



Research report

Relationship between physical activity and depression and anxiety symptoms: A population study



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ARTICLE INFO

Article history:

Received 20 November 2012

Received in revised form

5 December 2012

Accepted 28 January 2013

Available online 13 March 2013

Keywords:

Anxiety disorders

Mood disorders

Physical activity

Epidemiology

ABSTRACT

Background: There are few studies evaluating the association between practice of physical activity and mood in a population sample. This study evaluated the frequency of symptoms of depression and anxiety in the population of the city of Sao Paulo and their association with the report of practice of regular physical activity.

Methods: This survey was conducted with the adult population of Sao Paulo between July and December of 2007. The sample was composed of 1042 volunteers (both genders) with a mean age of 41.9 ± 14.4 years. The volunteers were evaluated using the Beck Depression Inventory, the Beck Anxiety Inventory, and two simple questions designed to evaluate and classify physical activity. Socioeconomic status was also determined according to Brazil's Economic Classification Criterion.

Results: People who do not engage in physical activity are two times more likely to exhibit symptoms of depression (PR: 2.1) and anxiety (PR: 2.5) compared with those who regularly practice physical activity and a higher prevalence of symptoms for anxiety (9.8%) and depression (10.9%) was observed among those claiming to not practice regular physical activity and 63.2% related did not practice any physical activity regularly.

Conclusion: Altogether, these results suggest that people who do not practice physical activity have a higher chance of exhibiting symptoms of depression and anxiety when compared to those who perform physical activity regularly. In this sense, regular physical activity must be encouraged, and this incentive should be routine in both current and future public health policies. Although the methodology in the present study does not allow assigning a relation of cause and effect, we observed associations between symptoms of depression, anxiety and physical activity.

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1. Introduction

Several studies suggest that mood disorders are associated with physical inactivity and that mood improvement occurs when physical activity is resumed (Ströhle, 2009; Pasco et al., 2011; Dinas et al., 2011; Barcelos-Ferreira et al., 2009; Farmer et al., 1988). This improvement typically occurs when physical activity is performed on a regular basis at a moderate intensity with an emphasis on aerobic activities (Sarbadhikari and Saha, 2006). Depressed people are typically less physically active and more unconditioned than non-depressed people (Paluska and Schwenk, 2000). The literature on physical activity in Brazil has quantitatively

increased over the years (Hallal et al., 2007). Several studies have investigated the effects of physical activity on mood state and obtained satisfying results (De Moor et al., 2006; Dunn et al., 2005).

Although the benefits of regular physical activity on both physical and psychological health are well known (Warburton et al., 2006; Antunes et al., 2006) there remains a relatively large number of people who do not engage in any type of regular physical activity, resulting in a considerable number of sedentary people. An epidemiological study conducted in the city of Sao Paulo by De Mello et al. (2000) showed that only 31.3% of the respondents were engaged in some type of physical activity.

There are few studies evaluating the association between practice of physical activity and mood in a population sample. Knowing the profile of a certain population with regard to both the performance of regular physical activity and mood is an important step for proposing strategies that may minimize complaints related to depressive and anxious symptoms, which

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are the most common psychiatric disorders (Machado-Vieira and Soares, 2007). Moreover, this result can contribute positively to the development of public health strategies. The aim of the present study was to identify the frequency of complaints or symptoms of depression and anxiety in the population of the city of Sao Paulo and their association with the report of practice of regular physical activity.

2. Methods

2.1. Participants

The study protocol was approved by the Ethics Committee for Research of the Universidade Federal de São Paulo (UNIFESP) (CEP 0593/06) and is in accordance with the guidelines laid down in the 1964 Declaration of Helsinki. This work was registered in ClinicalTrials.gov (name: epidemiology of sleep disturbances among adult population of the São Paulo city; number: NCT00596713; URL: <http://www.clinicaltrials.gov/ct2/show/NCT00596713?term=NCT00596713&rank=1>). After a complete description of the study to the volunteers, written informed consent was obtained.

We evaluated the probabilistic sample of the Sao Paulo Epidemiologic Sleep Study (EPISONO). EPISONO was conducted from July to December 2007 and adopted a three-stage probability sampling process (Kish, 1965). Sample size of 1042 volunteers was defined to allow prevalence estimates with 3% precision (Marques and Berquó, 1975). Volunteers were randomly selected to represent the population of São Paulo city according to gender, age (between 20 and 80 years), and socioeconomic status.

2.2. Procedures

Details about the rationale, study design, and methodology have been published (Santos-Silva et al., 2009). Briefly, in the first stage of sample selection, 96 of the 1500 districts that constitute the city of Sao Paulo were selected from four regions of the city and distributed by gender, age group and socioeconomic class for the population of São Paulo which matched the demographic projections for the city inhabitants in 2007 derived from the 2000 city census.

In the second stage, 11 households were randomly selected from each district. In the third stage, one volunteer from each household was randomly selected. Pregnant or breastfeeding women and volunteers with special needs (physical or mental) were excluded from the study. All volunteers were referred to the Sleep Institute for weight (kg) and height (m) evaluation and completion of the questionnaires described below.

2.3. Measures

The following questionnaires were administered by 10 trained psychologists prior to the volunteer's usual bedtimes. The average time for the completion of the questionnaires was 30 min.

Brazilian version of the beck depression inventory (BDI) (validated by Cunha, 2001): used to evaluate the intensity of depression symptoms, containing 21 items, with responses rated on a Likert scale. Scores range from 0 to 63 points (0–11 minimal; 12–19 mild; 20–35 moderate; and 36–63 severe). The translated version used was validated for the Brazilian population and its Cronbach's α values were 0.79 and 0.91 in psychiatric and non-psychiatric populations, respectively, which were similar to the ones in the original version (whose Cronbach's α values were 0.76 and 0.95; Beck et al., 1961, 1988a,b). The cutoff ≥ 19 was used to determine the presence of depressive symptom according to Cunha (2001).

Brazilian version of Beck Anxiety Inventory (BAI) (validated by Cunha, 2001): used to assess anxiety level, consisting of 21 statements, with responses rated on a Likert scale from 0 to 63 points (0–10: minimal anxiety; 11–19: mild anxiety; 20–30: moderate anxiety; and 31–63: severe anxiety) (Beck et al., 1988a,b). The translated version used was validated for the Brazilian population with Cronbach's α 0.92 in psychiatric populations and 0.90 in non-psychiatric populations, similar to the ones in the original version whose Cronbach's α values were respectively 0.90 and 0.86 (Cunha, 2001; Beck et al., 1988a,b). The cutoff ≥ 19 was used to determine the presence of depressive symptom according to Cunha (2001).

Self-report regular physical activity: this questionnaire included two simple questions regarding the performance and frequency of physical activity. These questions assess whether the volunteers perform some type of physical activity (yes or not) and with what frequency is performed the practice of regular physical activity ($\leq 2x/\text{week}$ or $\geq 3x/\text{week}$). This questionnaire was based on epidemiological surveys developed in the city of Sao Paulo in 1987 and 1995 (Pires et al., 2007).

Brazil's Economic Classification Criterion (CCEB): the CCEB evaluates the quality of durable consumer goods that the family owns (e.g., car, color television, radio, refrigerator, freezer, and washing machine), the number of rooms in the house with an emphasis on the number of bathrooms, and the number of domestic employees on monthly wages working at the house. The CCEB was developed by the Brazilian Association of Research Companies and allowed for the definition of three socioeconomic groups: upper, middle, and lower (IBGE, 2000).

2.4. Data analysis

The chi-square test for complex samples was used to generate prevalence ratios (PRs). Additionally, a logistic model that uses the backward stepwise method for entering variables into the model was used to calculate the prevalence ratios adjusted for confounders. PRs were applied to estimate the predictors of mood complaints. Statistical analysis was performed using SPSS 15.0 for Windows (SPSS Inc., Chicago, Illinois, USA). Alpha was set at 0.05.

3. Results

The mean age of the volunteers ($n=1042$) was 41.9 ± 14.4 years and 53.5% of the volunteers were women ($n=613$). The mean body mass index (BMI) of the total sample was $26.64 \pm 5.33 \text{ kg/m}^2$ and the prevalence of obesity ($\text{BMI} > 30$) was 20.9% (17.6–24.7) in the evaluated population.

A higher prevalence of symptoms for anxiety (9.8% [7.5–12.7]) and depression (10.9% [8.9–13.3]) was observed among those claiming to not practice regular physical activity.

Our results showed that 24.4% (15.6–20.2) of the population claimed to practice regular physical activity with a frequency equal to or greater than three times per week, 12.4% (12.3–16.6) claimed to practice physical activity with a frequency equal to or less than two times per week, and 63.2% (64.6–71.1) did not practice any physical activity regularly. Among those who reported practicing some form of physical activity, a higher frequency of men (52.4% [41.4–63.1]) was found for those who conducted it three or more times per week, and 62.6% (54.5–70.0) of volunteers who conducted physical activity up to two times per week were women. Among those who reported not practicing some form of physical activity, for the age group 20–34 years, a prevalence of 38.9% (32.9–45.1) was observed, while for the age group equal to or greater than 65 years the prevalence was of 8.2% (5.1–12.9). With regard to socioeconomic class, the lower and middle class

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