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Evaluating correlations between physical activity, psychological mediators of physical activity,  
and negative symptoms in individuals with psychosis and diabetes

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### Abstract

**Objective:** This study examined the relationship between physical activity, psychological mediators of physical activity, and negative symptoms in people living with psychosis and pre-diabetes or Type 2 Diabetes Mellitus to identify which variables should be targeted in future physical activity interventions.

**Methods:** A total of 63 individuals were recruited and filled out questionnaires with the assistance of trained research staff.

**Results:** Spearman's correlations showed a positive significant association between physical activity and self-efficacy. Negative significant associations were found between physical activity and negative symptoms of psychosis as well as perceived barriers of physical activity. There was no significant relationship between physical activity and perceived benefits of physical activity.

**Conclusions and implications for practice:** Future physical activity interventions need to focus on enhancing the confidence individuals have being physically active and how barriers to activity can be recognized and managed. Interventions should be conducted alongside treatment of negative symptoms of psychosis.

*Keywords: psychosis, physical activity, psychological mediators of physical activity, negative symptoms*

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Evaluating correlations between physical activity, psychological mediators of physical activity, and negative symptoms in individuals with psychosis and diabetes

Dr Paul Gorczynski

### Introduction

Individuals diagnosed with psychosis are at increased risk for obesity, cardiovascular disease, and early mortality by as many as 10 to 25 years (Correll et al., 2017; Laursen, Munk-Olsen, & Vestergaard, 2012; Vancampfort et al., 2015a; Vancampfort et al., 2015b; Vancampfort et al., 2016)). Despite the importance of physical activity to physical health, many individuals with psychosis and Type 2 Diabetes Mellitus (T2DM) remain inactive (Stubbs et al., 2016a; Stubbs et al., 2016b; Vancampfort, De Hert, Sweers, De Herdt, Detraux, & Probst, 2013; Vancampfort et al., 2017).

Several researchers have commented that behavioural strategies need to be devised to help individuals with psychosis to become physically active in order to improve overall health and diabetes risk (Faulkner & Gorczynski, 2013; Vancampfort & Faulkner, 2014; Taylor et al., 2017). Despite limited use of theoretical models to construct physical activity interventions (Vancampfort et al., 2014), research shows that most physical activity behavioural approaches for individuals with psychosis have been designed a-theoretically (Faulkner & Gorczynski, 2013; Faulkner, Gorczynski, Arbour-Nicitopoulos, 2013). Research involving the general population has shown that physical activity interventions designed using a theoretically driven approach are more effective at increasing levels of physical activity than those which are designed in an a-theoretical manner (Kahn et al., 2002). Examining relationships between psychological

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mediators of physical activity and levels of physical activity is a necessary first step to designing more effective interventions. Having a better understanding of which psychological mediators have a positive impact on physical activity will allow researchers to apply specific behavioural strategies to address those psychological antecedents. Previous research has shown that self-efficacy and positive perceptions of physical activity in addition to reduced levels of perceived barriers to physical activity have all played important roles in increasing overall physical activity in people with serious mental illness (Gorczyński, Faulkner, Greening, & Cohn, 2010). This research did not take into account what impact these variables have on physical activity in relation to specific psychiatric symptoms of psychosis, mainly negative symptoms such as avolition. Acknowledging and addressing negative symptoms in the construction of any intervention in this population is necessary to facilitate the motivation towards an active lifestyle (Vancampfort et al., 2015a) and consequently to help improve functional outcomes and overall recovery (Foussias et al., 2011). Given the complexity of psychological factors and symptoms that must be considered when constructing a physical activity intervention for this population, further research is needed on how these variables, together, play a role in predicting a person's likelihood to be physically active. The purpose of this study was to examine the relationship between physical activity, psychological mediators of physical activity, and negative symptoms in people living with psychosis and pre-diabetes or T2DM to identify which variables should be targeted in future physical activity interventions.

### Methods

Ethical approval was obtained from an out-patient psychiatric facility in Canada and adults (18-75 years) who were overweight or obese ( $BMI \geq 25 \text{ kg/m}^2$ ), diagnosed with a psychosis

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(schizophrenia, schizoaffective disorder, schizophreniform disorder, bipolar 1 disorder, major depression with psychotic features, substance-induced psychosis or psychosis not otherwise specified) (American Psychiatric Association, 2000) and pre-diabetes or T2DM were invited to participate. Individuals with a co-morbid diagnosis of substance disorders were not included in the study. Individuals were recruited through the assistance of research staff and research students. Clinical staff were also made aware of the study and invited participants to contact the research team. Confirmation of diagnoses of psychotic illness and T2DM was made through medical records obtained from psychiatrists and family physicians, respectively. Data was collected during intake assessments where participants filled out questionnaires with the assistance of trained research staff. Participants were invited to provide demographic information on their age, sex, ethnicity, marital status, education, living arrangements, employment status, psychiatric diagnosis, and diabetes diagnosis. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003; Duncan, Arbour-Nicotopoulos, Suramaniepillai, Remington, & Faulkner, 2017). The IPAQ is a reliable and valid self-report questionnaire that asks participants to recall the frequency, duration, In addition to demographic variables, data was collected on physical activity through the International Physical Activity Questionnaire, on self-efficacy, perceived benefits and perceived barriers through the Patient-Centered Assessment and Counseling for Exercise (PACE) questionnaire and intensity (walking, moderate, vigorous, sitting) of their physical activity over the last seven days (Duncan et al., 2017). Physical activity can be expressed in metabolic equivalent (MET)-minutes per week. Psychological mediators of physical activity, including self-efficacy, barriers to and benefits of physical activity, were assessed using the reliable Patient-Centered Assessment and

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Counseling for Exercise (PACE) questionnaire (Long et al., 1996). The PACE questionnaire rates items on a 5-point Likert scale with greater values indicating greater confidence or importance. The PACE questionnaire has been shown to be reliable in psychiatric populations previously (Gorczynski, Faulkner, Cohn, & Greening, 2010). Negative symptoms were evaluated using the Scale for the Assessment of Negative Symptoms (SANS), on a Likert scale of 0 (no symptoms present) to 5 (severe) (Andreasen, 1993). The SANS was administered by trained research staff.

Spearman's correlations were used to evaluate relationships between variables. A multiple regression was used to determine the best predictor for physical activity from sex, age, psychological mediators of physical activity, and negative symptoms. An alpha level of .05 was used for all tests.

### Results

A total of 69 individuals were recruited. Missing data was identified for 6 individuals resulting in the exclusion of these individuals from the analysis. A final sample of 63 individuals, 39 men and 24 women, was used for the analysis. The age of participants ranged from 27 to 72 years with an average age of 50.2 years (SD = 9.7 years). Most individuals had a diagnosis of schizophrenia (52.4%), followed by schizoaffective disorder (23.8%), bipolar 1 disorder (17.5%), major depressive disorder with psychosis (3.2%), and other forms of psychosis (3.1%). The majority (81%) of participants had diabetes, while 19.0% had pre-diabetes. Most individuals were white (58.7%) or black (19.0%) or Asian (12.7%), living in supportive housing (44.4%) or in a private residence (42.9%), unemployed (87.3%), and never married (66.7%). With respect to education, 71.4% had at least completed high school.

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Participants had an average combined total physical activity score of 1591.5 (SD=2563.6) MET-minutes per week. A total of 11 individuals were achieving levels of health enhancing physical activity. The global scores for self-efficacy, perceived benefits, and perceived barriers were 3.3 (SD=.9), 4.1 (SD=.7), and 2.8 (SD=.9), respectively. The mean SANS score was 29.7 (SD=15.3).

Spearman's correlations showed a significant association between physical activity and negative symptoms as a whole ( $r = -.502, p < .01$ ). Significant correlations existed between physical activity and self-efficacy ( $r = .295, p < .05$ ) and perceived barriers to physical activity ( $r = -.293, p < .05$ ), but not perceived benefits of physical activity ( $r = .018, p = .89$ ). A multiple regression showed that sex, age, psychological mediators of physical activity, and negative symptoms significantly predicted levels of physical activity,  $F(6, 56) = 2.6, p < .05, R^2 = .027$ . Of these variables, only total negative symptoms (SANS) added significantly to the prediction of physical activity,  $\beta = -.35, p < .05$ .

### Discussion

This study examined the relationship between physical activity, psychological mediators of physical activity, and negative symptoms in people living with psychosis and pre-diabetes or T2DM. This study identified that there is a significant negative relationship between negative symptoms of psychosis and physical activity as well as a negative relationship between perceived barriers to physical activity and physical activity. A significant positive relationship was found between self-efficacy and physical activity. However, the relationship between perceived benefits of physical activity and being active was not significant. Negative symptoms

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proved to be the best significant predictor of physical activity in a multiple regression model based on the data collected.

The results of this study confirm the importance of managing perceived barriers to physical activity as well as self-efficacy to being active (Gorczynski et al., 2010). Findings show that simply knowing the benefits of physical activity are not enough to explain one's engagement in physical activity, and knowing how to manage barriers to activity may be more useful to overall activity participation. This cross-sectional study shows that being physically active may be associated with lower negative symptoms. Previous research shows that negative symptoms of psychosis negatively impact functional outcomes and overall quality of life (Norma et al., 2010). Despite being difficult to treat (Foussias & Remington, 2010), improvements in negative symptoms can lead to enhanced independent living skills and social functioning. Addressing negative symptoms, perhaps most specifically a lack of motivation, may have a profound improvement in helping individuals pursue their goals and become engaged in activity (Granholm et al., 2007). Addressing physical activity needs in psychosocial interventions, while enhancing self-efficacy and developing skills to manage barriers to physical activity, may prove beneficial to helping individuals become active.

This study had a number of limitations that should be mentioned. First, physical activity was collected in a subjective manner, rather than objectively through accelerometry, which may have guarded against cognitive challenges and social biases. Researchers have noted that future studies should consider the limitations of the IPAQ and use accelerometers (Firth et al., 2017). Despite its subjective manner, the International Physical Activity Questionnaire is a valid and reliable measurement of physical activity in this population (Duncan et al., 2017). Second,



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results of this study illustrate the strength of relationships between variables at one moment in time and do not offer the ability to predict longitudinally their impact on physical activity.

Further longitudinal study is necessary. Lastly, future research may wish to evaluate relationships between levels of physical activity and psychotropic medication, as side effects of these medicines may have an impact on overall activity.

Results of this study suggest that interventions should aim to address negative symptoms of psychosis while addressing psychological barriers to physical activity and confidence to be active. Tailored engagement strategies may be necessary to help people become active and should be studied as to how they can help individuals regain functional recovery.

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