Brief intervention to improve physical activity in men with psychosis and obesity: a feasibility study.

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Brief theory-based intervention to improve physical activity in men with psychosis and obesity: a feasibility study.

Abstract

Physical activity (PA) is recommended to improve physical health in people with psychosis, however, most of them are inactive. The objectives of the study were to assess the feasibility of a four-week brief intervention to improve PA in men with psychosis and obesity. Feasibility, the participation, and the drop-out intervention rates were evaluated. PA, sedentary time, motivational processes of change, and anthropometric measures were evaluated. Thirty-eight men with psychotic disorders were approached and 32% participated ($n = 12$). Among these 12 participants (75% with schizophrenia; age: 33.2 ± 10.2 , Body Mass Index: $35.8 \pm 7.7 \text{ kg/m}^2$), 100% completed the intervention. Participants reported a high satisfaction rate in the intervention. Following the intervention, PA level was increased with a moderate effect size. Similarly, an increase in behavioral processes of change was observed with a moderate effect size. Hence, the brief intervention was feasible and could probably improve PA level.

Keywords: motivation, theory, implementation intention, processes of change, exercise

Mots-clés: motivation, théorie, implémentation d'intention, processus de changement, activité physique

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Introduction

People with psychotic disorders, such as schizophrenia or schizophrenia-spectrum disorders, are more likely to have a poor health compared to the general population (Stubbs et al., 2016b; Vancampfort et al., 2015b) including increased metabolic syndrome (Correll et al., 2017; Vancampfort et al., 2015b), and obesity being the most prevalent condition (Mitchell et al., 2013). Although these obesity rates could be partly explained by the antipsychotic medication, the unhealthy habits of people with schizophrenia should not be neglected. In fact, in addition to their poor dietary intake (Teasdale et al., 2019), population-based studies showed that people with schizophrenia are more likely to be sedentary (approximately 13 hours per day and defined as time spent in sitting, reclining or lying posture excluded sleeping), but also more inactive (defined as failure to meet physical activity recommendations) (Andersen et al., 2018; Stubbs et al., 2016a, 2016c).

Physical activity is recommended as an important strategy to manage obesity but also improve overall health in people with psychosis (Vancampfort et al., 2019). Indeed, several studies showed its beneficial effects on several outcomes including weight management, cardiovascular health, functioning, or psychotic symptoms (Dauwan et al., 2016; Firth et al., 2017; Ohi et al., 2018; Romain et al., 2019; Rosenbaum et al., 2015). However, despite the positive effects of physical activity, people with psychosis may experience many barriers to its practice (Bernard et al., 2013; Firth et al., 2016) and research consistently showed that lack of motivation is the most prominent along with poor social support from health professionals (Romain et al., 2020; Ussher et al., 2007). Nevertheless, even though motivation has been consistently showed as a barrier to physical activity in people with psychosis, previous studies also highlighted that they are ready to be more active (Subramaniapillai et al., 2016; Ussher et

al., 2007). Therefore, it is possible that people with psychosis had difficulties to overcome their intention – behaviour gap regarding physical activity practice (Gollwitzer and Sheeran, 2006; Sailer et al., 2015). One possibility to address this issue is the use of brief interventions. Brief interventions are opportunistic short-duration interventions (1 to 20 minutes) (Lamming et al., 2017) which offered the possibility to be used in clinical routine by health professionals (Lawlor and Hanratty, 2001, National Institute for Health and Care Excellence, 2006, 2013) and are used in different health contexts (e.g., nutrition, alcohol reduction, obesity) (Armitage et al., 2014b; Aveyard et al., 2016; Whatnall et al., 2018). In a physical activity context, brief intervention can be defined as any “intervention involving verbal advice, encouragement, negotiation or discussion with the overall aim of increasing physical activity delivered in a primary care setting by a health or exercise professional, with or without written support or follow-up” (National Institute for Health and Care Excellence, 2013). These interventions are particularly relevant given lack of time is a barrier to physical activity promotion in health professionals (Happell et al., 2012). Furthermore, these type of opportunistic interventions are also particularly suited for people who are less likely to use health services such as men (Affleck et al., 2018). Finally, brief interventions can be based on theoretical models of motivation to better tailor their contents (Armitage and Arden, 2010). This last aspect is particularly important as previous reviews showed that theory-based interventions improve physical activity in the general population (Gourlan et al., 2016) but also in people with psychosis (Ashdown-Franks et al., 2018; Farholm and Sørensen, 2016; Romain et al., 2020). The rationale to focus on motivational theory-based interventions is that they could be more replicable given they provide mechanisms or psychological processes explaining why interventions are successful (Bernard et al., 2018; Glanz and Bishop, 2010; Knittle et al., 2018). In brief intervention, two theories are widely used: the implementation intentions (Armitage, 2008; Gollwitzer and Sheeran, 2006) with the If – then plans and the transtheoretical model (Prochaska and DiClemente, 1982). The

transtheoretical model is a composite model of behaviour change with three core components being decisional balance (perceived advantages/ disadvantages related to the decision to change a behaviour), self-efficacy (individuals' judgment of their abilities to organize and execute courses of action required to attain designated types of performance) and the ten processes of change (five experiential and five behavioural strategies used by individuals to modify their behaviour) (Prochaska et al., 2008). Several studies showed this model to improve physical activity in different populations (Gourlan et al., 2016; Ahmed Jérôme Romain et al., 2018).

In terms of effects on physical activity, brief interventions have been found to improve physical activity in different populations (e.g., type 2 diabetes; inactive adults, obesity) (Aveyard et al., 2016; Lamming et al., 2017) and to be cost-effective (Gc et al., 2016). In people with schizophrenia, to the best of our knowledge, only one study investigated brief interventions (Sailer et al., 2015) and found increased attendance to jogging sessions. However, this previous study was not specifically conducted among people with psychosis and overweight/obesity although antipsychotic-induced weight gain is a barrier to physical activity (Bernard et al., 2013). Moreover, this study did not have written material while this strategy could facilitate interventions among people with potential cognitive deficits, or poor functioning such as men with psychosis (Ochoa et al., 2012). In addition, men with psychosis are more likely to die of cardiovascular diseases (Sommer et al., 2020) while having a lower use of health services compared with women (Affleck et al., 2018; Matheson et al., 2014). Therefore, it was necessary to examine whether a brief theory-based intervention could be feasible and effective in men with psychosis and obesity. The aim of the present study was to investigate the feasibility of a brief theory-based interventions to promote physical activity in men with obesity and psychosis. The secondary objective was to analyze the limited-efficacy testing (Bowen et al., 2009) of the intervention on physical activity, motivation to physical activity, anthropometric measures, and participants' subjective effects. It was hypothesized the study to be feasible in terms of

participation rate, accompanied by an improvement in total physical activity and a reduction in sedentary time. It was also expected an improvement in the motivational processes of change (notably in the behavioral processes of change), and that participants reported the study to be beneficial on their health. Finally, given the study duration, no changes were expected in anthropometrics measurement.

Methods

Compliance with ethical standards

Ethical approval

The present protocol was approved by the ethics committee of [masked for review] (#2016-179_82) in February 2017.

Informed consent

Informed written consent was obtained by the research nurse for all participants included in the study.

Settings

Participants were recruited over a 2-month period between March and May 2017 in community health services in the region [masked for review] (masked for review, Canada) and were referred by the case manager - who were not involved in the intervention. None of the investigators were involved in the treatment of the participants or worked in these mental health services at the time of study.

Exclusion and inclusion criteria

To be included, participants had to meet the following criteria: 1) men, 2) being 18 years old or older, 3) having a diagnosis of psychotic disorders (e.g., schizophrenia, schizophrenia-

spectrum disorder) according to the DSM-V criteria, 4) with overweight/obesity (body mass index, $BMI \geq 25 \text{ kg/m}^2$), 5) being able to answer the questionnaires.

The exclusion criteria were as follow: 1) medical contra-indication to physical activity, 2) being unable to complete the questionnaire, 3) meeting the physical activity recommendations.

Criteria were checked by a nurse not involved in the intervention and double checked by the research nurse [masked for review].

Design

The present study was a feasibility open trial with a quasi- experimental pre- post design and had a four weeks duration per participants to be completed. The trial was composed of three steps (baseline/intervention, intervention booster, final evaluation) (figure 1). At baseline, demographics information, physical activity, sedentary time, processes of change, and anthropometric measures were collected. Two weeks following this first step, a booster session was realized, and no evaluation was done. At the final evaluation, which was two weeks following the booster session, the same measures, excepted demographics, were collected. In addition, the feasibility and the subjective evaluation were assessed only at this step.

Intervention

The volitional help sheet component.

The brief intervention was based on a volitional help sheet develop by Armitage (2008) (Armitage, 2008) including the If-then plans. The volitional help sheet was used because participants did not have to generate their own critical situations and strategies as they are provided in the sheet (Armitage et al., 2014a). Hence, the volitional help sheet was a strategy to address the possible cognitive impairment of our population. Regarding the transtheoretical

model, previous studies showed that interventions specifically based on this model should integrate all its components (Gorczyński et al., 2010) with a specific focus on the processes of change as they were found to drive physical activity changes (Nigg et al., 2019).

Consequently, to integrate all theoretical components (decisional balance, self-efficacy, processes of change) and create the if – then plans using the volitional help sheet (Armitage and Arden, 2010), the intervention was delivered as follows: firstly, participants were asked about a physical activity they would like to initiate. If they could not provide one, walking was suggested given previous research consistently underlined this activity as preferred among people with psychosis (Subramaniapillai et al., 2016), included among men or individuals with obesity (Romain et al., 2020). Then, on a specific sheet, participants were presented different situations that are known to be physical activity barriers (decisional balance) in people with psychosis (Firth et al., 2016). After this step, participants were invited to select, among the 10 proposed strategies (five experiential and five behavioral as in the transtheoretical model) (Lipschitz et al., 2015), the most appropriate for them to overcome this barrier (processes of change). Once the if-then plan formed, participants were orally asked about their confidence (from 0 to 100%) to realize this plan (self-efficacy). If participants provided an answer below 60%, they were invited to re-create a new if-then plan that could improve their confidence.

This way to use the if-then plan was based on several articles showing that a) motivational theory-based interventions improve physical activity (Gourlan et al., 2016), b) there is no evidence of superiority among existing motivational theoretical models in terms of efficacy regarding physical activity improvement (Gourlan et al., 2016), c) interventions using the transtheoretical model were effective if all theoretical components were integrated - to be considered as theory-based and not theory-inspired (Ntoumanis et al., 2018; Romain et al., 2018), d) interventions using the transtheoretical model improved physical activity when there were a specific focus on self-efficacy and processes of change but not stages of change (Nigg

et al., 2019; Romain et al., 2018), e) interventions using the transtheoretical model among people with psychosis were found to modify its underpinning components as theoretical expected (Gorczynski et al., 2014, 2010).

Intervention setting.

The intervention itself consisted of two meetings. During the first meeting, after the evaluations were completed, the brief intervention (5 to 10 minutes maximum) with the if-then plan and the volitional help sheet was realized with the participant. Two weeks later, during the second meeting, a booster session was conducted. During this session, the physical activity if-then plan was revised and adjusted if necessary. At this step, there were two possibilities. If the participants failed to achieve what they planned, a new if-then plan was created as previously described. Otherwise, if the participant was successful, it was reinforced in this plan and was asked to continue. Nevertheless, they had the possibility to re-create a if – then plan if wanted. Finally, two weeks following this second step, the final evaluation was performed.

Health professional.

The present intervention was conducted by a registered nurse [masked for review] who had five years of experience in care in people with mental disorders. He received three training sessions (one hour per session) by one of the investigators [masked for review] before the beginning of the study. During these sessions, the nurse was trained to use the volitional help sheet and role-playing games were used.

Measures

Demographics.

Participants were asked about their age, tobacco status, education level, socio-professional status, diagnosis and medication. The health professionals who referred the participants provided the diagnosis.

Feasibility.

The feasibility of the intervention was assessed with different methods.

First, with a 3-item questionnaire (Theriault, 2014), participants were asked the following questions at the end of the intervention: 1) would you recommend this intervention to friends or family members ?, 2) if you had the possibility to continue the project, would you do it ?, 3) did the project meet your expectations ?

Feasibility was also evaluated using the participation rate to engage in the project and the drop-out rate once engaged in the intervention. Participation rate was defined as the number of participants meeting the inclusion criteria who accepted to participate in the study, and the drop-out rate as the number of participants who started the project but further decided to withdraw from it.

Subjective evaluation of the intervention effects.

To evaluate whether participants felt improvements following the intervention, a questionnaire dedicated to the present project was realized. This questionnaire had 9 items and was completed with the nurse and participants were offered to write their responses if wanted, to provide more details. These questions were 1) did you observe any improvement in your physical health? 2) did you observe any improvement in your psychological health?, 3) did you feel any improvement in your self-esteem?, 4) does this project enabled you to make changes in other behaviors? 5) did you notice any change in your psychiatric symptoms? 6) Has this research project encouraged you to do more physical activity? 7) do you feel your energy level

has improved? 8) Do you think you are more motivated to walk on longer distances? 9) Do you believe you are in a better physical condition compared with the last year?

Physical activity level.

Physical activity and time spent in sedentary activities were evaluated using the Global physical Activity Questionnaire (GPAQ) (Bull et al., 2009). With 16 items, the questionnaire assessed different amounts of physical activity (total, vigorous and moderate) in different contexts (working, transportation, and leisure time). In the present study, only total physical activity (minutes /week), sedentary time (in hours / week) were selected. The questionnaire was completed using an interview-administered method by the nurse to minimize the physical activity over-reporting bias (Chu et al., 2015) notably among those with reading issues

Motivation to physical activity.

Processes of change and stages of change were evaluated.

Processes of change were evaluated using the F-processes of change questionnaire (Bernard et al., 2014). This questionnaire assessed the five experiential (consciousness-raising, dramatic relief, self-reevaluation, environmental reevaluation and social liberation) and the five behavioral processes of change (self-liberation, helping relationships, counter-conditioning, reinforcement management and stimulus control) on a 5-point Likert scale with anchors going from 1 (never) to 5 (repeatedly). It has been found to be invariant according to sex, socio-professional status and obesity (Bernard et al., 2014; Romain et al., 2016), and associated with physical activity in people with psychosis (Gorczynski et al., 2010; Romain and Abdel-Baki, 2017).

Stages of change were evaluated using the French translation [REDACTED] of the stages algorithm (Nigg et al., 2005). The algorithm had four questions with a dichotomous response choice. According to their responses, participants were classified in one of the five

stages. In the present study, participants were classified in pre-action stages (precontemplation, contemplation, preparation) or post-action stages (action, maintenance). This measure was used only for descriptive purposes.

Anthropometric measures.

One investigator (masked for review) measured weight, height and waist circumference and body mass index (BMI) calculated. Height and weight were measured wearing light clothing and no shoes.

Waist circumference was evaluated with participants stand in an upright position with their arms across their chest. Waist circumference was measured twice using a tape measure at the iliac crests at the end of a normal expiration as recommended (Poirier and Després, 2003). The measure was recorded at 0.1 cm precision using a non-stretch tape. Waist circumference was measured twice and the mean between these two measures was used.

Statistical analyses

To analyze the satisfaction, and the feasibility, frequency statistics were used. To select the appropriate test, data were checked for normality with the Shapiro-Wilk test. If normal, to analyze the intervention's effect on physical activity and the other parameters (sedentary time, experiential and behavioral processes of change, BMI, waist circumference), paired sample t test were used. If data were not normal, the Wilcoxon rank test was used. To understand the intervention's effects, and given the present study was not powered to detect effects of the intervention, Cohen's *d* for paired sample was used as a measure of effect size and by definition 0.2, 0.5 and 0.8 represent small, moderate and large effect size. Statistical analyses were performed with JAMOV. Effect size and its 95% confidence intervals were run using Rstudio and the 'effect size' package.

Results

Participants enrolment

Over the 38 participants approached, 12 were recruited (reasons for non-inclusion are in figure 2). Regarding the 12 participants' characteristics (table 1), the main diagnosis was schizophrenia (75%; $n = 9$), mean age was 33.2 ± 10.2 , and mean BMI $35.8 \pm 7.7 \text{ kg/m}^2$. Also, 75% ($n = 9$) were smokers, 67% achieved a secondary school degree ($n = 7$) and 83% were unemployed ($n = 10$). At baseline, 92% of participants were in pre-action stages

Feasibility

In terms of feasibility, the 12 included participants (indicating a participation rate of 32%) were recruited in eight weeks. All participants (100%) completed the intervention. Based on the questions, 92% ($n = 11$) of participants reported they would refer a friend or a relative to the project, 92% ($n = 11$) said they would want to continue the project and 83% ($n = 10$) reported that the project met their expectations.

Volitional help sheet results

To create their if-then plans, the most selected physical activities were walking (59%, $n = 7$), indoor training (25%, $n = 3$), cycling (8%, $n = 1$) and soccer (8%, $n = 1$).

At baseline, main reported physical activity barriers were weather (33%, $n = 4$), anxiety (25%, $n = 3$), and depressed mood (17%, $n = 2$) (table 2). To overcome these barriers, the main selected processes of change selected by the participants were helping relationships (17%, $n = 2$), dramatic relief (17%, $n = 2$), reinforcement management and counter-conditioning (table 2).

Regarding the if – then plans, 75% ($n = 9$) of participants met their physical activity goals.

During the second meeting, the main barriers were the weather (33%, $n = 4$), and depressed mood (17%, $n = 2$). The main selected processes of change were self-liberation (25%, $n = 3$), and dramatic relief (25%, $n = 3$).

Intervention effects

Subjective evaluation.

When participants were asked for their subjective evaluation of the intervention's effects, almost all reported (92%, $n = 11$) an improvement in their energy level, 83% ($n = 10$) felt more motivation to walk on longer distance and 75% ($n = 9$) reported to exercise more following the beginning of the intervention. Also, 75% ($n = 9$) reported a better self-esteem and 67% ($n = 8$) mentioned an improvement in their physical and psychological health. Moreover, 60% ($n = 7$) reported the intervention helped them to change another health behavior (e.g., sleeping, tobacco cessation or eating). Finally, 58% ($n = 6$) reported an improvement on their psychiatric symptoms.

Physical activity and sedentary time.

Regarding total physical activity, the Shapiro-Wilk test of normality indicates a violation of this assumption and the Q-Q plot indicates the presence of one outlier. Using the Wilcoxon rank test, an increase of +142.0 minutes (standard error = 114; $p = 0.004$) was observed after the intervention with a moderate effect size ($d = 0.56$, 95%CI[-0.07, 1.21]). Given the potential impact of extreme values with such small sample size, the analysis was re-run without the outlier. Following this step, the pre-post intervention mean difference in total physical activity indicated a difference of +110.0 minutes (standard error = 37.6; $p = 0.01$) along with a large effect size ($d = 0.89$, 95%CI[0.21, 1.61]). Regarding physical activity from walking, an increase of +45.6 minutes (standard error = 22.9; $p = 0.01$) after the intervention along with a large effect size ($d = 0.82$, 95%CI[0.15, 1.53]) was observed.

Regarding sedentary time, a decrease of -1.67 hours/ day (standard error = 0.89; $p = 0.08$) was observed after the intervention with a moderate effect size ($d = -0.54$, 95%CI[-1.19, 0.08]) (table 2).

Processes of change.

Regarding the processes of change, no change was observed in the experiential processes of change (-0.012, standard error = 0.18; $p = 0.47$) after the intervention and the effect size was small ($d = 0.14$, 95%CI[-0.45, 0.74]). However, an increase in the use of behavioral processes of change was observed following the intervention (+0.30, standard error = 0.18, $p = 0.06$) along with a moderate effect size ($d = 0.38$, 95%CI[-0.23, 1.00]) (Table 2).

Anthropometric measures.

No results following the intervention were noted and effect size were small either for weight ($p = 0.76$), BMI ($p = 0.88$), or waist circumference ($p = 0.24$) (Table 2).

Discussion

In the present study, the objective was to assess the feasibility, then the limited-testing efficacy of a brief intervention using a volitional help sheet to improve physical activity in men with psychotic disorders and obesity. In terms of feasibility, with a participation rate of 32%, our study illustrated the difficulty to engage people with mental disorders in research activities as shown in previous studies (Barnes et al., 2012; Jørgensen et al., 2014). Several factors could explain this participation rate. First, the role of psychiatric symptoms in this participation rate should be considered because several participants refused to take part to the project because of their psychotic symptoms or due to their depressed mood. This result is not surprising as negative symptoms and poor social functioning are known to impair physical activity engagement in people with schizophrenia (Ohi et al., 2018; Romain et al., 2019). Another explanation could be the initial level of motivation given that in our study, 92% of participants

were in the preparation stage, which means they were ready to increase their physical activity (ref Archie). So, it is possible that we did not reach participants who had no interest in physical activity (so, those who are mainly in the precontemplation and contemplation stages). Nevertheless, it remains possible that other factors not evaluated in the present study (e.g., substance use, peer support) could explain the low participation rate (Dixon et al., 2016). However, given we reached our recruitment in the planned time (8 weeks), the present participation rate indicates that our strategy to involve health professionals in research purposes, as recommended (Hughes-Morley et al., 2015), was accurate. Regarding the drop-out rate, all participants completed the intervention. This low drop-out rate can be explained on one hand by the short intervention and research protocol duration (four weeks) and on the second hand, by the low number of meetings in which the investigator was involved. Similarly, the satisfaction rate with the intervention was excellent with 83% to 92% of participants reporting the intervention as satisfactory what indicated that the intervention was adequately developed for this population as previous research underlined that retention rate in lifestyle intervention remains a challenge in people with severe mental illness (Firth et al., 2015; Ward et al., 2015). Moreover, these findings probably indicate that the intensity of the intervention was adequate for participants, and the research nurse. This last point is particularly important as health professionals report multiple barriers regarding the provision of opportunistic behaviour change intervention, including the beliefs that these interventions would be poorly received by patients or skepticism about their ability to provide these interventions (Keyworth et al., 2019).

In terms of participants' subjective evaluations about the project, they reported several improvements on their health, notably their physical fitness but also their psychological health. These results are in line with previous findings highlighting the benefits of physical activity (Dauwan et al., 2016; Firth et al., 2015; Vancampfort et al., 2015a). Moreover, the results

pointed out that some subjective improvements could be seen after 1 month with intervention as short as 2 meetings.

In terms of intervention, we noted an increase in the total physical activity level, and in the walking level among our participants along with moderate to large effect sizes. These results underlined that the brief intervention using the volitional help sheet is interesting to increase physical activity in men with psychosis and that behavior change is possible in this population (Ashdown-Franks et al., 2018; Farholm and Sørensen, 2016). Moreover, this result corroborates the hypothesis that people with psychosis preferentially used walking as their main activity (Subramaniapillai et al., 2016) and that this activity should be privileged when trying to initiate physical activity also because of its association with motivational features (St-Amour et al., 2019).

Interestingly, in terms of motivational strategy, the increase in physical activity was associated with an increase in the use of behavioral, but not experiential, processes of change with a moderate effect size. This finding corroborates results from a previous cross-sectional study in people with psychotic disorders and obesity [masked for review]. Indeed, this previous study compared inactive and active people with psychotic disorder and obesity, and underlined that the latter had a higher use of behavioral processes of change [masked for review]. Furthermore, as in the present study, the previous cross-sectional study did not show any associations between physical activity and experiential processes of change [masked for review]. In terms of theoretical advancement, this set of results suggests a possible more prominent role of behavioral processes of change, compared with experiential processes of change, in physical activity behavior change (Rhodes and Pfaeffli, 2010). So, future studies should consider this point when developing future physical activity interventions.

However, the increase in physical activity should not hide the absence of results on the time spent in sedentary time, even though this finding should be tempered as a reduction of 1.6

hours per day along with a moderate effect size was observed. So, given the present study was a pilot, this result is encouraging for future interventions. Nevertheless, this finding also shed light on fact that interventions being effective on physical activity increase are probably not the same that are effective on sedentary time reduction (Ashdown-Franks et al., 2018). So, given sedentary time are distinct health behavior, new theoretical development or alternative interventions would be needed in the future.

Finally, regarding the anthropometrics measurement, as expected, no results were found, and the effect sizes were small. This finding is not new as the impacts of physical activity on these markers are inconsistent (Firth et al., 2015; Stubbs et al., 2018). In the present study, it is likely that the physical activity intensity in which participants spontaneously engaged was not enough to observe these specific effects.

Regarding the present study, several limitations should be noted. First, the sample size was small and not powered to detect finding on the different outcomes, hence our statistical power was impacted. Indeed, it should be noted that the present study aim was to assess the feasibility of the brief intervention. Also, our sample only included men with obesity and psychotic disorders, hence the population cannot be representative of the population of people with psychotic disorders. Furthermore, the present study should not distract from the fact that women with psychosis are at greater risk of metabolic complications compared with men. To another extent, physical activity was self-reported so we cannot ignore the possibility of an overestimation bias even though the questionnaire was well validated and administered by interview. Finally, the study was underpowered, without control group, so the results and effect size should be interpreted with caution.

In conclusion, and to summarize, the different results showed that brief interventions are feasible in terms of recruitment, professionals training, participants' evaluations and potentially improve physical activity in people with psychosis. However, the recruitment

strategy should be improved to increase the participation rate as only one-third of patients approached accepted to participate. Consequently, brief intervention using a volitional help sheet could be used to initiate the discussion about physical activity in men with psychotic disorders. It also underlines that nurse have an important role on physical activity promotion in this population. Future studies should consider realizing a randomized controlled trial including a larger and more diverse population along with a longer follow-up duration.

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Characteristics		Population (N = 12)
sex		
Men		12 (100%)
Age (M±SD)		33.2 ± 10.1
BMI (M±SD), Kg/m²		35.8 ± 7.7
Smokers, N (%)		9 (75%)
Employment, N(%)		
Unemployed		10 (83.3)
Diagnostic, N(%)		
Schizophrenia		9 (75%)
MDD with psychotic features		3 (25%)
Stages of change, N(%)		
Contemplation		3 (25%)
Preparation		8 (66.7%)
Action		1 (8.3%)

Table 1: Descriptive characteristics of the included population

Notes: BMI = body mass index; MDD = major depressive disorder,

	Baseline	Intervention end	p value	Cohen's <i>d</i> , [95%CI]
Physical activity - sedentary				
Total physical activity (min/week)	66.3 ± 44.8	285.0 ± 403.9	0.004	0.56 [-0.07, 1.21]
Transport physical activity (min/week)	52.5 ± 34.7	117.5 ± 84.0	0.01	0.82 [0.15, 1.53]
Sedentary time (h/day)	10.83 ± 1.89	9.17 ± 2.48	0.06	- 0.54 [-1.19, 0.08]
Anthropometrics				
Weight (kg)	110.7 ± 17.52	111.2 ± 19.23	0.76	0.09 [-0.50, 0.68]
BMI (Kg/m ²)	35.8 ± 7.71	35.9 ± 7.37	0.88	0.19 [-0.40, 0.79]
Waist circumference (cm)	124.1 ± 13.89	122.7 ± 15.78	0.24	-0.36 [-0.98, 0.24]
Processes of change				
Experiential processes of change	2.92 ± 0.44	2.94 ± 0.74	0.47	0.14 [-0.45, 0.74]
Behavioral processes of change	2.86 ± 0.73	3.16 ± 0.73	0.06	0.38 [-0.23, 1.00]

Table 2: Pre-post effects of the brief intervention in men with psychotic disorder (N=12)

Notes. Data are mean ± SD

Figure 1: Schematic representation of the study protocol

Figure 2: Flow-chart of included participants