Physical activity and anxiety: A perspective from the World Health Survey

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ABSTRACT

Background: Despite the known benefits of physical activity (PA) among people with anxiety, little is known about PA levels in people with anxiety at the population level. This study explored the global prevalence of anxiety and its association with PA.

Methods: Cross-sectional, community-based data from the World Health Survey was analyzed. Prevalence of anxiety was estimated for 237,964 individuals (47 countries). PA was categorized as low, moderate, and high based on the International Physical Activity Questionnaire (short form). The association between PA and anxiety was assessed by multivariable logistic regression.

Results: The overall global prevalence of anxiety was 11.4% (47 countries). Across 38 countries with available data on PA, 62.5%, 20.2%, and 17.3% of the sample engaged in high, moderate, and low levels of PA respectively. The prevalence of low physical activity in those with and without anxiety was 22.9% vs. 16.6% ($p <$ 0.001) (38 countries, n=184,920). In the pooled model adjusted for socio-demographics, depression, and country, individuals engaging in low PA (vs. high PA) had 1.32 (95% CI=1.17–1.47) times higher odds for anxiety than those with high PA. Female sex, older age, lower education and wealth, and depression were also associated with low PA. At the individual country level, there was a significant positive association between low PA and anxiety in 17 of the 38 countries.

Conclusion: Low PA levels are associated with increased prevalence of anxiety. There is a need for longitudinal research to establish the directionality of the relationships observed.

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1. Introduction

Anxiety is a common and burdensome mental health complaint (Haller et al., 2014) which can greatly impair an individual's functioning, quality of life and well-being (Mendlowicz and Stein, 2000; Olatunji et al., 2007). Symptoms of anxiety are personified by nervousness, pervasive thoughts of worry and pessimism, which if left untreated can develop into an anxiety disorder (Herring et al., 2010). The global prevalence of anxiety disorders ranges from 2.4–29.8% in the past year (Baxter et al., 2013), whilst high prevalence of subthreshold anxiety (Haller et al., 2014) and symptoms of anxiety are also common and problematic across the lifespan (Prina et al., 2011; Stubbs et al., 2016a; Baxter et al., 2014). Anxiety disorders are the sixth leading cause of disability, in terms of years lived with disability, in both high-income and low- and middle-income countries. Globally, anxiety disorders accounted for 390 disability-adjusted life years per 100,000 persons in 2010, with no discernible change observed over time (Baxter et al., 2014). The burden of anxiety is increased even more by the high risk of co-morbid cardiovascular diseases and associated premature mortality (Batelaan et al., 2016; Roest et al., 2012). Therefore, it is not a surprise that the global financial burden of anxiety is substantial, owing to lost work productivity and high medical resource use (Chisholm et al., 2016; Hoffman et al., 2008).

Antidepressants such as selective serotonin reuptake inhibitor (SSRI) or serotonin-norepinephrine reuptake inhibitor (SNRI) or benzodiazepines (Baldwin et al., 2011, 2010) are the frontline treatment of anxiety symptoms among people with anxiety disorders (de Vries et al., 2016) while cognitive behavioral therapy is efficacious in reducing anxiety symptoms (Hofmann and Smits, 2008). More recently, evidence has been accumulating that self-help interventions may also be beneficial in people with anxiety disorders (Lewis et al., 2012). For example, physical activity has been proposed as such a self-management strategy (Pedersen and Saltin, 2015; Jayakody et al., 2013; Conn, 2010). Previous systematic reviews (Pedersen and Saltin, 2015; Jayakody et al., 2013; Conn, 2010) have suggested that physical activity is helpful in reducing anxiety symptoms, while its role in preventing cardio-metabolic risks is largely known (Stubbs et al., Rosenbaum). People with anxiety may be at increased risk of cardiovascular disease and poorer cardiorespiratory function (Caldirola et al., 2016) and physical activity may help improve these outcomes (Vancampfort et al., 2016a). Despite the established benefits of physical activity in people with anxiety, little is known about physical activity levels in this population. Studies that have considered the relationship between physical activity and anxiety have been of small sample sizes and limited to one country (Helgadóttir et al., 2015; da Silva et al., 2014; Da Silva et al., 2012; Park et al., 2011). In addition, at the population level, there is a paucity of information on factors that might influence physical activity and anxiety. Such information might prove useful for developing interventions.

Given the aforementioned, using multi-country data from the World Health Survey, the current paper set out with the following aims: (a) describe the concurrent global prevalence of physical activity and anxiety; and (b) explore the association between anxiety and physical activity.

2. Methods

2.1. The survey

Data from the current study derives from the World Health Survey (WHS). The WHS was a cross-sectional, community-based survey carried out in 70 countries between 2002 and 2004. Data were collected using single-stage random sampling in 10 countries, while stratified multi-stage random cluster sampling was employed in 60 countries. Survey details are available elsewhere (http://www.who.int/healthinfo/survey/en/). Briefly, individuals with a valid home address

aged ≥18 years were eligible to participate. The questionnaire was subject to standard translation procedures to ensure comparability across languages and cultures. Information was obtained through face-to-face and telephone interviews conducted by trained interviewers. Across all countries, the individual response rate was 98.5% (Nuevo et al., 2012). To adjust for non-response, sampling weights were generated using the population distribution as reported by the United Nations Statistical Division. Ethical approval for the survey was provided by ethical boards at each study site. All participants provided their informed consent.

2.2. Variables

2.2.1. Anxiety (outcome variable)

Anxiety was assessed by the question '*Overall in the past 30 days, how much of a problem did you have with worry or anxiety*' with answer options being none, mild, moderate, severe, and extreme. In accordance with previous WHS publications, those who answered severe and extreme were considered to have anxiety within the current study (Koyanagi and Stickley, 2015; Wong et al., 2013).

2.2.2. Physical activity (exposure variable)

Physical activity was assessed using the short form of the International Physical Activity Questionnaire (C.L. Craig et al., 2003; C. Craig et al., 2003), in which respondents are asked to report the number of days and the duration of the vigorous, moderate, and walking activities they undertook during the last 7 days. Show-cards illustrating different types of vigorous and moderate physical activities were presented to the respondents in addition to brief explanations of what was meant by vigorous and moderate activity. The summary indicator of the IPAQ was used to categorize the overall population into three levels of physical activity: low, moderate or high. The moderate level nominally indicated meeting any of the following three criteria: (a) 3 days of vigorous activity of at least 20 min/day; (b) 5 days of moderate-intensity activity or walking of > 30 min/day for > 10 min at a time; or (c) 5 days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving at least 600 MET-minutes/week. *High* levels of physical activity are defined as meeting either of two criteria: (a) vigorous-intensity activity on > 3 days/week and accumulating at least 1500 MET-minutes/week; or (b) > 5 days of any combination of walking, moderate-intensity, or vigorous-intensity activities achieving at least 3000 MET-minutes/week.

One MET is defined as 1 kcal/kg/h and is more or less equivalent to the energy cost of sitting quietly (C.L. Craig et al., 2003; C. Craig et al., 2003). Those who neither meet the moderate nor high criteria were categorized in the low level physical activity group. These category definitions correspond to the criteria used for classifying people as insufficiently active in the largest study of global physical activity levels to date (Hallal et al., 2012).

2.2.3. Control variables

Information on sex, age (18–34, 35–59, ≥60 years), education, wealth, and depression were used for adjustment. Education was categorized as: no formal education, primary education, secondary or high school completed, or tertiary education completed. Principal component analysis based on 15–20 assets was conducted to create country-wise wealth quintiles. The DSM-IV algorithm was used to identify depression based on the duration and persistence of past-12 month depressive symptoms (Koyanagi and Stickley, 2015).

2.2.4. Statistical analysis

The statistical analysis was done with Stata 14.1 (Stata Corp LP, College station, Texas). Of the 69 countries for which data were publically available, 10 countries with no sampling information (Austria, Belgium, Denmark, Germany, Greece, Guatemala, Italy, Netherlands, Slovenia, UK) were excluded. We subsequently excluded