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REVIEW

PHYSICAL ACTIVITY AND DEPRESSION: A SYSTEMATIC REVIEW

ACTIVIDAD FÍSICA Y DEPRESIÓN: REVISIÓN SISTEMÁTICA

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ABSTRACT

This review examines original pieces of research which have investigated overall associations between physical activity (PA) and depression or symptoms of depression in.

A search in the most important electronic databases was performed. A total of 12 articles were included, 10 of them were observational studies and 2 of them were intervention studies.

Results show an inverse relationship between physical activity and symptoms of depression or the ability to mitigate those symptoms in depressed people. Most studies examine the frequency and regularity in PA.

PA mitigates depression symptoms and it is a protective effect of risk depression.

KEYWORDS: Depression, mental health, physical activity and exercise

RESUMEN

Esta revisión tiene como objetivo examinar las investigaciones originales que tratan la asociación entre actividad física (AF) y la depresión o síntomas depresivos en todo tipo de poblaciones.

Se realizó una búsqueda en las principales bases de datos electrónicas. Tras aplicar los criterios de inclusión, se obtuvieron un total de 12 artículos de los cuales 10 eran estudios observacionales y 2 estudios de intervención.

Los resultados de los estudios muestran una relación inversa entre práctica de actividad física y probabilidad de presentar síntomas depresivos o capacidad de la misma para atenuar dichos síntomas en personas deprimidas. La mayoría de los estudios analizan la frecuencia y regularidad de práctica de AF.

La AF actúa como efecto protector de padecer depresión o como atenuante de síntomas depresivos.

PALABRAS CLAVE: Depresión, salud mental, actividad física y ejercicio.

INTRODUCTION

Depression affects more than 340 million people worldwide (Greden, 2001). It is considered the main cause of disability in the developed world (López, A.D., Mathers, C.D., Ezzati, M., Jamison, D. and Murray, C.J.L., 2006). Depression is characterized by the presence of signs and symptoms that affect seriously the mood and daily activities (WHO, 2011). Its treatment involves professionals like doctors, psychologists and psychiatrists, and they often prescribe antidepressant medication (Commonwealth Department of Health and Aged Care, 1999).

Depression is a common disease in the aging population and the likelihood of developing this psychological disease is two to three times higher in patients with chronic diseases (Anderson, 2001; Rudisch, 2003; Rosemann, 2007). Many cross-sectional Studies have shown that depressed patients are more sedentary (Weyerer, 1994). However, this association may be bidirectional: depression can lead to decreased physical activity due to low motivation and energy shown by these subjects, and decreasing exercise can be a risk factor for depression.

Recently, we have studied the application of physical activity as treatment and/or prevention and depressive symptoms (Paluska and Schwenk, 2000). In this regard, countries like, UK, USA and Australia, have developed physical activity guidelines related to health, they usually recommend that all adults get at least 30 minutes of moderate physical activity, all or almost all weekdays (CDHAC, 1999; American College of Sports Medicine [ACSM], 2000; Chief Medical Officer's Report [CMOR], 2004). These guidelines were developed to improve population health and prevent disease such as type 2 diabetes and hypertension (Saxena et. al 2005). However, the optimal dose of physical activity required to prevent depression or reduce its symptoms has not been studied.

Previous studies have focused on analyzing the relationship between physical activity and depression (O'Neal, H., Dunn, A.L. and Martinsen, E.W., 2000; Brosse, A.L., Sheets, E.S., Lett, H.S. and Blumenthal, J.A., 2005; Paluska and Schwenk, 2000; Lawlor and Hopke, 2001; Craft and Perna, 2004; Teychenne, M., Ball, K. and J. Salmon., 2008). These works generally reach the conclusion that physical activity is positively associated with mental health, exerting a preventive role.

However, we know that there can be a bidirectional relationship: in one direction (developing depression results in a reduction of physical activity) or another (lack of physical activity induces dysphoric feelings) (Landers DM, Arent SM., 2001).

The aim of this review is to examine whether physical activity follows the trend before 2008 or if the trend is changing and if so causes should be analyzed in future studies.

MATERIALS AND METHODS

Search strategy

We conducted a detailed search of original articles published between 2008 and November 2011. We searched in the following electronic databases: MEDLINE, PUBMED, WEB OF KNOWLEDGE and PSYCOINFO. We used as keywords: Depression, mental health, physical activity, exercise and adults. The search was performed independently by two authors (SA, MD). At the beginning, 50 articles were found.

Inclusion / exclusion criteria

We applied the following inclusion criteria on the 50 articles: (1) They were original articles, (2) they were observational studies or in which had carried out an intervention program, (3) they were published from 2008 and (4) they were about the topic being studied specifically.

Following the inclusion criteria, a total of 12 studies were included, as we can see in the following figure.

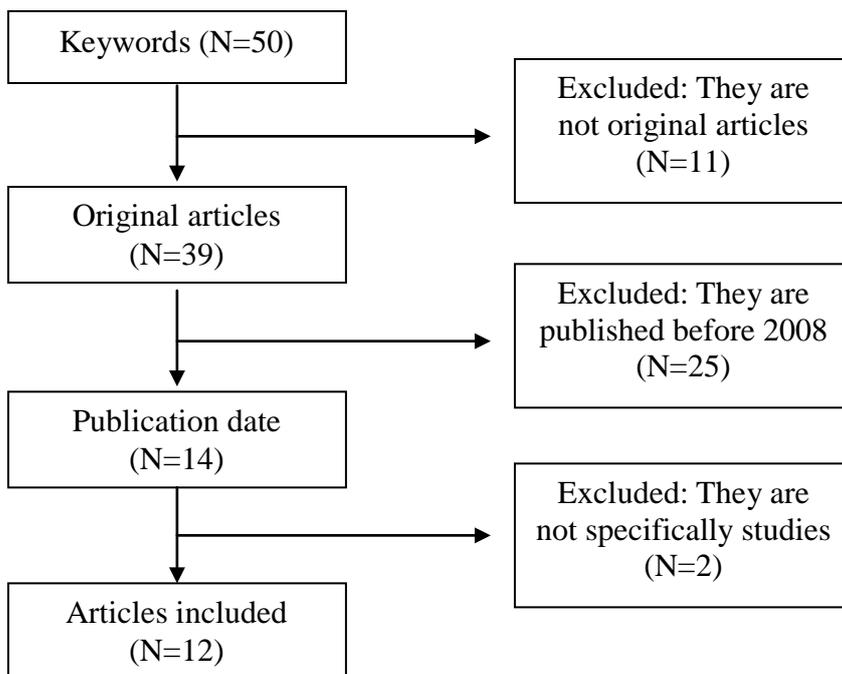


Figure 1. - Selection of Studies using the criteria inclusion

Level of scientific evidence

In this review the most of studies are observational studies (level III of scientific evidence comes from well-designed observational studies) (10) over intervention studies (level Ib of scientific evidence: the scientific evidence comes from at least one randomized clinical trial) (2), so that following the classification criteria established by the Agency for Healthcare Research and Quality (AHRQ, 2011), the first ones present level III of scientific evidence and the second ones present level Ib of scientific evidence.

Review of studies

The studies were analyzed by level of scientific evidence, sample used, measuring instruments, physical activity, and the relationship between physical activity and depression. Table 1 shows an analysis of each study.

RESULTS

In most of the studies analyzed, adults and older were the sample, except for a study of adolescents conducted in high-schools (Hong X., Li J., Xu F., Tse LA., Liang Y., Wang Z., Yu IT y Griffiths S., 2009), another one which included young people, adults and older people (18-69 years) (Baxter, H., Winder, R., Chalder, M., Wright, C., Sherlock, S., Haase, A., y Wiles, N., 2010), and another one which included young people and adults (18-45 years) (Teychenne, M., Kylie, B. y Jo, S., 2010).

Here we can see the results found in these populations groups depending on scientific evidence level.

Level Ib of scientific evidence studies.

We found two studies at this level. They were done by Nguyent, Q., Koepsell, T. and Unuetzer, J. (2008) and Baxter et al. (2011). These intervention studies, in which there is a control group and an experimental group. In the first one, subjects were older than 65 years and in the second one, the subjects of the study are aged between 18-69 years. The first of the two studies cited above is intended to treat depression while the second one is prevention aimed. Both questionnaires are used as measuring instruments. Each experimental group applies a physical activity program low-moderate intensity for a long time (8 months in the first study / 1 year in the second one), and significant differences between control groups and experimental groups were found. Physical activity can be an effective treatment for subjects with depression, and a good tool to prevent it.

Level III of scientific evidence studies.

The Hong et al. (2009) study, analyzes the effects of physical activity on depression in adolescents. Through two questionnaires (one for measuring physical activity and other possible measure depressive symptoms). In this study was establishing a level of physical activity (hours / week) and they observed a significant inverse relationship between the amount of physical activity and depressive symptoms presenting the subject.

In another study conducted by mothers Craike, M., Coleman, D., MacMahon, C. (2010), 4720 mothers of children between 3 and 19 months of age were analyzed. They were provided two questionnaires: one measures the activity level and the other measures depressive symptoms. Results showed that mothers who performed physical activity at moderate levels (2-3 days per week) or high levels (4 or more days per week) were less likely to suffer depression at high levels of stress.

In the study of Spaderna, H., Zahn, D., Schulze Schleithoff, S., Stadlbauer, T., Rupprecht, L., Smits, J. M. A., Krohne, H. W., Munzel T. and Weidner, G. (2010), they performed with patients in waiting lists to receive a heart, then administered two questionnaires to compare the two variables (physical activity

and depressive symptoms). It was observed that at high levels of stress that could cause a heart waiting, physical activity acted as an agent reliever, decreasing the likelihood of depression. The study of Stroud and Minahan (2009) showed that physical activity attenuated depressive symptoms in patients with multiple sclerosis.

In this review exists a new study conducted by Both, F., Hoogendoorn, M. and Klein, M. (2010). In this study there are three computer-simulated subjects, with patterns of behaviour in terms of frequency of physical activity (low, medium, high). We concluded that a positive relationship between frequency of activity physical and mood and an inverse relationship between frequency of physical activity and likelihood of depression or depressive symptoms appear.

Teychenne et al. (2010) analyzed the influence of physical activity in different areas (leisure, at work or as a mean of transport) on depressive symptoms in women between 18 and 45. Results showed a reduction in depressive symptoms only when performing physical activity during leisure time and not at work or when used as a means of transport. Along the same lines Charlotte, M., Schmidt, D. and Sanderson, K. (2009) analyzed the physical activity at work and during leisure time measured by a pedometer. They found the same relationship Teychenne et al. (2010), they also found an inverse relationship between the measurement obtained by the pedometer (steps / day) and depression.

Salguero, A., Martinez-Garcia, R., Miller, O. and Marquez, S. (2010) conducted a questionnaire study with 436 elderly (60-98 years), of which 42% were living in an elderly home. They found that older inmates in residential practiced less physical activity than those who lived in their own home, as well as previous studies showed an inverse relationship between physical activity and depressive symptoms. Mikkelsen, S., Schumann, J., Meulengracht, E. and Lykke, E. (2010) conducted a study involving subjects between 20 and 93 years and found a significant relationship in women, while men, in the sense that the most active had lower depressive symptoms.

Jacka, F., Pasco, J., Williams, L. and Leslie, E. (2010) go further and study the relationship between physical activity in children with depressive symptoms presented by these same subjects into adulthood and found that subjects who were more active in its infancy had fewer depressive symptoms in adulthood.

DISCUSSION

This review examines the evidence in the literature on the relationship between physical activity and depression. It is a systematic review of studies published between 2008 and 2011, a period during which there is no reviews about this topic published. Although empirical evidence shows a positive relationship between physical activity and mental health, with references to it even before our Era (see for example the legacy of Hippocrates and Galeno), the aim of this review is to analyze the trend of results in current studies, where the practice of physical activity differs from other historical moments as precisely due to the characteristics of current practice, it may (or may not) be sufficient to counteract the onset of symptoms depression. It would no longer sufficient if they had found results related to a large number of subjects performing physical activity and still have a large number of depressive symptoms. The results were similar to those of the review by Teychenne et. al (2008), confirming the inverse relationship between physical activity and depressive symptoms in all studies except one in which men were outside of this inverse relationship. However, in none of the studies examined the impact of the economic crisis on the population studied, what is important given that the crisis equally affects all social sectors or groups.

Most of the selected studies were followed for at least one year, which is important because depression is a disease where we can register immediate changes, but is observed in the medium term changes produced by specific therapies and / or physical activity programs or health mainly.

In the studies that analyzed people without diagnosed depression, there is no medication variable, however, in studies that looked at people with depressive symptoms or diagnosed depression were controlled by medication variable allowing to know the effects independent of physical activity on the disease.

Studies have in common that do not have to make a large volume of physical activity or vigorous in intensity, but it is important how often (more often less likely to have depressive symptoms) and appears to be sufficiently low to moderate intensity. In this aspect match the above reviews, in which the intensity is not categorized as a major factor in reducing the symptoms of depression (O'Neal et al., 2000; Brosse et al., 2005; Paluska and Schwenk, 2000, Lawlor and Hopke, 2001; Craft and Perna, 2004; Taychenne et al, 2008). It is important to continue work on the relationship between physical activity and depression, using experimental designs.

Limitations of the study

Most of the studies are observational, showing less levels of scientific evidence and expressing a point in time relationship between physical activity and depression, unable to explain exactly, the relationship between them. The results of the studies were collected through questionnaires, and these ones have some advantages, for example: the researchers do not lose the time, have a low financial cost, are minimally invasive, but are an indirect measure of

physical activity and behaviour symptoms of depression, being necessary to assess both variables with more direct methods, valid and reliable than questionnaires. In all studies analyzed, only one pedometer used as direct measure of physical activity.

It is necessary to continue investigating the effects of physical activity, differentiated by their factors (type, frequency, duration, intensity) on the prevention of depression and therapy of this disease, both in isolation and in conjunction with other therapies. Surely that would improve the quality of life for people in general and savings for health countries systems.

CONCLUSION

In this review we have analyzed observational and intervention studies showing an inverse association between physical activity and the likelihood of depression in adolescents, young adults and elderly. The studies suggest that physical activity can be effective even at low intensity and protective effect of depression.

Currently, we use physical activity as a remedy for physiological diseases (hypertension, diabetes...), but it is not so much important in combating mental illness, like depression. The results of this review suggest the need of promoting the role of physical activity, making it necessary to sensitize the society (through medical, educational, media, ...): that a proper practice of physical activity, defined essentially as that it is suitable for the type of person, with a regular light to moderate intensity will cause people to improve their quality of life related to health and also reduce the likelihood of depression is less than if we keep a sedentary lifestyle.

Annex I. Table 1. Review of the studies examining the relationship between physical activity and depression.

Author, year and country	Sample	Assessment instruments	Duration y/o Frequency y/o Intensity	PA* and depression relationship	Level of scientific evidence (AHRQ)
<i>Baxter et al. (2010); England.</i>	360 patients (18-69 yr.) Recruiting patients from august 07 to October 09. Essential < 1 month with antidepressants. CG* (180) y EG* (180)	-BDI* -SF-12	EG: PA for 8 months, 2 days per week, 1 hour sessions. (Low or medium intensity)	Follow-up 4, 8 y 12 months. At 12 months is shown that PA is effective treatment.	Ib
<i>Both et al. (2010); Holland</i>	3 subjects simulated by behaviour patterns. (Computer model)	-	Low, medium and high level of PA.	The higher level of AF improves mood and decreases the likelihood of depression.	III
<i>Charlotte et al. (2009); Australia</i>	1,995 subjects (950 men and 1,045 women) between 26 and 36 years	-International Physical Activity Questionnaire (IPAQ). -Podometer for 7 days. - DSM-IV*	Divide the PA: -Steps/day -Hours/week (At work and in leisure time)	Only women are significant results: > Leisure PA = Depression > PA work = Depression > Steps per day = <Depression.	III
<i>Craike et al. (2010); Australia</i>	4720 mothers of children between 3 and 19 months of LSAC *	-Health and Lifestyle of the LSAC questionnaire -Parent 1 Self Complete Questionnaire (PISC)	Low levels of AF = 0-1 days per week. Moderate levels of AF = 2-3 days a week. High levels of AF = 4 or more days per week	Mothers who perform PA at a moderate to high, are less likely to suffer depression at high levels of stress.	III
<i>Hong et al. (2009); China.</i>	2,452 adolescents (72 classes of 24 schools) 1272 girls and 1180 boys.	Questionnaire items related to PA and depression obtained	PA Classified per week: 0 to 0.9 hours / week 1-7 hours / week	Inverse relationship between PA and depression: The greater	III

Author, year and country	Sample	Assessment instruments	Duration y/o Frequency y/o Intensity	PA* and depression relationship	Level of scientific evidence (AHRQ)
		from: -YPAS -Children's Depression Inventory (CDI)	8-14 hours / week +15 Hours / week	the practice of AF, fewer cases of depression or depressive symptoms appears.	
<i>Jacka et al. (2010); Australia.</i>	2152 adults (758 women 1404 men, 38-72 years).	-DSM-IV -Levels of physical activity in childhood, defined as <15 yr of age	> 6 METs = High frequency 3-6 METs = Low frequency	PA low levels in childhood are associated with depressive symptoms in adulthood.	III
<i>Mikkelsen et al. (2010); Denmark.</i>	10,625 women and men aged 20-93 years. 5937 women and 4688 men	-Depression: ICD -PA: "The Copenhagen City Heart Study Leisure Time Physical Activity Questionnaire"	+ 4 hours / week = High Frequency 2-4 hours / week = Moderate Frequency - 2 hours / week = Low frequency	A low level of PA is significantly associated with risk of depression in women. In men there was no significance	III
<i>Nguyen et al. (2008); USA</i>	13,801 subjects aged 65 years. EG 4766 and CG 9035.	- GDS	EG free entry into the sports complex "Silver Sneakers" (As seniors) for 1 year.	EG subjects who went Centre regularly (3 or more days / week) had significantly lower risk of depression than the CG.	Ib
<i>Salguero et al. (2010); Spain.</i>	436 elderly (234 women and 202 men, 60-98 years). 42% nursing home.	-PA: YPAS -HRDQoL: SF-36 -Depression: GDS	PA time, multiplied by 1. Sitting. 2. Standing. 3. In motion. 4. Walking. 5. Vigorous activity.	Relationship between the three tests: > AF = Women > AF = > HRDQoL > AF = <Depression <AF = Nursing Home	III
<i>Spaderna et al. (2010); Germany</i>	318 patients of the study: "Waiting for a new heart." Age 53.5 ± 11.4	-Physical Activity Questionnaire for Older Adults	AF difference between regular (at least 4 days a week) and irregular.	It is observed that in patients who are given a PA program when they	III

Author, year and country	Sample	Assessment instruments	Duration y/o Frequency y/o Intensity	PA* and depression relationship	Level of scientific evidence (AHRQ)
	years, 18% female.	-Hospital Anxiety and Depression Scale (HADS-D)		enter the list of plaintiffs in heart, the rate of depression is lower.	
<i>Stroud y Minahan (2009); Australia.</i>	121 patients between 25 and 65 years with multiple sclerosis who do (52) and do (69) PA.	-Health Status Questionnaire Short Form 36 -Becks Depression Inventory -Modified Fatigue Impact Scale.	PA: At least two sessions per week for 30 minutes each one.	There is a significant inverse relationship between PA and depression.	III
<i>Teychenne et al. (2010); Australia.</i>	3645 women between 18-45 years of slums	-International Physical Activity Questionnaire (IPAQ-L). -Centre for Epidemiologic Studies Depression Scale (CES-D)	- <40 min. / Week = low level - 41 min. - 3.4 hours / week = moderate level. - > 3.5 hours = high level	Only significant differences are observed in the section on leisure time PA (moderate and high), while the PA at work or as a means of transport does not matter.	III

BDI: Beck Depression Inventory

LSAC: Longitudinal Study of Australian Children

DSM-IV: Diagnostic and Statistical Manual of Mental Disorders, fourth edition

EG: Experimental Group

CG: Control Group

GDS: Geriatric Depression Scale

PA: Physical Activity

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