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Length of stay of elderly in a Community Physical Activity Program and Associated Factors

Permanência de idosos em um Programa Comunitário de Atividade Física e fatores associados

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Abstract – The registration or insertion of older adults in Community Physical Activity Programs does not guarantee their stay over time. The purpose of this study was to analyze the length of stay of elderly in a Community Physical Activity Program and associated factors. This epidemiologic observational study of retrospective cohort performed in Aracaju City, Brazil, included a sample of 526 older adults (477 females) aged 66.4 ± 5.4 years. To characterize the profile and length of stay of individuals, descriptive statistics was used. To analyze the length of stay, the Kaplan-Meier non-parametric survival, estimator was used. To verify the association between variables in the observed time, the Cox regression model was applied. Inverse ratio equation (1/OR) was used to facilitate the understanding of significant values when necessary. In all analyses, 95% confidence interval and p≤0.05 were used. In the first three months, stay rate of 58.1% (95% CI = 54.6 - 61.3) was observed, with a risk estimative = 41.82%. Females presented a 45% chance of stay (OR = 0.69; 95% CI = 0.51 – 0.93) and individuals identified with osteoporosis had 32% more chances of stay (OR = 0.74, 95% CI, = 0.60-0.91). Only 1% of subjects remained until the end of the cohort. The stay rate was low throughout all series; the period with higher quitting rates was the 3rd and the 12th months, being associated with the female stay sex and undiagnosed osteoporosis.

Key words: Motor Activity; Older adults; Survival analysis.

Resumo – *A matrícula ou inserção de idosos em Programas Comunitários de Atividade Física não garante sua permanência ao longo do tempo. Objetivou-se analisar o tempo de permanência em idosos participantes de um Programa Comunitário de Atividade Física e seus fatores associados. Estudo observacional epidemiológico de coorte retrospectiva, realizado no Nordeste do Brasil, com amostra de 526 idosos (477 do sexo feminino), apresentando 66,4 ± 5,4 anos. Para caracterização do perfil e permanência da amostra foi utilizado estatística descritiva. Para analisar o tempo de permanência utilizou-se o estimador de sobrevivência não paramétrico Kaplan-Meier. Para verificar a associação entre as variáveis no tempo observado foi aplicado o modelo de regressão de Cox. Utilizou-se a análise inversa (1/OR) para facilitar a compreensão dos valores significativos quando necessário. Em todas as análises foi utilizado o intervalo de confiança de 95% e p≤0,05. Os primeiros três meses apresentaram uma taxa de permanência de 58,1% (IC95% = 54,6 – 61,3), com Estimativa de Risco = 41,82%. O sexo feminino apresentou chance de permanência de 45% (OR = 0,69; IC95% = 0,51 – 0,93) e os sujeitos identificados com osteoporose apresentaram 32% mais chances de permanência (OR = 0,74; IC95% = 0,60 – 0,91). Apenas 1% dos sujeitos permaneceram até o fim da coorte. A taxa de permanência foi baixa ao longo da série; O período onde houve maior desistência foi o 3º e o 12º mês, estando associados à permanência o sexo feminino e osteoporose não diagnosticada.*

Palavras-chave: *Análise de Sobrevida; Atividade Motora; Idoso.*

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INTRODUCTION

The World Health Organization (WHO) describes the phenomenon of population aging as one of the factors that need attention in terms of health and public policies[1]. In contrast to other countries, in Brazil, there is a scenario in which phenomena known as epidemiological transition and demographic transition occur practically at the same time, suggesting a framework of actions aimed at the prevention and control of chronic-degenerative diseases, as well as those aimed at the rapid population aging[2,3,4].

In this sense, in 2005, the Brazilian Ministry of Health began to encourage projects that offered physical activity to improve the quality of life of the population, which in 2006 became the axis of the National Health Promotion Policy (PNPS)[5]. However, interventions in these programs often seem to lead to high turnover of participants due to the lack of specificity of intervention methods for age groups and special groups[6].

Literature indicates that long-term permanence, as well as adherence to a physical activity program, depends on factors that involve sociodemographic conditions, lifestyle, organization of work processes into health, psychosocial aspects and accessibility, so that the non-compliance to these aspects leads participants of Community Programs to remain in them for a short time, the first three months being an important point of observation[6].

Thus, it is understood that, for adequate actions aimed at increasing the length of stay in Community Programs to occur, it is necessary to map the actual length of stay of older adults and other age groups in the existing programs, favoring the adequate Information on bottlenecks and quitting points according to each age group.

Based on the above, the purpose of this study was to analyze the elderly length of stay in a Community Physical Activity Program and its associated factors.

METHODOLOGICAL PROCEDURES

Study type

The present study is characterized as an epidemiological observational retrospective cohort study. Collection used secondary data present in the adhesion forms of the program poles between April 2004, beginning of the program, and November 2009, end of the study, totaling 69 months of observation.

The inclusion criterion was to participate in the Anamnesis and Physical Evaluation offered by the program. The exclusion criterion was to present two adhesion records in the same period; anamnesis records at different poles; incomplete relevant information in anamnesis records (date of entry of the individual into the program, age, marital status, schooling, income, stress status, information on regular physical activity and health perception); more than one absence consecutive to functional reassessments.

Population and Sample

The sample was taken from a population of 6,932 individuals over 18 years of age present in the records of adherence to the program, thus the sample was composed of 526 individuals aged 60-87 years, presenting mean age of 66.4 ± 5.4 years, of which 477 (90.7%) were female.

This work is part of the research on "Evaluation of the Effectiveness of the "Programa Academia da Cidade" - Aracaju - SE, approved by the Ethics Research Committee of the Federal University of Sergipe (Protocol: 4316.0.000.107-08).

Data collection procedures

The length of stay was considered as the outcome, taking as reference the average time the participant remained in the program since adherence at the end of the study observation.

Considering the type of analysis performed for this study, it should be considered that the time intervals were represented through the "Functional Evaluations and Reevaluations". Withdrawals from the program were considered as "events", that is, failures related to evaluations, related to undesired events considered in survival analyses. The censor is related to the presence of partial or incomplete observations of time until the occurrence of the event.

Box 1 shows the characterization of groups and variables used in the study, in which information was collected through data contained in the files used by the Community Physical Activity Program on: a) "Anamnesis", at which point the individual joined the program; b) "Functional Evaluation", referring to the first functional evaluation to which the individual was submitted and; c) "Functional reevaluation", evaluations made during the length of stay of the individual in the program. To better categorize the age group, the median of ages of the sample was taken as reference. Thus, age groups 60-65 and ≥ 66 years were formed.

Data Analysis Procedures

Descriptive statistics was used to characterize the group, using the non-parametric Kaplan-Meier survival estimator as a strategy to verify the length of stay.

For the comparison of the stay conditions, according to the category and variable, the non-parametric Log-Rank test of univariate analysis was used.

The estimation of possible multivariate associations was performed using the Cox regression model and were presented as odds ratio (OR), adopting a 95% confidence interval. Variables that were considered significant in the univariate model were added to the final model. At the moments when OR presented significant values that were not favorable to the variable of interest, for a better explanation and interpretation, the inverse ratio equation (1 / OR) was adopted to better interpret these associations and results.

In all analyses, 5% significance level was adopted, and the SPSS for Windows® software was used in all analyses.

Box 1. Characterization of the observed blocks and variables studied in the Community Program of Physical Activity, Northeastern Region of Brazil.

Observed Blocks	Variables	Questions Used / justification	Categorization
Sociodemographic	gender	What is your gender?	Female Male
	Age Groups *	How old are you? The median was used as the criterion for dichotomization	60 – 65 years ≥66 years
	Marital status	What is your marital status? References adopted in Brazil were considered	Single Married / living together Separate Widower
	Schooling (study years)	How many years did you study? We adopted the median of study time recorded in the database	≤ 8 > 8
	Income per capita (minimum wage / month)	What is your monthly income?	≤ 1 >1 to 3 >3
Lifestyle	Stress	Do you frequently present these characteristics? Aggressiveness, impatience, haste, tension, irritation	Yes No
	Smoking	Do you smoke?	Yes No
	Physical Activity	In your spare time, during a normal week, do you engage in moderate and / or vigorous physical activity for at least 10 continuous minutes, five or more days a week (e.g., jogging, walking, pedaling, sports in general, etc.) ?	Yes No
Health perception	Health	In general, would you say that your health is?	Poor or Very poor Good Very Good or Excellent
Health problems referred by clinical diagnosis	Osteoporosis	Has any doctor already stated that you have this disease?	Yes No
	Arthritis / Arthrosis	Has any doctor already stated that you have this disease?	Yes No
	Low back pain	Has any doctor already stated that you have this disease?	Yes No
	Hypertension	Has any doctor already stated that you have this disease?	Yes No
	Coronary disease	Has any doctor already stated that you have this disease?	Yes No
	High Cholesterol	Has any doctor already stated that you have this disease?	Yes No
	Diabetes Mellitus	Has any doctor already stated that you have this disease?	Yes No

* The age group was organized according to the group median

RESULTS

Table 1 shows that the group is predominantly composed of women, about one-third are married, and earned up to three minimum wages. Among participants, 6.5% were classified as censors, that is, subjects that at some

point quitted participation in the program, but who returned to it during the observation period.

An important point to consider is the maintenance of males in the categorization and model performed. This maintenance occurred due to their influence in the group. Although presenting low stay, if they are excluded, there is a risk of not having effective results, since men, even in a smaller amount, are present throughout the process.

Table 1. Distribution of dropouts and censors for the variables considered in this study

Variables	Frequency n (%)	Dropout n (%)	Censor n (%)
Sociodemographic			
Total	526 (100)	492 (92.8)	34 (6.5)
Gender			
Female	477 (90.7)	443 (92.8)	34 (7.1)
Male	49 (9.3)	49 (100)	0 (0)
Age Groups			
60 - 65	304 (57.8)	281(92.4)	23 (7.6)
≥66	222 (42.2)	211(95.0)	11 (5.0)
Marital status			
Single	88 (16.7)	76 (86.3)	12 (13.6)
Married	206 (39.2)	197(96.5)	9 (4.4)
Separated	44 (8.4)	41 (93.1)	3 (6.8)
Widowed	188 (35.7)	178 (94.6)	10 (5.3)
Schooling			
8	455 (86.5)	424 (93.1)	31 (6.8)
>8	71 (13.5)	68 (95.7)	3 (4.2)
Income			
≤ 1	173 (32.9)	162(93.6)	11(6.4)
1 a 3	313 (59.5)	293(93.6)	20(6.4)
>3	40 (7.6)	37(92.5)	3(7.5)
Lifestyle			
Stress			
No	262 (49.8)	243 (92.7)	19 (7.3)
Yes	264 (50.2)	249 (94.3)	15 (5.7)
Smoking			
No	508 (96.6)	475(93.5)	33 (6.5)
Yes	18 (3.4)	17(94.0)	1 (5.6)
Physical Activity			
No	275 (52.3)	263(95.6)	12(4.4)
Yes	251 (47.7)	229(91.2)	22(8.8)
Health Perception			
Very poor/Poor	89 (16.9)	82(92.1)	7(7.9)
Good	408 (77.6)	382(93.6)	26(6.4)
Very good /Excellent	29 (5.5)	28(96.5)	1(3.4)
Health problems referred by clinical diagnosis			
Osteoporosis			
No	381 (72.4)	361(94.7)	20(5.2)
Yes	141 (27.6)	131(90.3)	14(9.7)
Arthritis / Arthrosis			
No	365 (69.4)	338(92.6)	27(7.4)
Yes	161 (30.6)	164(95.6)	7(4.3)

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Variables	Frequency n (%)	Dropout n (%)	Censor n (%)
Low back pain			
No	330 (62.7)	310(93.9)	20(6.1)
Yes	196 (37.3)	182(92.8)	14(7.1)
Hypertension			
No	207 (39.9)	191(92.2)	16(7.7)
Yes	319 (60.6)	301(94.3)	18(5.6)
Coronary disease			
No	434 (82.7)	459(93.2)	33(6.7)
Yes	91 (17.3)	33(97.0)	1(2.9)
High Cholesterol			
No	302 (57.4)	291(302)	11(3.6)
Yes	224 (42.6)	201(89.7)	23(10.3)
Diabetes			
No	434 (82.7)	404 (93.0)	30(6.9)
Yes	91 (17.3)	87 (95.6)	4 (4.4)

Table 2 shows that the average length of stay in the program was 35.5 ± 21.2 months; however, it was observed that the most critical period of the cohort was the first interval, showing the stay of almost two thirds of participants.

At the end of the first year, table 2 indicates that about one third of the group remained in the program, showing that the first 12 months are an important period for the study of possible reasons for evasion of the program, which is beyond the scope of this work. However, the Estimate Risk (ER) in the fourth interval, when compared to the first one, shows the highest probability of remaining in the program when compared to the first one.

At the end of the 69-month study, 98.7% of participants had quitted the program, and it was verified that only seven participants remained until the conclusion of the investigated time, that is, more than 90% of participants dropped out of the program at some moment of the cohort.

Table 3 presents the Cox regression for the elderly length of stay in the observed group. It was verified in the univariate model that the length of stay was associated with female gender (OR = 0.69, 95% CI = 0.51 - 0.93), indicating that this group was 45% more likely of remaining in the program, and for response "no" to "osteoporosis" (OR = 0.74, 95% CI = 0.60-0.91), indicating that non-osteoporotic individuals were 35% more likely of remaining in the program than those who had the disease.

Table 3 shows the multivariate analysis, the model being adjusted for "gender" and "osteoporosis", obtaining a significant result only for variable "osteoporosis" (OR = 0.76, 95% CI = 0.62 - 0.64), where it was confirmed that individuals who did not have osteoporosis were 32% more likely of remaining in the program.

Table 3 also indicates that males were 31% less likely of remaining in the program while females were 45% more likely of remaining in the program.

For variable osteoporosis, it is verified that those who have the diagnosis of the disease were 26% less likely of remaining in the program, while those who were not diagnosed were 35% more likely of remaining the program.

Table 2. Stay of participants to reevaluations of the Community Physical Activity Program from 2004 to 2009.

Intervals	Months	P	D	P at t (%)	P up to t (%)	CI (95%)	ER
1	3	526	220	58.1	58.17	54.6-61.3	41.82
2	6	306	60	80.7	46.7	43.5- 49.9	11.40
3	8	246	33	86.5	40.5	36.9-43.3	6.27
4	12	213	28	86.8	35.17	31.9-38.3	5.32
5	15	185	33	82.1	28.89	25.6-32.0	6.27
6	20	152	27	82.2	23.76	20.2-26.9	5.13
7	24	125	22	82.4	19.58	16.3-22.7	4.18
8	27	103	14	86.4	16.92	13.7-20.1	2.66
9	31	89	13	85.3	14.44	11.2-17.9	2.47
10	36	76	9	88.1	12.73	9.5-16.2	1.71
11	42	67	12	58.6	10.4	7.2-13.6	2.28
12	46	55	19	65.4	6.84	3.6-10.0	3.61
13	51	36	9	75.1	5.13	1.9-8.3	1.71
14	54	27	5	81.4	4.18	0.9-7.3	0.95
15	58	22	1	95.4	3.99	0.7-7.1	0.19
16	62	21	7	66.6	2.66	0.06-5.8	1.33
17	66	14	7	50.0	1.33	0.01-4.5	1.33
18	69	7	0	0	1.00	0	0
Mean	35.5	126.1	30.5				
SD	21.2	132.2	4.9				

P: Stay of subjects (Sample); D: Absolute withdrawal of subjects at each moment; P at t: frequency of permanent subjects in the time observed by interval; P up to t: accumulated frequency of permanent subjects; ER: Estimated Risk for sample loss; CI (95%): Confidence interval of the frequency of permanent subjects; SD: Standard deviation.

Table 3. Cox regression analysis for elderly length of stay in the Community Physical Activity Program.

	Univariate odds ratio		Odds ratio adjusted for Cox	
Variables	OR (CI95%)	P	OR. Adjusted*(CI95%)	P
Sociodemographic				
Gender				
Female	1		1	
Male	0.69 (0.51– 0.93)	<0.01	1.33 (0.98 – 1.80)	0.06
Age				
60 - 65	1			
66 – 87	1.00 (0.84 – 1.19)	0.97		
Marital status				
Single	1			
Married	1.18 (0.91 – 1.54)	0.20		
Separated	1.24 (0.84 – 1.81)	0.26		
Widowed	1.24 (0.94 – 1.62)	0.11		
Schooling				
8	1			
>8	0.96 (0.79 -1.16)	0.69		
Income				
Up to 1	1			
from 1 to 3	1.13 (0.89 -1.44)	0.30		
from 3 to 5	1.18 (0.84 – 1.66)	0.32		
Lifestyle				
Stress				
No	1			
Yes	0.96 (0.80 – 1.15)	0.67		
Smoking				

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	Univariate odds ratio		Odds ratio adjusted for Cox	
No	1			
Yes	0.85 (0.52 – 1.38)	0.51		
Physical activity				
No	1			
Yes	1.12 (0.94 – 1.34)	0.20		
Health perception				
Health Perception				
Very poor/Poor	1			
Good	1.21(0.95 – 1.54)	0.11		
Very good /Excellent	1.26 (1.82 – 1.95)	0.27		
Health problems referred by clinical diagnosis				
Osteoporosis				
No	1		1	
Yes	0.74 (0.60 – 0.91)	<0.01	0.76 (0.62 – 0.64)	<0.01
Arthritis / Arthrosis				
No	1			
Yes	0.96 (0.81 – 1.19)	0.89		
Low back pain				
No	1			
Yes	0.95 (0.79 – 1.14)	0.63		
Hypertension				
No	1			
Yes	1.01 (0.84 – 1.21)	0.86		
Coronary disease				
No	1			
Yes	1.36 (0.95 – 1.94)	0.08		
High Cholesterol				
No	1			
Yes	0.85 (0.71 – 1.07)	0.85		
Diabetes				
No	1			
Yes	0.94 (0.74 – 1.19)	0.62		

CI95%: 95% confidence interval.

DISCUSSION

This study aimed to verify the elderly length of stay in community physical activity program through a seven-year retrospective cohort. Retrospective measurements in epidemiological studies may have a more interesting approach when compared to conventional forms in studies with cross-sectional design, since it presents the behavior of a certain variable over time[8].

There was a higher prevalence of female participants, corroborating literature[9], which indicates that the percentage of women adhering to physical activity programs is generally higher compared to men, although there is no concrete data. This may occur because of the type of activities that were originally based on "logical models" that may be uninteresting for men, which causes great evasion or resistance to the program.

On the other hand, regarding the length of stay in the program, the literature points out that there is a tendency to join and stay in Community Physical Activity Programs of subjects over 60 years of age[10], however, sub-

jects over 80 years tend to quit these programs more frequently[11,12], which may be associated with an increase in physical limitations with advancing age[13].

Although the reasons for the withdrawal in Community Program have not been investigated, the main reasons pointed out in literature for the permanence of individuals in these programs are related to the promotion of health, well-being, physical activity, socialization, support of relatives and / or friends and proximity to their home to the place of practice and opportunity to leave home[8,14,15].

In this study, it was found that the highest number of dropouts occurred in the first 12 months of participation, with the highest rates observed in the third month, which was identified as a critical period for stay and raised concern among health researchers[10,12].

Literature[16,17] points out that a large percentage of individuals included in programs of regular physical activity give up in the first six months, since they are in the phase of behavior change, which is considered an unstable and critical moment.

Studies[11,18,19,20] suggest that the reasons for dropping out are related to the perception of insecurity, lack of family encouragement, lack of follow-up by a qualified professional, distance from the place of practice, lack of time, sensation of pain after the activity, climatic changes and the lack of companion.

Although the number of male subjects was lower in relation to female subjects, another fact may be the men's objection to primary health care, seeking for health assistance only when diseases are already established, therefore, less adept at this type of program[21,22].

One of the main findings of the present study indicated that subjects with osteoporosis are less likely to remain in the program than those who were not affected by the disease.

Possibly, the reasons for withdrawal of the subject affected by the disease are related to the possible discomfort related to the practice of physical activity, and the limitations related to the chronic, degenerative diseases, although it is cause of enrollment in the program, which can also be the reason for drop out or evasion[23,24].

Therefore, the constant reflection of the team on the effectiveness of the logical model of intervention should be implemented in both program planning and interventions, since osteoporosis has been recognized as a public health problem due to the high mortality rates related to fractures, especially in older women[25].

Encouraging adherence to the practice of physical activity is an important aspect that must be considered in the planning of public policies aimed at the prevention and treatment of osteoporosis, as well as professionals and intervention programs in physical activity.

Another important finding refers to the number of participants present until the end of the study, representing only 1% of the sample, although the cause of the low stay over time is not the scope of this study, it is understood that there must be public policies to stimulate the participation of this popu-

lation in health promotion projects, with a perspective of exchanging the assistance model to a participatory and conscious model in order to guide activities for an active aging, valuing the subjective effects of the daily practice.

However, there remains a question for reflection that refers to the great turnover of subjects in this type of program. For being a Community Physical Activity Program, one of the objectives should be the empowerment of the subject, which would lead, at a certain moment, to his voluntary withdrawal from the program, since the objective of the program has been reached and there is need for the participation of new members. However, the program does not have this information cataloged, which makes it difficult to find the reasons for the low stay of subjects and, at the same time, the high turnover.

The results of this study enable the characterization of the group and estimate its length of stay, indicating that only a small number of subjects maintain themselves for more than five years in a Community Physical Activity Program, and the main points of observation are between the first three and 12 months of intervention, and female subjects who did not report having osteoporosis are the most likely to remain in the program.

CONCLUSION

The conclusions of this study serve as a basis to promote evaluation and planning criteria for the development of a Community Physical Activity Program with the objective of overcoming the barriers that make it impossible for older adults to adhere to and maintain continuity in the program as well as to overcome challenges found in the first months of participation and to bring male subjects and those affected by osteoporosis to the regular practices of physical activities.

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REFERENCES

1. World Health Organization: Global recommendations on physical activity for health. Geneva: WHO; 2010.
2. Banco Mundial. Envelhecendo em um Brasil mais velho. Washington DC: Banco Mundial; 2011.
3. Alves LC, Leite IC, Machado CJ. Conceituando e mensurando a incapacidade funcional da população idosa: uma revisão de literatura. Cienc Saude Colet 2008; 13(4):1199-207
4. Araujo, D. Polarização Epidemiológica no Brasil. Epidemiol Serv Saude 2012:21(4):6.
5. Knuth AG, Malta DC, Cruz DK, Freitas PC, Lopes MP, Fagundes J, et al. Rede Nacional de Atividade Física do Ministério de Saúde: resultados e estratégias avaliativas. Rev Bras Ativ Fís Saúde 2010; 15(4):229-33.

6. Monteiro GR, Silva RJS. The length of stay in community physical activity program does not exceed two years. Rev Bras Cineantropom Desempenho Hum 2014, 16(6):608-617.
7. Bertolozzi, M. R. Yasuko L, Ferreira R, Itsuko S, Hino P, Ferreira L, et al. Os conceitos de vulnerabilidade e adesão na Saúde Coletiva. Rev Esc Enferm USP 2009; 43(2)1326-30.
8. Fernandes RA, Christofaro DG, Casonatto J, Codogno JS, Rodrigues E, Cardoso M, Kawaguti S, Zanesco A. Prevalence of dyslipidemia in individuals physically active during childhood, adolescence and adult age. Arq Bras Cardiol 2011; 97(4):317-23.
9. Andreotti MC, Okuma SS. Perfil sócio-demográfico e de adesão inicial de idosos ingressantes em um programa de educação física. Rev Paul Educ Fís 2003;17(2):142–53
10. Ferreira MS, Najar AL. Programas e campanhas de promoção da atividade física. Ciênc Saúde Colet 2005;10(1):207-219
11. Pitanga FJG. Tempo de permanência em programas de exercícios físicos em hipertensos de ambos os sexos: Estudo através da análise de sobrevida. Rev Baiana Educ Fis 2001; 2(3): 6-10.
12. Dishman RK. Advances in exercise adherence. Champaign: Human Kinetics; 1994.
13. Nakamura PM, Papini CB, Chyoda A, Gomes GAO, Netto AV, Teixeira IP, et al. Programa de intervenção para a prática de atividade física: Saúde Ativa, Rio Claro. Rev Bras Ativ Fís Saúde 2010;15(2)128-132.
14. Andreotti MC, Okuma SS. Perfil sócio-demográfico e de adesão inicial de idosos ingressantes em um programa de educação física. Rev Paul Educ Fís.2003;17(2):142–53.
15. Freitas CMSM, Santiago MS, Viana AT, Leão AC, Freyre C. Aspectos motivacionais que influenciam a adesão e manutenção de idosos a programas de exercícios físicos. Rev Bras Cineantropom. Desempenho Hum 2007;9(1):92–100.
16. Costa BV, Bottcher LB, Kokubun E. Aderência a um programa de atividade física e fatores associados. Motriz 2009;15(1): 25-36.
17. Ravagnani CFC, Ravagnani FCP, Spiri WC, Ribeiro TC, Silva CFF, Duarte SJH, et al. Socio-environmental exercise preferences among older adults. Prev Med 2004; 38(6):804-10.
18. Eiras SB, Silva WHA, Souza DL, Vendruscolo R. Fatores de adesão e manutenção da prática de atividade física por parte de idosos. Rev Bras Cienc Esporte 2010; 31(2) 75-89.
19. Freitas CMSM, Santiago MS, Viana AT, Leão AC, Freyre C. Aspectos motivacionais que influenciam a adesão e manutenção de idosos a programas de exercícios físicos. Rev Bras Cineantropom Desempenho Hum 2007;9(1):92–100.
20. Serour M, Alqhenaei H, Al-saqabi S, Mustafa A, Ben-Nakhi A. Cultural factors and patients' adherence to lifestyle measures. Br J Gen Pract 2007;57(557):291–5.
21. Plapler PGP, Saron TRP, Rezende MU. Education and Physical Activity in Osteoporosis. J Osteopor Phys Act 2014: 2(2):2.
22. Townsend N, Wickramasingle K, Williams J, Bhatnagar P, Rayner M. Physical Activity Statistics. British Heart Foundation 2015.
23. Brasil. Instituto Brasileiro de Geografia e Estatística. Síntese de indicadores sociais–Uma análise das condições de vida da população brasileira. Rio de Janeiro: IBGE, 2010
24. Associação Brasileira de Avaliação Óssea e Osteometabolismo; Posições oficiais 2008 da Sociedade Brasileira de Densitometria Clínica (SBDens). Arq Bras. Endocrinol. Metab 2009;53:107-12.
25. Going S, Lohman T, Houtkooper L, Metcalfe L, Flint-Wagner H, Blew R, et al. Effects of exercise on bone mineral density in calcium-replete postmenopausal women with and without hormone replacement therapy. Osteoporos Int 2003;14(8):637- 43.

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