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Physical activity is associated with the physical, psychological, social and environmental quality of life in people with mental health problems in a low resource setting

Davy Vancampfort[a,b*], Tine Van Damme[a], Michel Probst[a], Joseph Firth[c,d], Brendon Stubbs[e,f], David Basangwa[g], James Mugisha[g,h]

[a]Department of Rehabilitation Sciences, KU Leuven, University of Leuven, Leuven, Belgium

[b]University Psychiatric Centre, KU Leuven, University of Leuven, Leuven-Kortenberg, Belgium

[c]NICM, School of Science and Health, University of Western Sydney, Australia

[d]Division of Psychology and Mental Health, University of Manchester, Manchester, UK

[e]Physiotherapy Department, South London and Maudsley NHS Foundation Trust, London, UK

[f]Health Service and Population Research Department, Institute of Psychiatry, Psychology and Neuroscience (IoPPN), King's College London, London, UK

[g]Butabika National Referral and Mental Health Hospital, Kampala, Uganda

[h]Kyambogo University, Kampala, Uganda;

*Corresponding author: Tervuursevest 101, 3001 Leuven, Belgium. Tel.: +32 2 758 05 11; Fax: +32 2 759 9879. Email: davy.vancampfort@kuleuven.be

Abstract

There is a growing recognition of the importance of encouraging patients with mental health problems to become more active as an efficacious strategy to reduce the disability-associated burden. The aim of the current study was to investigate if there are differences in quality of life (QoL) outcomes between people with mental health problems that do and do not meet the recommendations of 150 minutes per week of physical activity. 109 (36♀) Ugandan in- and outpatients (mean age=34.2±10.2 years) (depression=7, bipolar disorder=31, schizophrenia=21, alcohol use disorder=50) completed the Physical Activity Vital Sign (PAVS) method and World Health Organization Quality of Life Assessment brief version. Those who did not achieve the minimum physical activity recommendations as assessed by the PAVS (n=63) had a lower physical, psychological, social and environmental QoL. The current data offer further evidence that the PAVS method might be an important risk identification tool in people with mental health problems. The feasibility and acceptability of the PAVS may help promote

the importance of physical activity assessment and prescription as a core part of the treatment of mental health problems in LMICs.

Keywords: physical activity, exercise, quality of life, psychosis, bipolar disorder, depression, alcohol

1. Introduction

Mental health problems are the leading cause of disability in low to middle income countries (LMICs), accounting for almost 20% of all disability-associated burden (Whiteford et al., 2013). This burden is estimated to increase further in the decades to come (Metrics and Evaluation, 2013). Currently people with mental health problems worldwide die on average 14.5 years earlier, and this mortality gap increases up to almost 28 years in Africa (Hjorthøj et al., 2017). There is a growing recognition of the importance of encouraging patients with mental health problems to become more active as an achievable strategy to reduce the disability-associated burden and reduce the mortality gap (Firth et al., 2015, Firth et al., 2016; Rosenbaum et al;, 2014; Stubbs et al., 2016a, Vancampfort et al., 2015a) An essential first step in promoting an active lifestyle among people with mental health problems is to ensure routine assessment of the illness and current physical activity levels, including obstacles to PA participation in those who are currently inactive/sedentary (Sallis, 2011; Soundy et al., 2014). Without an understanding of current functional health status and current physical activity levels, it is difficult to advise patients as to how to optimize their physical activity habits to improve their functional status.

The QoL is an important patient-rated outcome that measures the impact an illness has on the functional health status as perceived by the patients themselves (Saarni et al., 2010). It is therefore an important target of interventions aiming to achieve functional recovery. Identifying determinants of QoL in people with mental health problems may also improve the focus of multidisciplinary treatment. Given that physical activity participation has been shown to improve a person's QoL in Western populations (Rosenbaum et al., 2014; Vancampfort et al., 2015b; Vancampfort et al., 2011), the concept of incorporating physical activity as an important strategy for every patient in order to improve their functional status has gained increasing attention among clinicians in recent years (Sallis, 2011). The International Organization of Physical Therapists in Mental Health Guidelines, for example,

(Vancampfort et al., 2012) recommends that people with mental health problems should achieve at least 150 min per week of moderate intensity (e.g., brisk walking) physical activity, or 75 min per week of vigorous physical activity (e.g., jogging).

One of the major challenges to physical activity promotion in mental health care settings, especially in LMICs is a lack of appropriate clinically relevant assessments tools (De Hert et al., 2011; Mugisha et al., 2016). Ensuring the availability of feasible, acceptable and culturally appropriate methods of assessing physical activity, such as self-report questionnaires, is therefore fundamental to physical activity promotion initiatives in low resource settings. The physical activity vital sign (PAVS) is an easy and quick to administer two-question measure to assess the adherence to the international recommendation of 150 minutes per week of moderate to vigorous physical activity. Previous studies in Western patients with bipolar disorder (Vancampfort et al., 2016a) and schizophrenia (Vancampfort et al., 2016b) in high income countries demonstrated that the PAVS assessment has clinical utility as a routine risk assessment. Patients who did not meet the physical activity recommendations had a higher body mass index and were at a significantly higher risk of cardio-metabolic diseases. However, to the best of our knowledge, there are no studies investigating the associations between physical activity behavior and the QoL in people with mental health problems in LMICs. This is an important research gap given the rapid increase in disability-associated burden in these countries, attributed mainly to lifestyle factors (Murray et al., 2015).

Furthermore, the association between QoL and physical activity behavior may differ in LMICs due to suboptimal treatment facilities (Chow et al., 2013; Patel et al., 2007) and differences in knowledge regarding the benefits of physical activity (Pengpid et al., 2015). Information regarding associations between physical activity behavior and QoL outcomes in people with mental health problems in LMICs could guide the design and delivery of targeted interventions in LMICs, especially now as most of these countries have started putting more effort in increasing access to mental health services at community level by integrating mental health into primary health care (Mugisha et al., 2017). The lack of studies from LMICs also highlights the gap between where most research is done and where the highest burden is expected. The aim of the current study was to investigate if there are differences in QoL outcomes between people with mental health problems that do and do not meet the recommendations of 150 minutes per week of physical activity as assessed by the PAVS-method. We

hypothesized that patients with mental health problems failing to achieve the physical activity recommendations according to the PAVS-method would have a lower QoL levels.

2. Methods

2.1. Participants and procedure

In two 3-month waves, all consecutive in- and outpatients who had ICD-10 diagnoses of schizophrenia, schizoaffective disorder, bipolar disorder, depression or alcohol use disorder as diagnosed by the treating psychiatrist of the Butabika National Referral Hospital, Kampala, Uganda, were invited to participate in this cross-sectional study. Participants were excluded if they had an absolute somatic contra-indication for normal physical activity participation according to American College of Sports Medicine (2009) including evidence of significant cardiovascular, neuromuscular and endocrine disorders). All participants were medically cleared by a general physical examination. Although pharmacotherapy is first-line treatment, all in- and outpatients were invited to exercise once a week (soccer, basketball, netball) or had the possibility to go for a walk. The exercise session is delivered by an occupational therapist. Individuals were included if they had partially remitted acute symptoms and were able to concentrate during the interview, as determined by the treating psychiatrist. All questionnaires were interviewer-administered in Luganda. The study procedure was approved by the ethics committees of Mengo Hospital and the Butabika National Referral Hospital. All participants gave their written informed consent.

2.2. World Health Organization Quality of Life Assessment brief version (WHOQoL-BREF)

Quality of life was assessed using the WHOQoL-BREF(Organization, 2004). The WHOQoL-BREF is a 26-item questionnaire developed from the original 100-item questionnaire the WHOQoL-100. The WHOQoL-BREF covers four different subscales: physical health (energy and fatigue, pain and discomfort, sleep and rest), psychological health (bodily image and appearance, negative feelings, positive feelings, self-esteem, thinking, learning, memory and concentration), social relationships (personal relationships, social support and sexual activity) and environment (e.g. financial resources, freedom, physical safety and security, health and social care). Each individual item of the WHOQoL-BREF is scored from one to five on a response scale. The scores are then transformed linearly to a 0–100 scale. Higher scores indicate a better QoL.

2.3. PAVS

Physical activity was assessed using the PAVS, comprising of two simple questions (Greenwood et al., 2010) in accordance with previous research (Vancampfort et al., 2016a; Vancampfort et al., 2016b). The first question was: “On average how many days per week do you engage in moderate to vigorous physical activity like a brisk walk?”. It was explained to patients that this meant the physical activity increased their heart rate, causing them to breathe more deeply and faster than normal, with some experiencing sweating. The second question was: “On those days, how many minutes on average do you engage in physical activity at this level?”. Next, the clinician multiplied the two responses together to calculate the minutes per week of self-reported moderate to vigorous physical activity and verified whether the patient was achieving the recommended target of 150 minutes per week of moderate to vigorous physical activity (yes=1; no=0) (Coleman et al., 2012; Sallis et al., 2015; Vancampfort et al., 2012).

2.4. Body mass index

Body weight and height were assessed in order to calculate the body mass index. Body weight was measured in light clothing to the nearest 0.1 kg using a SECA beam balance scale, and height to the nearest 0.1 cm using a wall-mounted stadiometer.

2.5. Chronic conditions

We reviewed the medical notes for the presence of any somatic conditions.

2.6. Statistical analyses

Data were assessed for normality using the Shapiro-Wilk test and found to be normally distributed. Descriptive statistics are presented as mean and standard deviation (SD). We first explored differences in QoL scores between patients with mood disorders (bipolar disorder and depression) versus patients with schizophrenia versus patients with alcohol use disorders using ANOVA. Next, differences in age, body mass index and QoL scores between those who met and those who did not meet the physical activity guidelines were assessed by an unpaired t-test while differences in gender

distribution and diagnostic subgroup [severe mental illness (bipolar disorder, depression, schizophrenia) versus alcohol use disorder] were assessed with Fisher's Exact tests. Since none of the variables were different between both groups (see results section), differences in QoL between those who adhere and those who did not adhere to the physical activity guidelines were investigated using an unpaired t-test. A priori, a level of significance was set at $P<0.05$. Statistical analyses were performed using the statistical package SPSS version 24.0 (SPSS Inc., Chicago, IL).

3. Results

3.1. Participants

A total of 115 consecutive in- and outpatients with mental health problems were invited to take part in the study. Two patients were excluded due to somatic contra-indications while four patients declined to participate. There were no missing data. In total, 73 men and 36 women were included. Seven patients had a primary diagnosis of depression, 31 bipolar disorder, 21 schizophrenia and 50 alcohol use disorder. All patients with alcohol use disorder were men. The mean age was 34.2±10.2 years. Twelve patients (11.0%) had a diagnosis of HIV/AIDS and all were receiving antiretroviral therapy (as recorded in the medical files). No other chronic somatic conditions were reported nor recorded in the medical files. Forty-six patients (42%) met the physical activity recommendations as established by the PAVS-assessment. There were no differences in physical (F=0.40, P=0.67), psychological (F=0.29, P=0.75), social (F=0.17, P=0.84) and environmental (F=0.18, P=0.84) QoL between the different diagnostic subgroups.

3.2. Differences in demographic characteristics and QoL between those who did achieve versus those who did not achieve the physical activity guidelines

Those who did not achieve the physical activity recommendations did not differ in age (33.9±10.8 versus 34.7±9.4 years, P=0.70), BMI (24.1±5.2 versus 24.3±6.1 years, P=0.86), gender (42/73 men versus 21/36 women, P=1.0) and diagnostic subgroup (23/59 in people with severe mental illness versus 23/50 in people with alcohol use disorder, P=0.56) compared with those who did adhere to the guidelines.

Those who did not achieve the minimum physical activity recommendations as assessed by the PAVS had significantly lower QoL across all domains, including reduced physical (50.3±12.2 versus 71.4±13.7, *P*<0.001), psychological (49.6±15.9 versus 70.3±15.8, *P*<0.001), social (41.4±20.9 versus 58.0±19.5, *P*<0.001) and environmental (51.3±14.8 versus 62.8±13.6, *P*<0.001) QoL.

4. Discussion

4.1. General findings

To the best of our knowledge, the current study is the first to examine QoL in people with mental health problems in LMICs in relation to their adherence to international physical activity guidelines. More than half of the participants (58.0%) did not meet the physical activity guidelines as assessed with the PAVS. This percentage of people with mental health problems not meeting PA guidelines in a low income country is higher than observed in patients from high income countries; where only ~43% do not meet the guidelines (Stubbs et al., 2016b). Our findings also confirm previous research findings from high-income countries; showing that people with mental health problems with higher physical activity levels have greater QoL scores (Vancampfort et al., 2015a; Vancampfort et al., 2015b; Vancampfort et al., 2011).

Of interest is that we found that meeting the physical activity guidelines was associated with greater QoL across all dimensions, i.e. physical, psychological, social and environmental QoL. Whereas the link between physical activity and physical QoL is easily ascribed to the health and fitness benefits of physical activity and the fact that lower physical activity levels are often associated with a range of physical comorbidities which might worsen an individual's physical QoL, the relationships between physical activity and other areas of QoL have yet to be fully explained. Nonetheless, one feasible explanation may be that the positive changes in health and fitness induce an improvement in mental health/psychological well-being, which in turn increases opportunities for engagement in social activities. Indeed, interventions which increase physical activity have been found to also improve social functioning among people with serious mental illness (Firth et al., 2015) and levels of social support have been shown to influence treatment outcomes in depression (Hallgren et al., 2017).

There is also good reason to hypothesise that lower physical activity levels, and the associated impairments in cardiorespiratory fitness, bring about a reduced QoL, although this was not

a focus in our study. In cases where cardiorespiratory fitness is limited centrally and peripherally (i.e. limitations in both the capacity to deliver oxygen to the working muscles, and the capacity of working muscles to uptake and utilise oxygen efficiently), impaired cardiorespiratory fitness may cause day-to-day activities to bring about undue fatigue (Pate, 1988); thus reducing QoL across various dimensions.

A further potential mechanism to explain the association between low physical activity and lower psychological QoL via cardiorespiratory fitness levels may be related to the association between cardiorespiratory fitness and the functional connectivity of the brain (Douw et al., 2014). Functional connectivity can be defined as the temporal dependence of neuronal activity patterns of anatomically separated brain regions (Aertsen et al., 1989). For example, evidence suggests that cardiorespiratory fitness is associated with better functional connectivity between the different regions of the brain (Douw et al., 2014). A better functional connectivity may be potentially explained by mechanisms such as (a) the enhancement of the endothelial function and decrease arterial stiffness, oxidative stress and vascular inflammation (Davenport et al., 2012); and (b) the improvement of oxidative capacity, promoted by the improvement of the mitochondrial function, angiogenesis, and upregulation of neurotrophic factors, including brain-derived neurotrophic factor (Voss et al., 2016). Next to this physical activity might influence the psychological QoL indirectly via e.g. distraction, increased self-esteem and a greater sense of mastery (Knapen et al., 2014).

Another consideration is that the link between physical activity and environmental QoL may operate in the reverse direction; with environmental factors influencing people's ability to undertake regular physical activity. For instance, previous research in Western countries already showed that that people with mental health problems who perceive their environment as unpleasant and unsafe are less physically active (Vancampfort et al., 2013a).

4.2. Practical implications

The current data underscore the importance of motivating patients with mental health problems to meet the international physical activity guidelines. The PAVS-method is a feasible and acceptable method of quickly (in < 1 min) identifying patients with mental health problems who do not comply with international physical activity guidelines in a low resource environment, and who therefore are at risk for a low QoL and in need of tailored interventions such as physical activity counseling. This is of high clinical significance given growing calls for novel, cost-effective interventions to reduce the burden of

mental health problems in LMICs. In particular, the brevity of the PAVS, along with the implementation of multidisciplinary care in all health care settings in LMICs, may help promote the importance of physical activity assessment and prescription as a core part of the treatment of people with mental health problems. Whilst physical therapists and exercise physiologists have a key role in leading the design and delivery of physical activity interventions, employing these specialists may not be feasible as standard care in low resource settings. Therefore, the existing work force should be trained to assess physical activity levels using the PAVS-questions, in addition to assessing the usual vital signs (Happell et al., 2014). Positive reinforcement should be given to patients achieving 150 min of physical activity, while advising them to maintain their physical activity behavior. Those patients who are not managing to achieve 150 minutes per week should be advised to become more active and informed about how to achieve this goal (e.g. brisk walking). Only when patients are experiencing low QoL scores and continue to struggle to be more physically active (Vancampfort et al., 2013b) may require further evaluation by a physical therapist or exercise physiologist (Stubbs et al., 2014).

4.3. Limitations and future research

The current findings, although promising, should be interpreted in light of some limitations. First, although our data offer further evidence for the concurrent validity of the PAVS-method to identify a low QoL, its “construct validity” and test-retest reliability in this vulnerable population are still unknown. Future research should test its reliability and compare the minutes of physical activity reported with the PAVS-method with objective activity measurement using accelerometers. Secondly, we did not include parameters such as socio-economic status, educational level, illness duration and psychiatric symptomatology to increase the external validity of the assessments. It is known that these factors are important correlates for physical activity participation in LMICs with a higher education, a higher socio-economic status, more severe symptoms and a longer illness duration associated with less physical activity (Stubbs et al., 2016; Vancampfort et al., 2017a; Vancampfort et al., 2017b). Thirdly, due to the cross-sectional nature of the study we were not able to make any firm conclusions regarding causality. Therefore, we cannot conclude whether participation in physical activity leads to higher QoL or improved QoL leads to a lifestyle (e.g. absence of limiting illnesses) more enabling for participation in physical activity.

Notwithstanding these limitations, our findings do indicate the potential for generating policy relevant information on promotion and evaluation of physical activity programs for people with mental health problems in LMICs. Programs aimed at improving the uptake of physical activity might encourage participation rates by making people aware of the potential benefits associated with participation. In terms of cost-effectiveness evaluations, the findings here reinforce the need for investigation into the economic impact of the QoL gains from PA interventions. Previous analyses have suggested that including such benefits, alongside the longer-term benefits resulting from reduced incidence of long-term conditions, will lead to an improvement in the cost effectiveness of interventions designed to increase physical activity (Wu et al., 2011). However, further research is required to understand the relationship between QoL improvements which might result directly from participation in physical activity as differentiated from improvements that result from sustained participation and reduced incidence of long-term conditions. Only examining these relationships will bring us in a position to accurately determine the cost effectiveness of interventions designed to promote physical activity for people with mental health problems in LMICs.

In conclusion, our study shows that patients with mental health problems in low resource settings who do not meet the recommended physical activity recommendations of 150 minutes per week, as assessed by the PAVS-method, are more likely to have lower scores across all dimensions of QoL. The current data offer further evidence that the PAVS method might be an important risk identification tool in people with mental health problems. The feasibility and acceptability of the PAVS may help promote the importance of physical activity assessment and prescription as a core part of the treatment of mental health problems in LMICs.

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None

Authors' contributions

DV, TVD, MP and JM designed the study. DV and JM were responsible for the data collection. MP performed the statistical analyses. DV and JM wrote a first draft and all co-authors assisted in the writing process. The final version was approved by all authors.

Declaration of conflicting interests

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Highlights

- The Physical Activity Vital Sign-method can identify those with a low quality of life.
- The economic impact of the quality of life gains from physical activity need to be explored.