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Physical Inactivity and Depression in the Brazilian Aged: a Systematic Review
Inatividade física e depressão em idosos no Brasil: uma revisão sistemática
Inactividad física y depresión en los ancianos en Brasil: una revisión sistemática

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This study aims at analyzing the connections between physical inactivity and depression and/or depressive symptoms in observational studies. A systematic review was conducted in the databases PUBMED, Biblioteca Virtual em Saúde (Health Virtual Library) and LILACS, from April to June, 2016. The following descriptors were used: "motor activity", "depression", and "elder"; they were used in association with each other through the boolean operator *AND* , and no specific time frame was selected. Initially, 53 articles were found. After the analysis of the aforementioned articles, 48 were excluded. 5 articles, published in the last 8 years, were selected for analysis. Considering the association between physical inactivity and the existence of depression, every study analyzed indicated a positive and inverse association between physical activity and depressive symptoms. This study has demonstrated that the regular practice of physical activities can have an important role in protecting one against the emergence of health problems, among them, depression.
Descriptors: Motor activity; Depression; Aged.

Este estudo objetiva analisar a relação da inatividade física com a depressão e/ou sintomas depressivos em estudos observacionais. Realizou-se uma revisão sistemática nas bases de dados PUBMED, Biblioteca Virtual em Saúde e LILACS de abril a junho de 2016, utilizado os seguintes descritores: “atividade motora”, “depressão” e “idoso” de forma associada utilizado o operador booleano *AND* e, sem corte temporal. Em busca inicial, foram encontrados 53 artigos. Após a análise dos mesmos foram excluídos 48 artigos. Para a análise foram selecionados 5 artigos publicados nos últimos 8 anos. Considerando a associação da inatividade física e a presença de depressão todos os estudos selecionados apontaram uma associação positiva e inversa entre atividade física e os sintomas depressivos. Este estudo evidenciou que a prática de atividade física regular pode desempenhar papel de proteção contra o surgimento de problemas de saúde, sendo a depressão um deles.
Descritores: Atividade motora; Depressão; Idoso.

Este estudio objetiva analizar la relación de la inactividad física con la depresión y/o síntomas depresivos en estudios observacionales. Se realizó una revisión sistemática en las bases de datos PUBMED, Biblioteca Virtual en Salud y LILACS de abril a junio de 2016, utilizando los siguientes descriptores: “actividad motora”, “depresión” y “anciano” de forma asociada utilizando el operador booleano AND y sin corte temporal. En la búsqueda inicial, fueron encontrados 53 artículos. Después del análisis de los mismos fueron excluidos 48 artículos. Para el análisis fueron seleccionados 5 artículos publicados en los últimos 8 años. Considerando la asociación de la inactividad física y la presencia de depresión, todos los estudios seleccionados apuntaron a una asociación positiva e inversa entre actividad física y los síntomas depresivos. Este estudio evidenció que la práctica de actividad física regular puede desempeñar papel de protección en el surgimiento de problemas de salud, siendo la depresión uno de ellos.
Descriptores: Actividad motora; Depresión; Anciano.

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INTRODUCTION

Depression and depressive disorders are disturbances that affect the population as a whole, especially the elderly[1]. There is no absolute consensus, however, some studies point out that the prevalence of depression is of 10% among the elderly who live in the community, and from 10 to 30% among those who are institutionalized[2,3].

The aging process contributes for a decline in the functional abilities, and increases the elders' predisposition for the emergence mental health diseases, that directly affect the state of their health and their quality of life[4,5].

According to the *American Psychiatric Association*, depressive mental disorders are characterized by depressed mood episodes, or by the lack of interest and pleasure in almost every activity, including changes to appetite, weight, sleep, and psychomotor activities, diminishing energy, and bringing forth a feeling of unworthiness or guilt, among others[6].

Depression can become a recurring health problem, even a chronic one, putting the individual in a condition of constant concern about bad expectations, sometimes necessitating treatment in tertiary health care services[7].

Its treatment, generally, is associated to drug therapy, and rarely associated to non-pharmacological interventions, such as psychological therapy and recreational activities in the social context of the individual. Facing this situation, the health professionals need to associate such diverse treatment alternatives to the drug therapy. Strong evidences support the notion that the reduction of depressive symptoms in the elderly is meaningfully associated to the regular practice of physical activities[8-11].

A physical activity is any bodily movement produced by the skeletal muscles which spends more energy than that which is spent when one is resting.

Exercise, on the other hand, is a planned physical activity, structured and repetitive, that can be experienced in leisure, transport, through the practice of sports, domestic activities and occupational activities. Both can bring immediate and long-lasting benefits, such as: improvements in physical conditioning; diminishing in the loss of bone and muscle mass; increase in strength, coordination and balance; reduction of functional incapacities, of the intensity of negative thoughts and of physical diseases; and the promotion of improvements to one's well-being and humor[10,11].

The regular practice of physical activities meaningfully impacts in the prevention and control of the chronic non-transmissible diseases, as well as in the control of stress, anxiety and depressive symptoms. That improves its positive effects over the lipidic and glycogenic metabolism, pressure levels, bodily composition, bone density, hormones, antioxidants and intestinal motility, working as well as a defense mechanism against the emergence of health problems[10-11].

This study aims at conducting a systematic review of observational studies which analyze the connection between physical inactivity and depression and/or depressive symptoms.

METHOD

The systematic review was conducted through the use of the descriptors *"atividade motora"*(motor activity) AND *"depressão"* (depression) AND *"idoso"* (aged). The consulted databases were PUBMED, and Biblioteca Virtual em Saúde (BVS/LILACS). No specific time frame was chosen in the search of the articles, but every study selected was published between 2008 and 2016 in the languages Portuguese, Spanish, and English, and all of them were fully available for reading. The review was conducted from April to July, 2016.

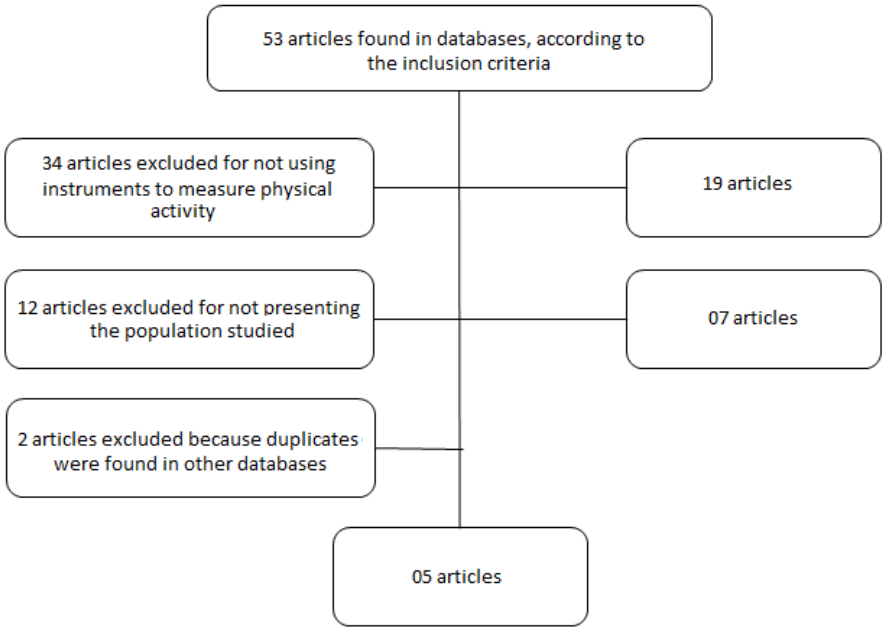
It included observational studies, whose design included the characteristics specified in the PICO strategy (Population, Intervention, Comparison, and Outcome), as Table 1 demonstrates.

Table 1. The PICO strategy, used in the search for the articles. Uberaba/MG, 2016.

Population	Elders who are 60 years of age or older, and live in Brazil
Intervention	Practice of a physical activity
Comparison	Prevalence of depression/depressive symptoms
Outcomes	Relationship between physical inactivity and depression/depressive symptoms

The studies in which the population was not aged (< 60 years of age) were excluded, as well as those which were not conducted in Brazil, and which did not associate depression to physical inactivity. The final number of articles excluded is in Figure 1.

Figure 1. Flowchart of the selection and distribution of articles. Uberaba/MG, 2016.



The information selected to characterize the articles were: study site, year of publication, age group, study design, instrument used to evaluate depression/depressive symptomatology, instrument used to evaluate physical activity, level of physical activity of the population, prevalence of depression, and the connection between physical inactivity and depression/depressive symptomatology (Prevalence Ratio - PR, Odds Ratio - OR, or Relative Risk - RR).

The quality of the studies selected was evaluated through a checklist, adapted from an instrument based on the criteria of *Downs and Black*[12]. The following was noted: the quality of the description of the objectives, the quality of the description of the studies outcome, the quality of the sample characterization (the description of participants and their selection criteria), the quality of the description and the discussion of the main confounding factors, the quality of the description of participant loss, the quality of the description of the main results of the study, the proof of how representative the sample is in front of the population of the study, the description of the calculation of the studied sample regarding the population of the study, the description of the calculation of the sample and the sampling process, the accuracy of the instruments used to measure the outcome, the appropriation of statistic tests to the variable characteristics, the correct evaluation of the comparison groups (equal periods of time spent in cohort studies, and between exposition and outcome for the studies of the control case), the adequacy of the comparison groups (recruited from the same population in the same period of time), and the adequacy or adjustment for the main confounding factors

or the appropriation of the statistical tests used for their control[13].

Each evaluated item which was in accordance to the checklist received a score of 01 point, and the total score corresponded to the sum of the total number of items evaluated as positive, which meant the maximum score would be 13 points.

To analyze the data, the level of physical activity (PA) was divided as proposed by the American College of Sports Medicine (ACSM), which recommends that adult individuals practice PA with a moderate intensity at least 5 days a week, for at least 30 minutes, beyond their daily life activities [14,15].

Individuals who are sedentary or insufficiently active, and those who are not active (moderate to vigorous PA < 150 min/wk) were classified as non-active; the active and non-sedentary individuals (moderate to vigorous PA ≥ 150 min/wk) were classified as active. The articles which divided the intermediary group in sufficiently active or irregularly active were included in the "active" classification, as both practice 150 min/wk or more of moderate to vigorous physical activity.

Another way in which the numbers recommended by the ACSM can be reached is the association of moderate and vigorous exercises equivalent to a consumption from 450 to 750 MET/minute per week (considering that 1 MET, or Metabolic Equivalent, corresponds to the consumption of 3.5mL of oxygen for each kg of body mass each minute)[14,15]. In order to compare these data to that of other studies, the metabolic equivalent was converted to minutes of physical activity per week, according to the recommendations of the Advisory Committee of the International Physical Activity Questionnaire (IPAQ), which classifies the physical activity in minutes as: at least 30 minutes/day of moderate to vigorous PA for 5 or more days/week[16]. Therefore, the group with an insufficient PA (MET/sem ≤ 600) was classified as inactive and the groups with sufficient (MET/sem > 600) and very high (MET/sem >1500) PA were classified as actives.

RESULTS

The search strategy resulted in 5 observational studies that answered to the criteria established by this systematic review, whose methodological validity was verified according to the criteria of Downs and Black[12] (Table 02).

The sample of the study varied from 144 to 1656 participants, with an age average of 69 (dp±6) and 71.6 (dp±7;9). Considering the gender of the participants, the studies showed a prevalence of females (62.2%). The prevalence of depression found in the population varied between 19.7 and 37.1% (Table 3).

The level of physical activity the studies identified varied from 29.6 to 68.6% of active elders, and from 31.3 to 70.4% of inactive elders. In the sum of the 5 studies (n=3676), 1599 elders were considered to be active and 2077 to be not active. As result, 56.5% of the total population was inactive (Table 3).

As a result of the association of physical inactivity and the presence of depression, however heterogeneous the articles may be, all of them presented a positive and inverse association between physical activities and depressive symptomatology.

The article 1, with 379 participants, showed that the group considered to be very active (n =119 - MET/sem > 1500) presented 42% less depressive symptoms than the group with insufficient physical activity (n=127 - MET/sem ≤ 600) (IC95% 1% - 66%).

Starting from the analysis in two groups (both active and non-active), the OR for the depressive symptomatology of the group of non-actives (n= 127 - PA < 150 min/wk) comparing to the active one (n=252 - PA ≥ 150 min/wk) was 1.90[17].

In article three, a meaningful and inverse statistic association was found between total physical activity and leisure physical activity and depression ($p<0.001$). The OR, adjusted for depression, comparing the sedentary subjects with the active ones was of 2.38 (IC95%;1,70-3,33)[18]. In study four, the OR of physical inactivity associated to depression was 1.83 (IC95%; 1,14-2,94)[5].

Table 2. Observational studies which connect physical activity and depression in Brazil.

AUTHORS (code of the article)	Site of the study	Year of publication	Design of the study	Instrument for assessing depression	Depression score	Instrument for assessment of the Physical Activity	SCORE *
Reichert CL, Diogo CL, Vieira JL, Dalacorte RR (1)	Nova Hamburgo (RS)	2011	Cross-sectional study with a base population	Geriatric Depression Scale (GDE)	≥ 5	International Physical Activity Questionnaire (IPAQ)	10
Domingues PC, Neri AL (2)	Countryside of the São Paulo state	2009	Cross-sectional study	Depresison Scale of the Center for Epidemiological Studies (CES-D)	>11	Baecke's Questionnaire, Modified for Elders (BQMI)	9
Benedetti TRB, Borges LJ, Petroski EL, Gonçalves LHT (3)	Florianópolis (SC)	2008	Cross-sectional study with a base population	*Geriatrics Mental Status* (GMS)	≥ 7	International Physical Activity Questionnaire (IPAQ)	8
Paulo TRS, Tribess S, Sasaki JE, Meneguci J, Martins CA, Freitas Jr, et al. (4)	Uberaba (MG)	2016	Cross-sectional study with a base population	Geriatric Depression Scale (GDE)	≥ 6	International Physical Activity Questionnaire (IPAQ)	11
Borges LJ, Benedetti TRB, Xavier AJ; d'Orsi E (5)	Florianópolis (SC)	2013	Cross sectional population home-based study	Geriatric Depression Scale (GDE)	≥ 6	International Physical Activity Questionnaire (IPAQ)	11

* Score: quality score according to criteria of *Downs 7 Black*[12]

Table 3. Population according to gender, age average, depression prevalence, and classification according to PA in the analysed studies. 2008 at 2016.

ARTICLES	Population (sample)			AGE (average and standard deviation)	Depression prevalence (%)	Non-active	Active
	TOTAL	Men n (%)	Women n (%)			n (%)	n (%)
1.	n = 379	127 (33.5%)	252 (66.5%)	69 ± 6	32.1%	127 (34%)	252 (66%)
2.	n = 144	8 (5.4%)	136 (94.4%)	71.2 ± 6.65	33.3%	45 (31.3%)	99 (68.7%)
3.	n = 875	437 (50%)	438 (50%)	71.6 ± 7.9	19.7%	519 (59.3%)	356 (40.7%)
4.	n = 622	218 (35%)	404 (65%)	71.07 ± 7.7	37.1%	221 (35.5%)	401 (64.5%)
5.	n = 1656	598 (36.1%)	1058 (63.9%)	No mentioned	23.9%	1165 (70.4%)	491 (29.6%)
	n = 3676	1388 (37.8%)	2288 (62.2%)	-	-	2077 (56.5%)	1599 (43.5%)

The article five has shown physical activities associated to depression as a protection factor, PR=0.75 (IC95%;0.59-0.94)(p=0.015). The OR for the population, adjusted for the depression symptoms (n=1613) was 2.38[19].

In the study two, which used the BQME to identify the physical activity, elders

with intermediary and low scores in PA had, respectively, 3.4 and 3.8 more chances to present depressive symptoms than those with higher scores (p = 0.022 and p = 0.021). The study also classifies the physical activity level according to ACSM, however, it does not provide the prevalence of depressive symptomatology or the score of the CES-D in the different groups, making it impossible to calculate that assocation in the groups analyzed in the present study[20].

Table 4 presents an analysis of the data obtained from the studies selected. In three of them, the sample was reduced to calculate the depression prevalence. One of the articles justified that through the high level of dementia identified in the participants, and another, which also studies cognitive deficits, exclusively analyzed the data of individuals with depression (after adjusting for depression, n = 3523). Regarding the connection between depression and active or non-active physical activity practices, the OR was 1.87, that is, non-active elders are 1.87 more likely to be victims of depression than active elders.

Table 4. Association between physical activity and depression in the selected articles.

ARTICLE	Sample adjusted to depression *	Non-active		Active		OR
		Existing Depression (n)	Absence of Depression (n)	Existing Depression (n)	Absence of Depression (n)	
1	n = 379	50	67	72	190	1.90
3	n = 869	100	254	71	444	2.38
4	n = 518	78	86	100	254	1.83
5	n = 1613	318	813	68	414	2.38
TOTAL	n = 3523	546	1220	311	1302	1.87

* The sample excluded the participants with some type of cognitive deficit.

DISCUSSION

Physical activity is an important resource in the stimulation of the biochemical process that produces hormones; it releases those substances while offering a feeling of pleasure, well-being, and improving the mood. Beyond the biochemical process which results from the practice of physical activities, it can be said that it has a sociocultural aspect, in which relationships and interactions are favored, helping to prevent from social isolation[21,22].

This study examined the association between physical inactivity and depression depression, and all articles selected have shown that physical inactivity is a risk factor for depression, since non-active elders are 1.83 to 2.38 times more prone to present depression than active elders. These results are not unlike those of similar studies [1,10].

The greatest number of female elders in the samples can be explained once we consider the feminization of this age group, owing to the fact that, in Brazil, women live on average eight years longer than men - not to mention they are usually more interested in cooperating with studies[23].

The prevalence of depression in the studies analyzed shows some discrepancies; however, it is still compatible with that of other studies conducted in Brazil[6,7,24-27]. A high level of depression among the elders in Brazil can be explained by the unfavorable social conditions and by the structure of the health system[17].

Researches point out that waking and running were activities used to treat elders in sever levels of depression, and obtained positive results[28,29]. A study conducted with North-Americans analyzed the sample regarding the intensity of the physical activity, and the most active elders were found to have the lowest OR for depression (OR: 0.37, IC95%; 0.20-0.70), indicating physical activity as a defense mechanism[30].

In an epidemiological study[31], elders related the practice of physical activity in the most recent years, and an analysis showed that those who diminished the intensity of their physical activities reported more depressive symptoms. On the other hand,

those who had increased the intensity of their practice or who had remained active, reported less characteristics associated with depression.

In another study[19], the depression symptoms decreased 50% among elders who practiced physical activities; that information corroborates that of another study[25], which stated that factors such as sense of coherence and social integration were related to elders who exercised at least twice a week.

The research shows that physical inactivity is related to the presence of depressive symptoms, indicating that the adequate practice of exercises acts as a factors which protects one against depression[17,32]. It is not possible to say if the social interaction promoted by the practice of exercises and their psychological benefits are related to the smaller prevalence of depression, as it can be a confounding factor.

The limitations of this study is in its cross-sectional design, which does not allow for the definition of causes and effects. The instruments used in the studies are validated, sensitive and specific[33-38]; however, they are questionnaires which consist in self-reports, which may generate imprecise results[39]. Regarding the scores considered for the evaluation of depression through the use of the GDS instrument, there was some variation in the cut points, which generates different sensibility and specificity levels in the results. Literature suggests that the point 5/6 is the most adequate[40], and its use in only one of the three studies which used the scale might indicate either that the prevalence of depression was underestimated, or the opposite.

CONCLUSION

It can be concluded, from this review, that there is an connection between depression and the decline in the practice of physical activities in elders of both genders. It can be suggested, considering this result, the implementation of actions in Public Policies that promote and insert habits which contribute for the maintenance and encouragement of the practice of physical activities by elders, with the appropriate technical support, since this population is susceptible to depression.

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