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Exercise self-efficacy correlates in people with psychosis

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ABSTRACT

Despite the recognition of the importance of exercise self-efficacy in exercise adoption and maintenance, previous investigations on exercise self-efficacy in people with psychosis is scarce. The present study aimed to (1) explore if exercise self-efficacy differed between stages of behavior change in Ugandan outpatients with psychosis, and (2) assess sociodemographic, clinical and motivational correlates of exercise self-efficacy. In total, 48 patients (24 women) completed the Exercise Self-Efficacy Scale (ESES), the Patient-centered Assessment and Counseling for Exercise questionnaire, the Brief Symptoms Inventory-18 (BSI-18), and questions pertaining to intrinsic motivation in the Behavioral Regulation in Exercise Questionnaire-2. Additionally, participants were asked about their exercise behavior in the past 7 days and screened for cardio-metabolic risk factors. Higher ESES-scores were observed in those in the maintenance ($n = 17$) versus those in the pre-action stage ($n = 17$) of behavior change. Higher ESES-scores were also significantly associated with lower BSI-18 somatization and higher intrinsic motivation scores. Our data indicated that health care professionals should assist patients with psychosis in interpreting physiological states during exercise. Future research should explore whether bolstering such sources of information might directly or indirectly effect exercise self-efficacy.

1. Introduction

Exercise has important physical and mental health benefits for people with psychosis (Firth et al., 2015, 2017; Rosenbaum et al., 2014; Soundy et al., 2015; Vancampfort et al., 2015). Despite these benefits, dropout from exercise interventions is high. In a recent meta-analysis the dropout rate in 19 exercise trials in people with schizophrenia was found to be 26.7%, which is higher than in most other sedentary populations (Stubbs et al., 2016a). Therefore, determining the factors that contribute to continued exercise behavior in people with psychosis is of clinical relevance.

There is strong evidence that perceived self-efficacy is an important mediator of exercise behavior in people with schizophrenia (Beebe et al., 2010; Chuang et al., 2016; Gorczynski et al., 2014, 2010; Twyford and Lusher, 2016; Vancampfort et al., 2012). Self-efficacy is a psychological concept defined as an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977). The theory of self-efficacy argues that patients' confidence in their ability to perform exercise influences

their engagement and actual exercise performance, which in turn influences health outcomes (Bandura, 1982). Studies exploring exercise self-efficacy are however only based on studies from Western, high-income countries (Beebe et al., 2010; Gorczynski et al., 2014). The lack of studies from low- and middle-income countries (LMICs) highlights the gap between where most research has been completed and where the largest public health impacts of physical inactivity can be gained (Sallis et al., 2016). Exploring exercise self-efficacy in LMICs is of interest as most individual-focused behavior change models are found not to be applicable in LMICs and in immigrants from these countries (Rathod et al., 2017; Zimmerman et al., 2016). Therefore, we want to explore whether self-efficacy could explain exercise behavior in non-Western, low resourced settings. To this end, we will explore whether the level of self-efficacy differs across different stages of changes as defined by the transtheoretical model (TTM) of behavior change (Prochaska and DiClemente, 1992) in outpatients with psychosis in Uganda. Within the TTM, patients are placed into one of five stages: pre-contemplation (not considering changing their exercise behavior); contemplation (intending to change their exercise behavior in 6

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months); preparation (intending to change their exercise behavior in 30 days); action (engaged in exercise for less than 6 months); and maintenance (engaged in exercise for more than 6 months).

Despite the recognition of the prominent role of exercise self-efficacy in decisions of exercise adoption and maintenance in high-income countries, no information on exercise self-efficacy correlates is available on people with psychosis. This is likely due to an interest in demonstrating to what extent self-efficacy affects exercise behavior, rather than specifying and demonstrating factors that affect self-efficacy. Thus, it is important to identify factors associated with a person's exercise self-efficacy when trying to facilitate increased exercise participation in people with psychosis. In this study, we want to explore the associations of exercise self-efficacy, socio-demographic, mental and physical health parameters and intrinsic motivation in patients with psychosis. Intrinsic motivation refers to performing an activity due to its inherent satisfaction (Ryan and Deci, 2000). We hypothesize that higher levels of psychological distress, the presence of cardio-metabolic risks and lower levels of intrinsic motivation towards physical activity are associated with a lower exercise self-efficacy. Based on previous research (Clark and Nothwehr, 1999; Firth et al., 2016a; Wilcox et al., 2005) we hypothesize that increasing age, female gender and the presence of cardio-metabolic risks will be associated with lower exercise self-efficacy. Additionally, we hypothesized that individuals who perceive themselves to be less confident in their capabilities to participate in exercise are likely to experience less interest in such an activity.

In summary, the present study aimed to (a) explore if exercise self-efficacy differs between different stages of behavior change in a non-Western population of outpatients with psychosis, and (b) assess sociodemographic (age, gender), clinical (mental and physical health parameters), and motivational (the level of intrinsic motivation) correlates of exercise self-efficacy.

2. Methods

2.1. Participants and procedure

In a 3-month period all consecutive outpatients with a DSM 5 diagnosis of psychosis (delusional disorder, substance/medication-induced psychotic disorder, unspecified psychotic disorder, schizophrenia, schizoaffective disorder, bipolar disorder with psychotic features) as diagnosed by the treating psychiatrist of the Butabika National Referral Hospital, Kampala, Uganda, were invited to participate in this study. Individuals were included if they had a full or partial remission in psychotic symptoms and were able to concentrate during the interview as determined by the treating psychiatrist. All questionnaires were interviewer-administered. The study procedure was approved by the ethical committee of Mengo Hospital. All participants gave their written informed consent.

2.2. Exercise self-efficacy scale (ESES)

The ESES consists of 10 items about level of self-confidence with regard to performing regular physical activities and exercise (Kroll et al., 2007). A sample item is: "I am confident that I can overcome barriers and challenges with regard to physical activity and exercise if I try hard enough". Respondents answer using a 4-point scale: not at all true, rarely true, sometimes true, and always true. ESES scores ranged from 10 to 40, in which a higher score indicates a higher level of exercise self-efficacy.

2.3. Patient-centered assessment and counseling for exercise (PACE)

The Patient-centered Assessment and Counseling for Exercise (PACE) questionnaire (Long et al., 1996) was used to assess the stages of change as derived from the trans-theoretical model (Prochaska and DiClemente, 1992). The algorithm used was a single item followed by

four questions. In the present study, exercise was defined as performing physical activity of at least moderate intensity (activities that take moderate physical effort and make you breathe somewhat harder than normal) for a minimum 30 min per day (in at least 10 min bouts) at least five days of the week, and the four questions were used to determine the stage of change. Participants had to answer either 'yes' or 'no' to each of the following questions: (1) Do you currently engage in regular exercise? (2) Do you intend to engage in regular exercise in the next 6 months? (3) Do you intend to engage in regular exercise in the next 30 days? (4) Have you been regularly exercising for the past 6 months? If they answered 'no' to questions 1 and 2, they were classified as being in pre-contemplation. If they answered 'no' to questions 1 and 3, but 'yes' to question 2, they were considered to be in contemplation. If they answered 'no' to question 1, but 'yes' to question 3, they were classified as being in preparation. If they answered 'yes' to question 1, but 'no' to question 4, they were considered in action and, if they answered 'yes' to questions 1 and 4, they were considered to be in maintenance. In this study those in the (pre-) contemplation and preparation stages were labeled as being in the pre-action stage.

2.4. Brief symptoms inventory - 18 (BSI -18)

The BSI-18 (Derogatis, 2001) is a self-reported screening inventory designed to assess participants' level of psychological distress on three dimensions: somatization, depression, and anxiety. The 18 items are divided equally across the three dimensions and were presented with the standard instructions asking participants to rate how much they have been "distressed or bothered" in the past 7 days, including today, by the given symptom, using a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). Each item contributes to only one subscale, which is scored by summing the scores on each of the six subscale items. The three raw subscale scores range from 0 to 24.

2.5. Intrinsic motivation: behavioral regulation in exercise questionnaire 2 (BREQ-2)

We used the 4 items of the intrinsic motivation factor of the BREQ-2 (Markland and Tobin, 2004): (1) I exercise because it's fun, (2) I enjoy my exercise sessions, (3) I find exercise a pleasurable activity, (4) I get pleasure and satisfaction from participating in exercise. Each item is measured on a five-point Likert-scale, from 0 ('Not true for me') to 4 ('Very true to me').

2.6. Cardio-metabolic risks

We assessed the presence of three cardio-metabolic risk factors: (1) abdominal obesity, (2) hypertension, and (3) smoking. Waist circumference (WC) was measured to nearest 1 cm at the level of the umbilicus and at the end of expiration with the subject upright. Based on criteria for Sub-Saharan Africans, a waist circumference of > 90 cm is considered a cardio-metabolic risk factor for both men and women (Crowther and Norris, 2012; Kalk et al., 2011). Hypertension was diagnosed when the systolic pressure was ≥ 140 mmHg and/or diastolic pressure was ≥ 90 mmHg (Chobanian et al., 2003) or when taking anti-hypertensive medication. Blood pressure measurements were taken on the left arm with the participant in the sitting position using a calibrated electronic blood pressure device (Omron®). Two systolic and diastolic blood pressure measurements were taken at least five minutes apart. The average was used in this analysis. Smoking status was self-reported by participants. If they smoked, the mean number of cigarettes smoked per day was recorded. When patients fulfilled 2 of the 3 risks factors, they were we considered as at risk.

2.7. Medication use

Data on current use of antidepressants, mood stabilizers and

antipsychotics was collected from the medical records.

2.8. 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). ANOVA with post-hoc Scheffé was used to test for significant differences in exercise self-efficacy scores across the stages of change, while *t*-tests were used for differences between men and women, and between those with and without a cardio-metabolic risk profile. Associations of ESES, BSI-18 and BREQ-2 scores were assessed with Pearson's correlations and Partial correlations controlling for age and gender. A significance level was set at $P < 0.05$. SPSS 24.0 was used for the data analyses (SPSS Inc, Chicago, IL).

3. Results

3.1. Participants

A total of 50 consecutive outpatients with psychosis were invited to take part in the study of which two declined to participate because they were not interested in taking part in the study. There were no missing data. In total, 24 men and 24 women were included. The mean age was 33.3 ± 9.6 years. There were 10 patients with a cardio-metabolic risk profile (i.e. at least 2 risk factors). Fifteen patients (31%) had a waist circumference which was larger than 90 cm. For the entire sample, the mean waist circumference was 88.0 ± 13.3 cm. Eight patients (17%) had hypertension and eight patients (17%) smoked a mean of 2 ± 1 cigarettes per day. Forty-seven patients were on antipsychotic medication [chlorpromazine ($n = 22$), haloperidol ($n = 14$), trifluoperazine ($n = 7$), flupenthixol ($n = 2$) olanzapine ($n = 1$) and risperidone ($n = 1$)]. Fifteen patients were treated with carbamazepine and five with valproic acid. Antidepressants (fluoxetine) were taken by 2 patients. Nine patients reported not doing any physical activity during the last week. Of those being physically active, 29 performed aerobic activities while 10 also included strength exercises. Eighteen patients were physically active in a group setting (i.e. soccer, basketball or netball) while 21 performed physical activities alone (i.e. walking; brisk or for transport or jogging).

3.2. Differences in ESES scores between different stages of PACE, gender, cardio-metabolic risks groups

Significant differences in ESES scores were found between the different stages of behavior change ($F = 9.02$, $P < 0.001$). Post-hoc Scheffé analyses showed that a higher ESES score could be observed in patients in the maintenance ($n = 17$) than those in the pre-action stages (i.e. pre-contemplation stage, contemplation stage and preparation stage) ($n = 17$) (29.9 ± 7.0 versus 20.5 ± 6.2 , $P = 0.001$). There were no differences in ESES scores between the action stage group ($n = 14$, 25.4 ± 6.0) and the pre-action stage group ($P = 0.12$). The scores for ESES did not differ significantly between the action stage group and the maintenance stage group ($P = 0.17$). Men had higher ESES scores than women (27.5 ± 7.7 versus 23.0 ± 6.7 , $t = 2.16$, $P = 0.036$). No differences were found between those with and without a cardio-metabolic risk profile (25.0 ± 8.2 versus 25.3 ± 7.4 , $t = 0.12$, $P = 0.91$).

3.3. Correlations between BSI-18, BREQ-2 and ESES scores

An overview of the Pearson's and Partial correlations between BSI-18, BREQ-2 and ESES scores is presented in Table 1. The overall ESES score (25.2 ± 7.5) was significantly ($P = 0.038$) associated with the BSI-18 somatization score and with the BREQ-2 intrinsic motivation score ($P = 0.001$). When controlling for age and gender, only the BREQ-2 intrinsic motivation score remained a significant contributor ($P = 0.002$).

Table 1

Correlations between BSI-18, BREQ-2 and ESES scores in outpatients with psychosis ($n = 48$).

	Mean	SD	Pearson <i>r</i>	<i>P</i>	Partial <i>r</i>	<i>P</i>
Age (years)	33.3	9.6	0.12	0.42	/	/
BSI-18 Somatization	11.5	4.5	- 0.30	0.038*	- 0.28	0.057
BSI-18 Anxiety	10.8	4.3	- 0.11	0.46	- 0.16	0.28
BSI-18 Depression	11.5	5.3	- 0.24	0.10	- 0.24	0.11
BSI-18 Total score	33.8	12.6	- 0.25	0.09	- 0.26	0.09
BREQ-2 Intrinsic motivation	2.6	0.8	0.47	0.001*	0.44	0.002*

* Significant when $P < 0.05$, SD = standard deviation, Pearson *r* = Pearson correlations with the Exercise Self-Efficacy Score, Partial *r* = Partial correlations controlled for age and gender with the Exercise Self-Efficacy Score BSI-18 = Brief Symptoms Inventory - 18, BREQ-2 = Behavioral Regulation in Exercise Questionnaire - 2.

4. Discussion

4.1. General findings

To the best of our knowledge, the current study is the first to explore if exercise self-efficacy differs between different stages of behavior change in a non-Western population of outpatients with psychosis (first aim). Our data show that in Ugandan outpatients with psychosis higher exercise self-efficacy levels can be observed in those who are exercising for more than 6 months compared to those who are not yet physically active. This finding is in agreement with a similar study in 44 Canadian patients with severe mental illness (Gorczyński et al., 2010). Our data demonstrate that also in non-Western low resourced settings attention should be given to exercise self-efficacy when trying to engage people with psychosis in maintaining an active lifestyle. Few attempts have been made however to examine those factors and therapeutic techniques that are associated with increases in exercise self-efficacy. Previous studies in people with schizophrenia spectrum disorder (Beebe et al., 2010; Gorczyński et al., 2014) demonstrated that (a) motivational interviewing, (b) exploring past, present and future exercise interests; (c) assisting in goal setting, (d) providing suggestions on reducing common exercise discomforts, and (e) information on exercise benefits and how to overcome barriers might be useful.

A second aim of the current study was to assess sociodemographic, clinical and motivational of the exercise self-efficacy of a person with psychosis. First of all, we did observe that a higher level of somatization was associated with lower levels of exercise self-efficacy, although this association was not significant ($P = 0.057$) anymore when controlling for age and gender. There was however no difference in the level of somatization symptoms between men and women ($P = 0.38$), nor a significant association between somatization levels and age ($r = 0.04$, $P = 0.76$). Associations between somatization symptoms and exercise self-efficacy do indicate that health care professionals should consider impressions of physiological states during exercise. For example, health care professionals could assist patients with psychosis in interpreting the level and gradual change in the degree of symptoms of fatigue, tension, physical discomforts and cardiorespiratory responses. Second, our data also show that, in agreement with previous research in socioeconomically disadvantaged populations (Clark and Nothwehr, 1999), men have higher exercise self-efficacy levels. More research is however needed to explore these gender differences.

4.2. Limitations and future research

Caution is needed in interpreting our findings as this was a cross-sectional study and cause and effect cannot be clarified. It might be hypothesized that since exercise is often initiated for external reasons (such as weight loss, mood improvement or stress reduction) (Firth et al., 2016b), only once a person perceives himself more competent, intrinsic motivation increases (Vancampfort et al., 2013). On the other

hand, it might be as well that the intrinsic interest in exercise and consequently regular practice increases the self-efficacy. Longitudinal research is needed to disentangle the directionality of our findings. Secondly, the limited sample size and the lack of data on marital status, educational status and occupation status reduces the generalizability of our findings.

Future research should also explore the relationship between the interference of somatization symptoms and psychotic symptoms and exercise self-efficacy in people with psychosis. Next to this, future research in people with psychosis should focus on how to increase self-efficacy via mastery experiences. Mastery experiences represent experiences from when a person has been successful in accomplishing a specific exercise target in the past, and thus constitutes an authentic indicator of one's ability to accomplish similar targets in the future. Mastery experiences are considered the strongest source of self-efficacy beliefs (Bandura, 1997), and prompting mastery experience in interventions has been found to be an effective way to increase self-efficacy beliefs for exercise in a wide range of clinical conditions (Ashford et al., 2010). Future research could also focus on the importance of social modelling, (e.g. the role of observing successful peers on exercise self-efficacy). A recent review (Stubbs et al., 2016b) indicated that there is currently inconsistent evidence to support the use of peer-support interventions to improve the physical health and promote lifestyle change among people with severe mental illness. Stubbs et al. (2016c) concluded that due to small sample sizes, heterogeneity of interventions, outcome measures, and lack of clarity about the unique contribution of peer-support, no definitive conclusions can be made about the benefits. Therefore, future exercise interventions should explore the extent to which vicarious experiences (i.e. seeing a 'similar other' successfully perform exercise and appraising one's own performance against the performance of that similar other (Bandura, 1997)) enhance self-efficacy and thus exercise behavior, and those delivering exercise interventions should provide participants with feedback by comparing an individual's exercise performance with that of similar others.

In summary, our data show that also in low resourced non-Western setting exercise self-efficacy is of importance for the maintenance of exercise behaviors in people with psychosis. Our data indicate that health care professionals should consider somatization symptoms and intrinsic motives for being physically active when trying to increase the exercise self-efficacy of a person with psychosis. Longitudinal and intervention research are however needed before any rigorous claims can be made.

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Conflicts of interest

None.

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