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Feasibility and acceptability of an exergame intervention for schizophrenia

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ABSTRACT

Objectives: To evaluate the feasibility and acceptability of an exergame intervention as a tool to promote physical activity in outpatients with schizophrenia.
Design: Feasibility/Acceptability Study and Quasi-Experimental Trial.
Method: Sixteen outpatients with schizophrenia received treatment as usual and they all completed an 8-week exergame intervention using Microsoft Kinect® (20 min sessions, biweekly). Participants completed pre and post treatment assessments regarding functional mobility (Timed Up and Go Test), functional fitness performance (Senior Fitness Test), motor neurological soft signs (Brief Motor Scale), hand grip strength (digital dynamometer), static balance (force plate), speed of processing (Trail Making Test), schizophrenia-related symptoms (Positive and Negative Syndrome Scale) and functioning (Personal and Social Performance Scale). The EG group completed an acceptability questionnaire after the intervention.
Results: Attrition rate was 18.75% and 69.23% of the participants completed the intervention within the proposed schedule. Baseline clinical traits were not related to game performance indicators. Over 90% of the participants rated the intervention as satisfactory and interactive. Most participants (76.9%) agreed that this intervention promotes healthier lifestyles and is an acceptable alternative to perform physical activity. Repeated-measures MANOVA analyses found no significant multivariate effects for combined outcomes.
Conclusion: This study established the feasibility and acceptability of an exergame intervention for outpatients with schizophrenia. The intervention proved to be an appealing alternative to physical activity. Future trials should include larger sample sizes, explore patients' adherence to home-based exergames and consider greater intervention dosage (length, session duration, and/or frequency) in order to achieve potential effects.

Introduction

The majority of patients with schizophrenia is known to have a more sedentary lifestyle in comparison to healthy controls (Faulkner, Cohn, & Remington, 2006; Lindamer et al., 2008). Physical activity levels are reduced in this population and can be related to impaired health-related quality of life (Martín-Sierra et al., 2011; Vancampfort, Probst, Scheewe, et al., 2011; Vancampfort, Probst, Sweers, et al., 2011). Furthermore, these individuals show less confidence in their physical abilities, which is associated with a lower participation in physical activities (Vancampfort, Probst, Sweers, et al., 2011).

There is also evidence that patients with schizophrenia have a reduced functional exercise capacity when compared to healthy controls (Vancampfort, Probst, Sweers, et al., 2011). Patients with schizophrenia display impairments in several physical fitness indicators including flexibility (Vancampfort et al., 2013), maximal aerobic capacity, maximal anaerobic power, anaerobic capacity (Ozbulut et al., 2013) and muscular fitness as measured by hand grip (Callison et al., 1971; Viertiö, 2011), abdominal and leg muscle

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strength (Vancampfort et al., 2013). Moreover, patients with schizophrenia commonly display motor deficits which have a great impact on the long-term outcome of the disease (Putzhammer & Klein, 2006). The main motor impairments described include a decreased balance and postural control, displayed by postural instability, increased postural sway area and center of pressure displacement (Agarwal & Agarwal, 2014; Kent et al., 2012; Marvel, Schwartz, & Rosse, 2004; Stensdotter, Loras, Fløvig, & Djupsjobacka, 2013); poorer gait performance, comprising shorter stride length and decreased gait velocity (Putzhammer et al., 2004; Putzhammer, Perfahl, Pfeiff, & Hajak, 2005); and higher incidence of motor neurological soft signs, with inferior performance in motor coordination and sequencing tasks (Dazzan & Murray, 2002; Zakaria, Jaafar, Baharudin, Ibrahim, & Midin, 2013).

Currently, there has been a growing interest in the physical rehabilitation of patients with schizophrenia (Hert et al., 2011), with international guidelines emphasizing the role of physical activity in the treatment of this disorder (Lehman et al., 2010; National Institute for Health and Care Excellence, 2014; Scottish Intercollegiate Guidelines Network, 2013; Vancampfort et al., 2012). Rosenbaum, Tiedemann, Sherrington, Curtis, and Ward (2014) recently completed a systematic review with meta-analysis with psychiatric patients which found a large effect of physical activity on depressive and psychotic symptoms, a moderate effect on aerobic capacity and quality of life and a small effect on anthropometric measures. The effects of exercise in patients with schizophrenia have also been reported in another systematic review, with findings showing that regular exercise programs are feasible for this population and can provide benefits for physical/mental health and well-being of these individuals (Gorczynski & Faulkner, 2010). These authors also reported that current guidelines for lifestyle activity and exercise appear just as acceptable for individuals with schizophrenia. International physical activity guidelines state that any adult, even if diagnosed with schizophrenia, should complete at least 150 min a week of moderate-intensity, or 75 min of moderate-to vigorous-intensity aerobic activity to achieve substantial health improvements (Vancampfort et al., 2012). Exergames have emerged in recent years as promising new tools to promote physical fitness and motor rehabilitation in several populations (Chang, Chen, & Huang, 2011; van Diest, Lamoth, Stegenga, Verkerke, & Postema, 2013; Eichhorn et al., 2013; Jansen-Kosterink et al., 2013; Knights et al., 2014; Lange et al., 2011; Staiano, Abraham, & Calvert, 2013), being a reliable tool to improve balance and postural control (van Diest et al., 2013), lower limb muscle strength (Chen et al., 2012; Kim, Son, Ko, & Yoon, 2013) and other physical fitness measures (Knights et al., 2014; Staiano et al., 2013). This intervention allows the user to perform video games that involve exercise and are controlled by bodily movements. The application of exergames in patients with psychiatric disabilities has not been fully considered, although there are some findings regarding subjects with schizophrenia. The latter have reported emotional state improvement after an exergame intervention, which reinforces the role of this intervention in people who experience mental health problems (Patsi, Antoniou, Batsiou, Bebetsos, & Lagiou, 2012). Exergames have also been highlighted as an accessible and ideal tool to promote physical activity and promote well-being in older adults with schizophrenia (Leutwyler, Hubbard, Vinogradov, & Dowling, 2012). However, further work is necessary to determine if this intervention is an acceptable and alternative tool to promote physical activity in subjects with schizophrenia from different settings and across several age groups. This study is a quasi-experimental trial which aims to evaluate the feasibility and acceptability of an exergame intervention as a tool to promote physical activity in outpatients with schizophrenia.

Methods

Participants

Participants were recruited from the *Associação Nova Aurora na Reabilitação e Reintegração Psicossocial (ANARP)* socio-occupational center, Porto, Portugal, which provides services to individuals with stable, severe and persistent mental illnesses. The inclusion criteria were the following: patients diagnosed with schizophrenia based on the Diagnostic and Statistical Manual of Mental Disorders IV criteria (American Phychiatric Assocation, 2000) recognized by each patient psychiatrist, aged between 18 and 65 years and clinically stable (no significant changes in medication for at least one month). The patients with severe cognitive impairment (based on Mini Mental State cut off values), neurologic disorders or current substance dependence were excluded from the study.

This study was approved by the Scientific Committee of the *School of Allied Health Technologies - Polytechnic Institute of Porto* and by the directive board of ANARP. All participants signed a consent form and there was no financial compensation for participation. Details of enrollment into the trial are described in Fig. 1. Forty-six patients were assessed for eligibility and eight did not meet the inclusion criteria (three clinical unstable; two with neurologic disease diagnosis; one with severe cognitive impairment; two were discharged from the institution). Six of the eligible participants were not interested in participating in the study. Therefore, 32 participants were recruited and assigned to either the exergame intervention group (EG; n = 16) or the treatment-as-usual group (TAU; n = 16). Group allocation of participants was based on participants' availability to attend the exergame sessions biweekly. Three participants did not complete the intervention. No significant differences were found between groups regarding socio-demographic, clinical and physical characteristics (Table 1).

Instruments

Participants of both groups were evaluated twice, before and after the intervention (up to two weeks after the intervention). Assessment procedures were completed by two blinded evaluators which had previous training applying the selected instruments. Clinical and functional outcomes were assessed by each

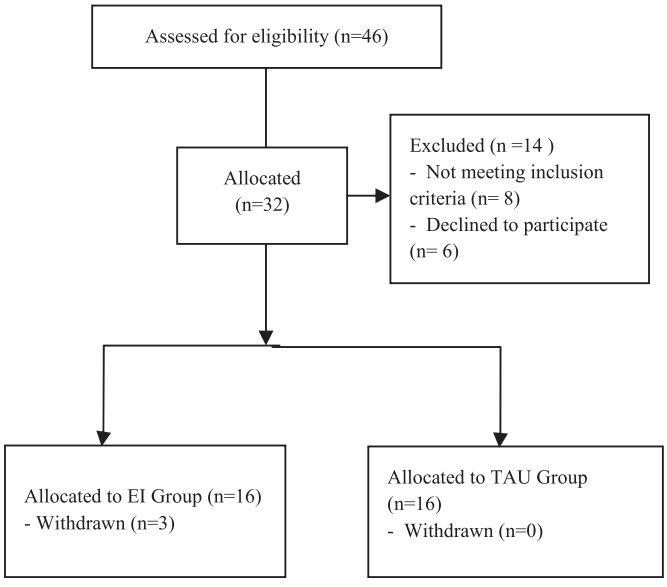

Fig. 1. Participants flow diagram according to CONSORT Statement.