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Using the transtheoretical model to predict physical activity level of overweight adults with serious mental illness

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ABSTRACT

Although physical activity (PA) is recommended for individuals with serious mental illness (ISMI), most of them are inactive or insufficiently active. The transtheoretical model (TTM) has been proposed to explain the motivational factors associated with PA however, there is little evidence of its applicability to ISMI. So, the objective was to analyse whether TTM components are related to PA in overweight ISMI. In this cross-sectional study, participants completed the Global Physical Activity Questionnaire to assess their PA level and TTM components: stages of change (SOC), decisional balance (pros and cons), self-efficacy and processes of change (POC; experiential and behavioural). 43 overweight ISMI (27 males, mean age 29.0 ± 6.64, mean BMI 31.91 ± 5.10 kg/m^2, 30% with schizophrenia, and 44% inactive), referred to a PA programme were recruited. PA was positively correlated with POC and perceived pros, with TTM constructs accounting for 14.5% of PA variance. Mean level of behavioural POC and perceived pros were higher in physically active than in inactive participants. So, this study confirms that TTM components are associated with PA in overweight ISMI. Therefore, the TTM should be considered when planning PA interventions for ISMI.

1. Introduction

Interest in the effects of physical activity (PA) on individuals with serious mental illness (ISMI), such as schizophrenia, has grown in recent years (Abdel-Baki et al., 2013; Vancampfort et al., 2009, 2016c). ISMI are more likely to have obesity (Manu et al., 2015), and die prematurely because of metabolic complications (Almeida et al., 2014), and PA appears to be an effective strategy to manage them (Bruins et al., 2014; Chalfoun et al., 2015; Firth et al., 2015). However, PA initiation and maintenance remain problematic. Indeed, ISMI have high levels of sedentary behaviours (Janney et al., 2013) and when involved in PA interventions, more than one in four will drop-out (Vancampfort et al., 2016b) even in the presence of facilitating factors (Archie et al., 2003). Therefore, better understanding of the factors associated with PA would be an asset to optimize PA interventions.

In this context, models of behaviour change provide theoretical frameworks to identify motivational factors related to PA practice, but two systematic reviews on the theoretical predictors of PA in ISMI indicate that available studies on the topic are scarce and that further investigations were needed (Farholm and Sørensen, 2016a, 2016b). Among the models of behavioural change, the transtheoretical model (TTM) has been widely applied to several populations (Prochaska and DiClemente, 1982), and a recent meta-analysis, including clinical (e.g., type 2 diabetes) and non-clinical adults populations, has shown that interventions based on this model are effective in increasing PA practice (Gourlan et al., 2016).

The TTM has several components, with the most often used being stages of change (SOC: individual's current intentions and engagement regarding a specific behaviour such as PA). The TTM comprises five SOC, namely, pre-contemplation (not intending to start PA), contemplation (intention to change PA within the next 6 months), preparation (intention to change PA within the next month), action (engaged in PA for less than 6 months) and maintenance (being engaged in PA for more than 6 months). The first three SOC are considered as pre-action stages, while the two other two SOC are considered as post-action stages.

The TTM assumes that transition between SOC is related to its other theoretical constructs: decisional balance (perceived advantages or disadvantages related to behaviour modification; e.g., engagement in PA), self-efficacy (defined as people's perception of their capabilities, to organize and execute courses of action required to engage in or maintain PA) and experiential as well as behavioural processes of change

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(POC: methods and strategies that people use to alter their PA).

In the TTM, it is assumed that, to engage in and maintain PA, individuals need to perceive more advantages to exercise, with high self-efficacy and more use of POC. A meta-analysis, of PA practice, also conducted among clinical and non-clinical adults participants, highlights that the most effective components of TTM-based interventions are self-efficacy, POC or the use of more than 3 theoretical constructs (e.g., POC, self-efficacy, decisional balance) to tailor the intervention (Romain et al., 2016a). Nevertheless, despite its popularity, few studies have examined whether the TTM could provide a theoretical framework for ISMI.

Although studies on the TTM regarding PA practice by ISMI are scarce, they are very informative. First, it has been shown that ISMI are more likely to be in pre-action SOC than the general population (Bernard et al., 2013; Lindamer et al., 2008). Furthermore, readiness to change (which could be considered as an indirect estimation of PA level) (Nigg, 2005) is found to be associated with self-reported level of PA practice by ISMI (Bezyak et al., 2011). Vancampfort et al. (2014) showed that, similarly to the general population, individuals with schizophrenia in post-action SOC have higher levels of autonomous motivation when they engage in PA. However, Vancampfort et al. (2014) did not consider all TTM constructs but only SOC. Another study of ISMI found significant correlations between SOC and self-efficacy, perceived advantages to exercise and POC (Bassilios et al., 2015). However, even though all TTM constructs were considered, this study did not make the distinction between experiential and behavioural POC, and it is known that these constructs are not related to PA to the same extent. Indeed, in PA, while both, experiential and behavioural, processes of change act in tandem (rather than sequentially as in tobacco cessation) (Rosen, 2000), several studies led on different populations consistently highlighted that behavioural processes appear to be more strongly related to PA (in terms of association, mediation, or effect size) than are experiential processes (Dishman et al., 2014; Rhodes and Pfaeffli, 2010; Romain et al., 2014, 2015, 2017a). Another study, which concluded that the TTM is a valid framework to explain PA among adults with schizophrenia, did not examine POC (Gorczynski et al., 2010). In fact, only one study (Bezyak et al., 2011) included all TTM components and concluded that the TTM accounted for 27% of PA practice, with only mean level of behavioural POC being a significant predictor. However, this study was not specifically restricted to overweight participants and mainly included males. Thus, it was necessary to replicate the afore-mentioned study to ensure reliability and validity of the TTM among overweight ISMI.

1.1. Objective and hypothesis

The objective of the present study was to examine the validity of all TTM constructs in PA prediction among overweight ISMI. It was hypothesized that PA would be correlated with TTM constructs, namely, decisional balance, self-efficacy and POC, and that physically active individuals would be more likely to use these constructs.

2. Methods

2.1. Design

A cross-sectional study was conducted among overweight ISMI referred to a PA clinical research programme aiming to examine its effects on metabolic outcomes.

2.2. Inclusion criteria

Participants were included if they were 18–55 years old, had a diagnosis of severe mental disorder by psychiatrist (according to the DSM-V) and were overweight or obese (body mass index (BMI) ≥ 25 kg/m^2).

Participants were excluded if their psychiatric symptoms were unstable or if they had such cognitive impairment that they were unable to understand the questionnaires, even with assistance, or if a PA contraindication was determined after a consultation with a physician (e.g., because of injuries).

2.3. Measures

Demographic (age, sex) and anthropometric data (height, weight) were collected. Height and weight were measured and BMI was calculated. Diagnosis, medication and time since first hospitalization were collected by charts review.

2.3.1. Stages of change of physical activity

SOC were assessed according to a SOC algorithm (Romain et al., 2012). Using four questions with a dichotomous response choice, and according to their responses, participants were classified among the five different stages being pre-contemplation, contemplation, preparation, action and maintenance. In the SOC questionnaire, regular PA was defined as at least 30 min of exercise per session, at least 4 days per week.

2.3.2. Processes of change

POC were evaluated with the POC questionnaire (Bernard et al., 2014) to assess the five experiential POC (consciousness-raising, dramatic relief, self-reevaluation, environmental reevaluation and social liberation) and the five behavioural POC (self-liberation, helping relationships, counter-conditioning, reinforcement management and stimulus control) on a 5-point Likert scale with anchors going from 1 (*never*) to 5 (*repeatedly*). Table 1 lists the definition and gives examples of each POC. In the present study, we only used mean levels of experiential and behavioural POC, respectively. This questionnaire was found to be valid in several populations (but not tested in ISMI) and invariant according to gender, economic status and body weight (Bernard et al., 2014; Romain et al., 2016b).

2.3.3. Self-efficacy

Self-efficacy was evaluated according to a scale developed by Bandura (2006) with translation of all items from English to French. With 14 items, and a response scale going from 0% (not at all confident) to 100% (absolutely confident), participants were asked whether they felt confident to practice PA, three times per week or more, in the face of several barriers (e.g., when I'm feeling tired).

2.3.4. Decisional balance

Decisional balance elements were evaluated with a validated scale (Eeckhout et al., 2013). This questionnaire ascertains the perceived advantages of PA (pros) with 8 items and the perceived inconveniences (cons) with 8 items.

2.3.5. Physical activity

PA was estimated by the Global Physical Activity Questionnaire (GPAQ) (Bull et al., 2009), which evaluates different amounts of PA (total, vigorous, and moderate). According to the scoring protocol, PA was considered as being low at 600 MET-min/week, moderate between 600 and 3000 MET-min/week, and vigorous, above 3000 MET-min/week. In the present study, ISMI received the help of a research assistant to complete the GPAQ and minimize the bias of over-reporting.

2.4. Statistical analyses

Internal consistency for all scales was computed with Cronbach's alpha (α). Pearson correlations between PA levels and age, BMI and TTM constructs were analysed, to identify PA correlates. Significantly correlated variables were entered in a multiple regression model to determine if they were associated with PA. To control for the effect of