; Montes, F.; Brownson, R. C. and Lancet Physical Activity Series Working Group. 2012: Evidence-based intervention in physical activity: lessons from around the world. *Lancet* 380, 272-281.

Hébert E. T.; Caughy, M. O. and Shuval, K. 2012: Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review. *British Journal of Sports Medicine*. 46, 625-631.

Hoehner, C. M.; Ribeiro, I. C.; Parra, D. C.; Reis, R. S.; Azevedo; M. R.; Hino, A. A.; Soares, J.; Hallal, P. C.; Simões; E. J. and Brownson, R. C. 2013: Physical activity interventions in Latin America: expanding and classifying the evidence. *American Journal of Preventive Medicine* 44, e31-e40.

Lobelo, F.; Stoutenberg, M. and Hutber, A. 2014: The Exercise is Medicine Global Health Initiative: a 2014 update. *British Journal of Sports Medicine* 48, 1627-1633.

Long, B. J.; Calfas, K. J.; Wooten, W.; Sallis, J. F.; Patrick, K.; Goldstein, M.; Marcus, B. H.; Schwenk, T. L.; Chenoweth, J.; Carter, R.; Torres, T.; Palinkas, L. A. and Heath, G. 1996: A multisite field test of the acceptability of physical activity counseling in primary care: project PACE. *American Journal of Preventive Medicine* 12, 73-81.

Malta, D. C. and Barbosa da Silva, J. 2012: Policies to promote physical activity in Brazil. *Lancet* 380, 195-196.

Marinopoulos, S. S.; Dorman, T.; Ratanawongsa, N.; Wilson, L. M.; Ashar, B. H.; Magaziner, J. L.; Miller, R. G.; Thomas, P. A.; Prokopowicz, G. P.; Qayyum, R. and Bass, E. B. 2007: Effectiveness of Continuing Medical Education. Evidence Report/Technology Assessment No. 149 (Prepared by the Johns Hopkins Evidence-based Practice Center, under Contract No. 290-02-0018.) AHRQ Publication No. 07-E006. Rockville, MD: Agency for Healthcare Research and Quality. January 2007.

McDowell, N.; McKenna, J. and Naylor, P. J. 1997: Factors that influence practice nurses to promote physical activity. *British Journal of Sports Medicine* 31, 308-313.

Miura, S.; Yamaguchi, Y.; Urata, H.; Himeshima, Y.; Otsuka, N.; Tomita S.; Yamatsu, K.; Nishida S. and Saku, K. 2004: Efficacy of a multicomponent program (patient-centered assessment and counseling for exercise plus nutrition [PACE+ Japan]) for lifestyle

modification in patients with essential hypertension. *Hypertension research : official journal of the Japanese Society of Hypertension* 27, 859-864.

Orrow, G.; Kinmonth, A. L.; Sanderson, S. and Sutton, S. 2012: Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials. *British Medical Journal* 344, e1389.

Paim, J.; Travassos, C.; Almeida, C.; Bahia, L. and Macinko, J. 2011: The Brazilian health system: history, advances, and challenges. *Lancet* 377, 1778-1797.

Patel, A.; Schofield, G.M.; Kolt, G.S. and Keogh, J.W. 2011: General practitioners' views and experiences of counselling for physical activity through the New Zealand Green Prescription program. *BMC Family Practice* 2, 119.

Prochaska, J. O. and Diclemente, C. C. 1992: Stages of change in the modification of problem behaviors. *Progress in Behavior Modification* 28, 183-218.

Ramos, L. R.; Malta, D. C.; Gomes, G. A. O.; Bracco, M. M.; Florindo, A. A.; Mielke, G. I., Parra, D. C.; Lobelo, F.; Simoes, E. J. and Hallal, P. C. Prevalence of health promotion programs in primary health care units in Brazil. *Revista de Saude Publica* 48, 837-44.

Sá T. H.; Velardi M. and Florindo A. A. 2016. Limits and potentialities of educating family health workers for physical activity promotion: a participatory research. *Revista Brasileira de Educação Física e Esporte*, 30, 427-36

Sallis R. 2011: Developing healthcare systems to support exercise: exercise as the fifth vital sign. *British Journal of Sports Medicine* 45, 473-474.

Salvador, E. P.; Ribeiro, E. H.; Garcia, L. M.; Andrade, D. R.; Guimaraes, V. M.; Aoki, M. S. and Florindo, A. A. 2014: Interventions for physical activity promotion applied to the primary healthcare settings for people living in regions of low socioeconomic level: study protocol for a non-randomized controlled trial. *Archives of Public Health* 72, 8.

Santos, T. I.; Guerra, P. H.; Andrade, D. R. and Florindo, A. A. 2015: Personal and professional practices of physical activity promotion in community health workers. *Revista Brasileira de Atividade Fisica & Saude* 20, 165-163 <in portuguese>.

Swinburn, B. A.; Walter, L. G.; Arroll, B.; Tilyard, M. W. and Russell, D.G. 1998: The green prescription study: a randomized controlled trial of written exercise advice provided by general practitioners. *American Journal of Public Health*. 1998 88, 288-291.

Schmid, M.; Egli, K.; Martin, B. W. and Bauer G. 2009: Health promotion in primary care: evaluation of a systematic procedure and stage specific information for physical activity counseling. *Swiss Medical Weekly* 14, 665-71.

The Activity Counseling Trial Research Group. 2001: Effects of physical activity counseling in primary care: the Activity Counseling Trial: a randomized controlled trial. *Journal of the American Medical Association* 286, 677-687.

van Sluijs, E. M.; van Poppel, M. N.; Stalman, W. A. and van Mechelen, W. 2004: Feasibility and acceptability of a physical activity promotion programme in general practice. *Family Practice* 21, 429-436.

Wilcox, S.; Parra-Medina, D.; Felton, G. M.; Poston, M. B. and McClain, A. 2010: Adoption and implementation of physical activity and dietary counseling by community health center providers and nurses. *Journal of Physical Activity and Health* 7, 602-612.