

Running head: ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

(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

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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.

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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,

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

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.

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

References

- American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders: DSM-IV-TR. Washington, DC: American Psychiatric Association.
- Andreasen N. (1993). The Scale for Assessment of Negative Symptoms (SANS). Iowa City: University of Iowa.
- Correll, C. U., Solmi, M., Veronese, N., Bortolato, B., Rosson, S., Santonastaso, P.,...Stubbs, B. (2017). Prevalence, incidence and mortality from cardiovascular disease in patients with pooled and specific severe mental illness: a large-scale meta-analysis of 3,211,768 patients and 113,383,368 controls. *World Psychiatry*, 16(2), 163-180. doi: 10.1002/wps.20420.
- Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E.,...Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise*, 35(8), 1381-1395.
- Duncan, M. J., Arbour-Nicitopoulos, K., Subramaniepillai, M., Remington, G., & Faulkner, G. (2017). Revisiting the International Physical Activity Questionnaire (IPAQ): Assessing physical activity among individuals with schizophrenia. *Schizophrenia Research*, 179, 2-7. doi:10.1016/j.schres.2016.09.010
- Faulkner, G. & Gorczynski, P. (2013). Evidence of impact of physical activity on schizophrenia. In: A. Clow & S. Edmunds (Eds.), *Physical Activity and Mental Health* (pp. 215-235). Champaign, IL: Human Kinetics.
- Faulkner, G., Gorczynski, P., & Arbour-Nicitopoulos, K. (2013). Exercise as an adjunct therapy for schizophrenia. In P. Ekkekakis (Ed.), *Handbook of Physical Activity and Mental*

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

Health (pp. 541-555). New York, NY: Routledge.

Firth, J., Stubbs, B., Vancampfort, D., Schuch, F. B., Rosenbaum, S., Ward, P. B.,...Yung, A. R.

(2017). The validity and value of self-reported physical activity and accelerometry in people with schizophrenia: A population-scale study of the UK Biobank. *Schizophrenia Bulletin*, sbx149. doi: 10.1093/schbul/sbx149

Foussias, G., Mann, S., Zakzanis, K. K., van Reekum, R., Agid, O., &Remington, G. (2011).

Prediction of longitudinal functional outcomes in schizophrenia: the impact of baseline motivational deficits. *Schizophrenia Research*, 132(1), 24–27.

doi:10.1016/j.schres.2011.06.026

Foussias, G. & Remington, G. (2010). Negative Symptoms in Schizophrenia: Avolition and

Occam's Razor. *Schizophrenia Bulletin*, 36(2), 359-369. doi:10.1093/schbul/sbn094

Gorczyński, P., Faulkner, G., Greening, S., & Cohn, T. (2010). Exploring the Construct Validity

of the Transtheoretical Model to Structure Physical Activity Interventions for Individuals with Serious Mental Illness. *Psychiatric Rehabilitation Journal*, 34(1), 61-64.

doi:10.2975/34.1.2010.61.64

Granholm, E., McQuaid, J. R., McClure, F. S., Link, P. C., Perivoliotis, D., Gottlieb, J. D.,

Patterson, T. L., & Jeste, D. V. (2007). Randomized controlled trial of cognitive behavioral social skills training for older people with schizophrenia: 12-month follow-up.

Journal of Clinical Psychiatry, 68(6), 730-737.

Kahn, E. B., Ramsey, L. T., Brownson, R. C. Heath, G. W., Howze, E. H., Powell, K.

E....Corso, P. (2002). The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine*, 22(4 Suppl.), 73–107.

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

Laursen, T., Munk-Olsen, T., & Vestergaard, M. (2012). Life expectancy and cardiovascular mortality in persons with schizophrenia. *Current Opinion in Psychiatry*, 25(2), 83-88.

doi: 10.1097/YCO.0b013e32835035ca

Long, B. J., Calfas, K. J., Wooten, W., Sallis, J. F., Patrick, K., Goldstein, M.,...Heath, G. (1996).

A multisite field test of the acceptability of physical activity counseling in primary care: project PACE. *American Journal of Preventive Medicine*, 12(2), 73–81.

Norman, R. M., Malla, A. K., McLean, T., Voruganti, L. P., Cortese, L., McIntosh, E., Cheng,

S., & Rickwood, A. (2000). The relationship of symptoms and level of functioning in schizophrenia to general well-being and the Quality of Life Scale. *Acta Psychiatr Scand*, 102(4), 303-309.

Stubbs, B., Firth, J., Berry, A., Schuch, F. B., Rosenbaum, S., Gaughran, F.,...Vancampfort, D.

(2016a). How much physical activity do people with schizophrenia engage in? A systematic review, comparative meta-analysis and meta-regression. *Schizophrenia Research*, 176(2-3), 431-440. doi:10.1016/j.schres.2016.05.017

Stubbs, B., Firth, J., Berry, A., Schuch, F. B., Rosenbaum, S., Gaughran, F.,...Vancampfort, D.

(2016b). How much physical activity do people with schizophrenia engage in? A systematic review, comparative meta-analysis and meta-regression. *Schizophrenia Research*, 176(2-3), 431-440. doi: 10.1016/j.schres.2016.05.017

Taylor, J., Stubbs, B., Hewitt, C., Ajjan, R. A., Alderson, S. L., Gilbody, S.,...Siddiqi, N. (2017).

The Effectiveness of Pharmacological and Non-Pharmacological Interventions for Improving Glycaemic Control in Adults with Severe Mental Illness: A Systematic

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

Review and Meta-Analysis. *PloS One*, 12(1), e0168549. doi:

10.1371/journal.pone.0168549

Vancampfort, D., De Hert, M., Stubbs, B., Ward, P.B., Rosenbaum, S., Soundy, A., & Probst, M.

(2015). Negative symptoms are associated with lower autonomous motivation towards physical activity in people with schizophrenia. *Comprehensive Psychiatry*, 56, 128-132.

doi:10.1016/j.comppsy.2014.10.007

Vancampfort, D., De Hert, M., Sweers, K., De Herdt, A., Detraux, J., & Probst, M. (2013).

Diabetes, physical activity participation and exercise capacity in patients with schizophrenia. *Psychiatry and Clinical Neuroscience*, 67(6), 451-456.

doi:10.1111/pcn.12077

Vancampfort, D., & Faulkner, G. (2014). Physical activity and serious mental illness: A

multidisciplinary call to action. *Mental Health and Physical Activity*, 7(3): 153-154.

Vancampfort, D., Stubbs, B., Mitchell, A. J., De Hert, M., Wampers, M., Ward, P. B., ... Correll,

C. U. (2015a). Risk of metabolic syndrome and its components in people with schizophrenia and related psychotic disorders, bipolar disorder and major depressive disorder: a systematic review and meta-analysis. *World Psychiatry*, 14(3), 339–347.

<http://doi.org/10.1002/wps.20252>

Vancampfort, D., Stubbs, B., Mitchell, A. J., De Hert, M., Wampers, M., Ward, P. B.,...Correll,

C. U. (2015b). Risk of metabolic syndrome and its components in people with schizophrenia and related psychotic disorders, bipolar disorder and major depressive disorder: a systematic review and meta-analysis. *World Psychiatry*, 14(3), 339-347. doi:

10.1002/wps.20252

ENHANCING PHYSICAL ACTIVITY IN PSYCHOSIS AND DIABETES

- Vancampfort, D., Correll, C. U., Galling, B., Probst, M., De Hert, M., Ward, P. B.,...Stubbs, B. (2016). Diabetes mellitus in people with schizophrenia, bipolar disorder and major depressive disorder: a systematic review and large scale meta-analysis. *World Psychiatry*, 15(2), 166-174. doi: 10.1002/wps.20309
- Vancampfort, D., Vansteenkiste, M., De Hert, M., De Herdt, A., Soundy, A., Stubbs, B., Buys, R., & Probst, M. (2014). Self-determination and stage of readiness to change physical activity behaviour in schizophrenia. *Mental Health and Physical Activity*, 7(3), 171-176. doi:10.1016/j.mhpa.2014.06.003.
- Vancampfort, D., Firth, J., Schuch, F. B., Rosenbaum, S., Mugisha, J., Hallgren, M.,...Stubbs, B. Sedentary behavior and physical activity levels in people with schizophrenia, bipolar disorder and major depressive disorder: A global systematic review and meta-analysis. *World Psychiatry*, 16(3), 308-315. doi: 10.1002/wps.20458