



Associations between perceived neighbourhood environmental attributes and self-reported sitting time in patients with schizophrenia: A pilot study



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ABSTRACT

Sitting behaviours may, independent of physical activity behaviours, be a distinct risk factor for multiple adverse health outcomes in patients with schizophrenia. In order to combat sitting behaviours health care providers and policy makers require further understanding of its determinants in this population group. The aim of the present study was to investigate the variance in sitting time explained by a wide range of community design and recreational environmental variables, above and beyond the variance accounted for by demographic variables. One hundred and twenty-three patients (42♀) with schizophrenia (mean age = 41.5 ± 12.6 years) were included in the final analysis. The built environment was rated using the Instruments for Assessing Levels of Physical Activity and Fitness environmental questionnaire and sitting time was assessed using the International Physical Activity Questionnaire-short (IPAQ) version. Regression analysis showed that environmental variables were related to sitting time. The body mass index (BMI) and disease stage explained 8.4% of the variance in sitting, while environmental correlates explained an additional 16.8%. Clinical practice guidelines should incorporate strategies targeting changes in sitting behaviours, from encouraging environmental changes to the availability of exercise equipment.

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1. Introduction

Sedentary behaviours refer to activities that do not increase energy expenditure substantially above a resting level (< 1.0 metabolic equivalent, MET). The term refers to activities such as sleeping, lying down, sitting, watching television, and other forms of screen-based entertainment (Pate et al., 2008). Current understanding of sedentary behaviour is less well developed than our understanding of physical activity behaviours in individuals with schizophrenia. Although sedentary behaviour may arguably be conceptualised as no more than the other side of the physical activity coin, it is a class of behaviours that can coexist and compete with physical activity. It is therefore important to distinguish between sedentary and physical activity behaviours,

as they might be independent of each other (Owen et al., 2011). Thus, whilst there is some research consensus on the benefits of physical activity and understanding of the type and level of physical activity engagement (Vancampfort et al., 2009, 2010; Gorczyński and Faulkner, 2010; Scheewe et al., 2013), there is generally less understanding around sedentary behaviour and the factors that affect this behaviour in patients with schizophrenia. Recent studies have demonstrated that sedentary behaviour may, even independent of physical activity behaviours, be a distinct risk factor for multiple adverse health outcomes in patients with schizophrenia (Strassnig et al., 2012). It might be that those patients with schizophrenia who engage in sufficient physical activity, still spend the rest of their day in sedentary behaviours (Vancampfort et al., 2011). A recent study (Duvivier et al., 2013) in the general population showed that 1 h of daily physical activity cannot compensate the negative effects of sedentary behaviour on insulin level and plasma lipids if the rest of the day is spent sitting. Further to this, in patients with schizophrenia, sedentary behaviour is associated with metabolic abnormalities. For example, for

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each 1-h increase in overall sitting time, there is an increase in the odds of having the metabolic syndrome (OR=2.33; 95% CI= 1.37–3.96; $P=0.002$) (Vancampfort et al., 2012a).

Thus, from a clinical and public health perspective, the sedentary behaviour among overweight and obese adults with schizophrenia is alarming, and points to an urgent need for interventions to decrease sedentary behaviours (Janney et al., 2013). It is therefore critical to research factors that contribute to inactivity in patients with schizophrenia. Specifically, it is important to consider what correlates there are towards sedentary behaviour, since currently little research has been able to establish this. However, indications from research on correlates of physical activity behaviour have been developing. Review evidence (Vancampfort et al., 2012b) suggests less physical activity to be associated with psycho-social factors (e.g., low self efficacy), cardio-metabolic co-morbidities, negative symptoms of the illness and side effects of medication. At the same time, socio-ecological models of physical activity (e.g., Sallis et al., 2006) highlight the importance of considering the impact the environment has on physical (in)activity, in addition to these other correlates.

In a recent study (Vancampfort et al., 2013) a consistent relationship between physical activity participation (total minutes of walking per week) and perceived built environment characteristics was identified, notably an association between emotional satisfaction with the individual's built environment. Built environments are the totality of places built or designed, including buildings, grounds around buildings, layout of communities, transportation infrastructure and parks and trails (Transportation Research Board and Institute of Medicine, 2005). In the general population overall sitting time per week has been associated with perceived aesthetics of the built environment and proximity of destinations (Van Dyck et al., 2012). It is however unclear whether neighbourhood environment characteristics are related to sitting time in patients with schizophrenia. With the emerging importance of prolonged sitting time as a chronic disease risk factor, it is important to identify factors that are associated with this kind of sedentary behaviour, not only to guide future research, but also to inform the developing health interest in rehabilitation programmes for patients with schizophrenia. Since physical activity and sitting behaviours might be independent of each other, it should not be assumed that sitting behaviours are necessarily lower in environments that promote physical activity. Thus, there is an urgent need to consider if neighbourhood characteristics are related to both sitting and physical activity behaviours, as this will provide evidence of the need for changes in the built environment.

The aim of the present cross-sectional pilot study was to investigate the variance in sitting time explained by a wide range of community design and recreational environmental variables, above and beyond the variance accounted for by demographic variables.

2. Methods

2.1. Participants and procedure

A cross-sectional multi-centre design was used, this incorporated 13 centres that treat patients with schizophrenia (see Acknowledgements). The centres were located across the five Dutch-speaking provinces of Belgium and accessed over a 4-month period (November 2012–February 2013). All patients had a DSM-IV diagnosis of schizophrenia (American Psychiatric Association, 2000) established by experienced psychiatrists, who were responsible for the patients' treatment. Patients were included if they were; inpatients or outpatients with schizophrenia, had a full or partial remittance in symptoms, and were able to concentrate for 20–25 min. Patients were excluded if they were located within an intensive supervision unit, or, experienced acute persecutory delusions. No incentive was provided for participation. The study procedure was approved by the 13 ethical committees based at each centre. All participants gave their written informed consent.

2.2. Demographic variables

The following demographic variables were assessed including; gender, age, education, living situation, working situation, treatment setting, disease stage and body mass index (BMI). Dichotomous variables were constructed for education (lower: vocational or technical training; higher: general education or college), living situation (alone or not alone), working situation (working or not working), treatment setting (in- versus out-patients) and disease stage (first-episode versus multi-episode patients).

2.3. Sitting behaviour

Participants were asked for the time spent sitting each day (expressed in hours and minutes per day) using the International Physical Activity Questionnaire-short form (IPAQ-SF) (Craig et al., 2003). A structured format required participants to recall the time they spend sitting on week days during the last 7 days. Examples of this include sitting within specific environments, such as, within the home (e.g., watching television), at work (sitting at a desk) and also considers leisure time (e.g., visiting a friend). If the respondent could not answer because the pattern of time spent varied widely from day to day, patients were asked "what is the total amount of time you spent sitting last Wednesday?" ($n=19$). Previous research (Faulkner et al., 2006) demonstrated that the IPAQ-SF is a reliable surveillance tool in patients with schizophrenia.

2.4. Built environment

The built environment was rated using the Instrument for Assessing Levels of Physical Activity and Fitness (ALPHA) environmental questionnaire (Spittaels et al., 2009). The following themes of the built environment within a neighbourhood were covered by the questionnaire: (a) types of residences (3 items), (b) distances to local facilities (8 items), (c) walking and cycling infrastructure (4 items), (d) maintenance of infrastructure (3 items), (e) neighbourhood safety (6 items), (f) pleasantness of the neighbourhood (4 items), (g) walking and cycling network (4 items), (h) home environment (6 items), and (i) workplace or study environment (10 items). Different answer categories were used in the different themes. A 5-point Likert scale was used for scale 1 (five levels of different types of residences: none, a few, some, and most all) and scale 2 (five levels of time to reach different local facilities: 1–5 min, 6–10 min, 11–20 min, 21–30 min, and > 30 min). A 4-point Likert scale (strongly agree to strongly disagree) was used for scales 3–7 and a dichotomous answer category (yes or no) was used for scales 8 and 9. The neighbourhood was defined as the area within approximately 1 km that you could walk to in 10–15 min. Previous research demonstrated that ALPHA environmental questionnaire is a reliable and valid assessment tool for the built environment in patients with schizophrenia (Vancampfort et al., 2013).

2.5. Statistical analysis

Independent sample *t*-tests were used to assess difference between sitting time on bi-directional variables including gender, disease stage, treatment setting, education level, working situation, and living situation. Pearson product moment correlations were used to investigate association between sitting behaviour and environmental variables, age and BMI.

Before running the forced linear regression analysis, all variables (demographic and environmental) with low bivariate correlations with sitting behaviour ($P>0.10$) were omitted. As in accordance with previous research (De Bourdeaudhuij et al., 2003) the alpha value of 0.10 was chosen rather than the more stringent 0.05 value for the bivariate correlation analyses. This was selected, from a health promotion perspective, because all variables that might have some influence on sitting behaviour are reasonable to include in the regression analysis. A forced linear regression analysis was conducted to determine variance explained in sitting time, including demographical variables as a first block in the regression, followed by the environmental variables as a second block. This allows an estimation of the independent contribution of the environmental variables above and beyond the variance accounted for by demographic variables. Interaction effects were examined for significance ($P<0.05$), and if not significant, the model was re-run without the interaction term.

Table 2 presents the partial correlations after all blocks were entered, along with the adjusted r^2 values. A $P<0.05$ was considered to be significant in the forced linear regression analysis. Based on the recommendations by Weisberg (2005) regression diagnostics for outliers were conducted. Influence scores were investigated using Cook's distance (Cook, 1977), outliers were reported where Cook's distance was >1 . The statistical package SPSS version 20.0 (SPSS Inc., Chicago, IL) was employed for the data analyses.

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