



Review article

Physical activity and sedentary behavior in people with bipolar disorder: A systematic review and meta-analysis



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ABSTRACT

Background: Mortality rates are approximately two to three times higher in people with bipolar disorder (BD) than in general population. Lack of physical activity (PA) and sedentary behavior (SB) are independent risk factors for cardiovascular disease and premature mortality.

Aims: We conducted a meta-analysis to investigate PA and SB levels and its predictors in BD.

Methods: Major electronic databases were searched from inception till 02/2016 for articles measuring PA and SB with a self-report questionnaire (SRQ) or objective measure (e.g. accelerometer) in BD. A random effects meta-analysis and meta-regression analysis were conducted.

Results: Six studies were eligible including 279 (129♂) people with BD (mean age=43.9 years; range: 32.0–51.5 years). The trim and fill analysis demonstrated people with BD spent in total 210.1 min (95% CI=146.3–273.9 min) per day being physically active and 613.3 min (95%CI=389.9–836.6 min) during waking hours being sedentary. No significant difference in total PA per day was observed between people with BD and controls ($g = -0.62$, 95% CI= -1.55 to 0.31 , $I^2 = 88.5\%$, $n_{BD} = 82$, $n_{controls} = 86$). Objective measures of PA recorded significantly lower levels ($P = 0.03$) compared to self-report PA. Meta-regression demonstrated that older age and a higher body mass index predicted lower PA levels.

Limitations: Only a limited number of studies were identified assessing SB in people with BD.

Conclusions: Adults with BD engage in high levels of sedentary behavior during waking hours. Given that sedentary behavior is an independent predictor of cardiovascular disease, future lifestyle interventions specifically targeting the prevention of sedentary behavior are warranted.

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1. Introduction

People with bipolar disorder have higher levels of morbidity and mortality than the general population (De Hert et al., 2011). A recent meta-analysis (Walker et al., 2015) demonstrated that mortality rates are approximately two to three times higher than those of the general population. The higher premature mortality rates are for an important part attributable to cardiovascular disease (Goldstein et al., 2015; Vancampfort et al., 2013a). In the general population there is evidence that physical activity and exercise are broadly as effective as pharmacological interventions in preventing cardiovascular disease and mortality (Naci and Ioannidis, 2013). However, people with bipolar disorder experience a range of barriers to engage in physical activity such as lower self-efficacy, presence of medical co-morbidity, lower educational status, and lack of social support (Vancampfort et al., 2013b). Recently, interest has developed in the importance of preventing prolonged periods of sedentary behavior in order to reduce cardiovascular disease and mortality. A large meta-analysis (Biswas et al., 2015) in the general population demonstrated that sedentary behavior is independently associated with an increased risk of developing cardiovascular disease, type two diabetes, and all-cause mortality.

Given that an active lifestyle and reductions in sedentary behavior are related to lower cardiovascular disease risk, understanding physical activity and sedentary behavior levels and their predictors among people with bipolar disorder is critical to improving long-term health outcomes (Ward et al., 2015). To our knowledge, five reviews (Bauer et al., 2016; Kucyi et al., 2010; Melo et al., 2016; Stanton and Happell, 2014; Thomson et al., 2015) have considered physical activity as a therapeutic intervention concluding that there is, albeit limited, evidence for its beneficial role on mood, weight, blood pressure, lipid profile, and overall well-being. However, several important questions regarding the relationship between physical activity, sedentary behavior and bipolar disorder remain unanswered (Vancampfort et al., 2016b). For instance, the exact levels of physical activity and sedentary behavior among people with bipolar disorder has yet to be established.

Most studies which have measured the level of physical activity and sedentary behavior have used self-report questionnaires (SRQ), rather than objective measures such as accelerometers (Soundy et al., 2014). Since there are concerns that SRQ may overestimate physical activity levels and underestimate sedentary levels in people with bipolar disorder (Soundy et al., 2013; Stubbs

et al., 2016), large-scale research is required to establish if SRQ report significantly higher levels of activity than the gold standard objective measurements (Warren et al., 2010).

Next to this, it is of interest to explore whether geographical differences and differences between settings (e.g., outpatients versus inpatients) in physical activity and sedentary behavior exist as such differences might help researchers and clinicians to identify specific environmental factors (e.g. differences in health-related policies, available facilities, etc.) which should be considered.

In addition, it remains unclear if people with bipolar disorder engage in more or less physical activity and sedentary behavior compared to healthy controls, and what factors moderate physical activity participation and sedentary behavior in this population. Therefore, we conducted a systematic review to: (1) establish the mean time spent physically active (at light, moderate and high intensity) and sedentary per day, in people with bipolar disorder (2) investigate differences between SRQ and objective measures, (3) investigate predictors of physical activity and sedentary behavior using meta-regression analyses and (4) explore differences in physical activity and sedentary behavior in people with bipolar disorder versus age- and gender matched healthy controls.

2. Methods

This systematic review adhered to the MOOSE guidelines (Stroup et al., 2000) and PRISMA statement (Moher et al., 2009).

2.1. Inclusion criteria

We included studies that: (1) involved adult participants with a diagnosis of bipolar disorder according to established criteria (e.g., DSM (American Psychiatric Association, 2013), or ICD (WHO, 1993)). If we encountered studies including mixed samples of mental illnesses (e.g. major depressive disorders) we attempted to extract the data for those with bipolar disorder. If the data were not available in the paper, the authors were contacted twice in a two-week period. (2) Measured physical activity and sedentary behavior using either a SRQ (e.g. International Physical Activity Questionnaire (IPAQ), (Craig et al., 2003)) or objective measure (e.g. accelerometer). Physical activity was defined as any interventions that use bodily movement produced by skeletal muscles and which requires energy expenditure (Caspersen et al., 1985) while sedentary behavior is defined as an energy expenditure

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