Impact of nurse-led behavioural counselling to improve metabolic health and physical activity among adults with mental illness

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ABSTRACT

The life expectancy of adults with mental illness is significantly less than that of the general population, which is largely due to poor physical health. Behavioural counselling can improve physical health indicators among people with non-communicable disease. This repeated measures, single group intervention trial evaluated the effects of a 19-week behavioural counselling program on metabolic health indicators and physical activity levels of outpatient adults with mental illness. Sixteen participants completed the intervention that comprised individual face-to-face counselling sessions with a Registered Nurse every three weeks and progress reviews with a medical practitioner every six weeks. Assessment included self-report and objective measurement of physical activity and measures of blood pressure and anthropometry. Statistically significant changes were demonstrated between baseline and post intervention for participants' waist circumference ($p=0.035$) and waist-to-height ratio ($p=0.037$). Non-significant improvements were demonstrated in weight and physical activity. Findings indicated that adults with mental illness can engage in a nurse-led behavioural counselling intervention, with improvements in some metabolic health measures after 19 weeks. It is recommended that behavioural counselling programs for adults with mental illness be sustained over

time and have an ‘open door’ policy to allow for attendance interruptions, i.e. hospitalisation.

KEY WORDS: adults, mental health, metabolic health, physical activity counselling

INTRODUCTION

The life expectancy of adults with mental illness such as post-traumatic stress disorder, depressive disorders, schizophrenia, bipolar disorder, affective psychosis and anxiety disorders is significantly less than that of the general population, and this is largely due to poor physical health (Charlson et al., 2014; Lawrence et al., 2013). People with mental illness have an increased prevalence of metabolic risk factors (see Table 1) and associated conditions such as cardiovascular disease and diabetes than in the general population (Scott & Happell, 2011; Scott et al., 2012; Galletly et al., 2012). Physical activity (PA) is recommended for the prevention and management of many metabolic risk factors and non-communicable diseases (Firth et al., 2015; Josefsson et al., 2014). Physical activity is a feasible and effective adjunctive therapy to usual care for adults across a range of mental health disorders (Rosenbaum et al., 2015), and may be a key factor in the prevention and management of the many physical health problems that are prevalent in adults with mental illness (Rosenbaum et al., 2014; Vancampfort et al., 2015).

Behavioural counselling is one method for promoting PA. This is an individualised or group based, goal orientated, discourse based approach that promotes autonomous motivation and can be delivered via different mediums (i.e. face-to-face, telephone, email). A common framework for behavioural counselling is the 5As Model which identifies five key components of the counselling process that need to occur to promote change: assess, advise, agree, assist and arrange (Meriwether, 2008; Peterson, 2007). Applied to promote PA, a clinician may: *assess* knowledge and beliefs regarding PA, current PA levels and the factors that enable and constrain

participation; *advise* of personally relevant advantages for PA engagement and give clear and strong advice to do PA; *agree* (collaboratively*)* on PA goals; a*ssist* by action planning, responding to any ambivalence, identifying coping and problem solving strategies to manage barriers and competing life demands, and provide ongoing support and positive reinforcement; and *arrange* resources, assistance or follow-up as required (Meriwether, 2008; Peterson, 2007).

Behavioural counselling can be effective in improving PA and metabolic health among people with non-communicable diseases. A 12-month counselling intervention for people with type two diabetes mellitus (T2DM) increased PA between baseline and 6-months ($p<0.001$); and reduced HbA_{1c} by -0.26% ($p<0.05$); total cholesterol by 0.33mmol/L ($p<0.05$) and systolic blood pressure by 7.7mmHg ($p<0.05$) (Kirk et al., 2004). Increases in PA were maintained at 12-months ($p<0.05$) (Kirk et al., 2004). A meta-analysis indicated that counselling based on motivational interviewing significantly increased PA levels among people with chronic conditions such as obesity, cardiovascular disease (CVD) and multiple sclerosis (SMD: 019, 95% CI 0.06 to 0.32, p=0.004) (O'Halloran et al., 2014).

Less research however, has examined the effectiveness of behavioural counselling to improve PA and metabolic health among adults with mental illness. A study of four obese adults with schizophrenia suggested that PA counselling is feasible, and although participants' PA levels did not significantly increase over the two month study period, increases were seen in important determinants of PA, i.e. perceived benefits of PA and self efficacy (Gorczynski et al., 2014). Lifestyle counselling interventions (focusing on e.g. a combination of PA and diet) have been shown to be

effective for reducing weight (Attux et al., 2013; Bonfioli et al., 2012; Green et al., 2015), increasing PA participation (Attux et al., 2011), and for improving metabolic risk factors, e.g. fasting blood glucose and lipids (Cabassa, 2010; Firth et al., 2015; Green et al., 2015) among adults with mental illness.

Mental health nurses are well placed to deliver behavioural counselling to adults with poor mental health as they spend a lot of time in close patient contact (Happell et al., 2012). They may also experience fewer barriers to counselling than other health practitioners, e.g. less time constraints than general practitioners (McPhail & Schippers, 2012; Meriwether, 2008; Peterson, 2007). The aim of this study was to evaluate the effects of a nurse-led behavioural counselling program on improving the metabolic health indicators and PA levels of outpatient adults with mental illness.

METHODS

This was a repeated measures, single group intervention trial. Recruitment was conducted over a seven-month period in 2014. Study participants were adults with mental illness (18-75 years) who attended an outpatient clinic at a private psychiatric hospital in Brisbane, Australia. Individuals were referred in writing to the clinic by their treating psychiatrist or general practitioner. Once a referral was received, a Registered Nurse (RN) contacted the individual by phone and invited them to attend the clinic. If they agreed to attend, a letter was sent indicating the date and time of their first appointment.

Individuals were assessed by the same RN for study eligibility at their first clinic appointment and were invited to participate if they met the following inclusion criteria: (i) had a psychiatric diagnosis as defined by the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition; (ii) were prescribed psychotropic medication; (iii) had the capacity to be ambulatory, (iv) resided within the Brisbane region, (v) were not an inpatient at the time of the baseline assessment and (vi) did not have a diagnosis of a feeding or eating disorder. Individuals were given an information sheet outlining the study and written informed consent was obtained prior to baseline assessment. Individuals who did not meet the study eligibility criteria or declined to participate in the study, were still eligible to attend the clinic and receive treatment, however their information was not included in the analyses. This study received ethical clearance by The University of Queensland Human Research Ethics Committee (2014000483).

Procedure

The intervention was conducted over 19 weeks and involved individual face-to-face counselling with the RN and progress reviews with a medical practitioner. The same RN and medical practitioner conducted all counselling and review sessions, with the RN also collecting and analysing the data. Prior to the intervention, the RN had professional experience in lifestyle counselling and attended a one day professional development training course on PA Counselling for mental health settings; this was led by a senior psychologist and had a strong focus on the 5As Model. The frequency of counselling sessions and progress reviews were pre-determined by the hospital, with counselling sessions conducted every three weeks (weeks 1, 4, 7, 13, 16 and 19), and medical progress reviews conducted every six weeks (weeks 1, 7, 13 and 19).

At baseline, the medical practitioner documented a detailed physical health history and gave the participant a pathology request form for fasting blood glucose and lipids. The results were used as part of the assessment of risk for metabolic syndrome.

Assessment of outcome measures included self-administered questionnaires, measures of blood pressure (BP) and anthropometry by the RN, and objective measurement of PA. Questionnaires were administered at baseline and after the intervention (week 19). Sociodemographic and health questions were included in the baseline questionnaire and participant satisfaction questions were included in the post intervention questionnaire. Height was assessed at baseline only. Blood pressure and waist circumference (WC) were measured every six weeks by the RN to coincide with the progress reviews. Weight was measured by the RN at start of each counselling session. Accelerometers were given to participants to objectively assess PA for one week at baseline and post intervention. Accelerometers were returned to the RN in person or by post.

Intervention

Six behavioural counselling sessions were conducted by the RN, with one session every three weeks for 19 weeks. The major component (85%) of each session was individually tailored physical activity counselling based on the 5A's Model (Meriwether, 2008; Peterson, 2007). An overview of how this model was applied to this study is described in Table 2. All participants were given a Yamax Digi-Walker 200 pedometer to assist with self-monitoring and goal setting. The remaining 15% of

each counselling session involved reinforcing lifestyle lifestyle advice given by the medical practitioner regarding e.g. healthy eating, smoking cessation and sleep hygiene. To further support this advice, written information was provided regarding physical activity and healthy eating for improved mental wellbeing (Australian Government Department of Health, 2014; Australian Government Department of Health and Ageing, 2013; Black Dog Institute, 2012).

Four medical progress reviews were conducted. During the first progress review, the medical practitioner reviewed the participant's results from the baseline assessment and provided feedback for change. In the subsequent sessions, the medical practitioner reviewed the participant's progress in relation to their anthropometric measurements and goals identified in the counselling sessions. During each review, the participant also was provided with relevant lifestyle advice regarding e.g. PA, diet, sleep hygiene and metabolic health and this was documented in their health record so that the nurse counsellor could reinforce the advice during the counselling sessions.

Measures

The primary outcome measures for this study were waist circumference (WC) and waist-to-height ratio (WHtR). Studies indicate that these measures are key predictors of adverse metabolic health outcomes (i.e. CVD and diabetes) and better than body mass index (BMI) as a predictor (Ashwell et al., 2012; Savva et al., 2013). A recent meta-analysis of cross-sectional studies concluded that WHtR has stronger associations than BMI with Type 2 Diabetes Mellitus (T2DM) (rRR: 0.71, 95% CI: 0.59 to 0.84) and metabolic syndrome (rRR: 0.92, 95% CI: 0.89 to 0.96) (Savva et

al., 2013). Secondary outcome measures included: weight, BP, and PA. Anthropometric measurement and BP were conducted by the RN. Waist circumference (cm) was taken in the horizontal plane, midway between the inferior margin of the participants' ribs and the superior border of their iliac crest (Alberti et al., 2006). Height was measured using a wall mounted stadiometer. Weight was measured using an electronic scale, calibrated annually to the nearest 0.1kg (Tanita model, BWB-800, Wedderburn Scales). Waist to Height Ratio (WHtR) was calculated using the formula: WC (cm) / height (cm). Resting BP was measured using a Welch Allyn Spot Vital Signs 42NOB machine, which was calibrated annually.

Self-reported PA was assessed using a modified version of the Active Australia survey (Australian Institute of Health and Welfare, 2004). Items assessed the frequency of and total time spent walking for transport, walking for recreation and leisure, and in moderate and vigorous-intensity PA during the previous week. The Active Australia survey has been used in national and state surveys (Armstrong et al., 2000; Australian Institute of Health and Welfare, 2004) and has acceptable psychometric data with reliability coefficients ranging from 0.56-0.64 for each category of activity (Brown et al., 2008). PA was objectively assessed using Actigraph GT3x+ accelerometers. Participants wore the accelerometer positioned on the right hip on a belt around the waist during waking hours for seven consecutive days.

Participant engagement was assessed using counts of the number of people who were referred to the program and were eligible, invited, consented and provided

data. Session attendance rates were calculated. Reasons for session non-attendance and study non-completion that were verbally volunteered from the participants were noted.

Sociodemographic variables were assessed at baseline using standard questionnaire items. Data on diagnosis and medications were obtained verbally from the participant during the baseline assessment. As participants could be assigned multiple diagnoses, each diagnosis was recorded. Metabolic syndrome was determined using the International Diabetes Federation definition (Table 1) (International Diabetes Federation, 2009) . For this study, participants were categorised as being *at risk of* developing metabolic syndrome if they had central obesity plus one other risk factor.

Post intervention, participants were asked to indicate on a ten point Likert scale how satisfied they were with the (i) counselling program overall, (ii) sessions with the RN, (iii) sessions with the medical practitioner, (iv) pedometer and (v) written materials provided. A score of 1–3 indicated low satisfaction, 4–6 moderate satisfaction and 7–10 high satisfaction. Participants were also asked the following open ended questions in the post questionnaire (i) was there anything that made it difficult for you to attend the program, (ii) what were the positive aspects of the program, (iii) what were the negative aspects of the program and (iv) what changes could be made to improve the program. Participants were also provided with space to provide any further written comments regarding the program.

Data management

Self-reported PA data were included in the analyses if duration was available for at least one questionnaire item. Missing data were imputed with a zero. To avoid potential over-reporting, reported times greater than 840 minutes (14hrs/week) for a single activity type were truncated at 840 minutes (Australian Institute of Health and Welfare, 2004). Total self-reported moderate to vigorous-intensity physical activity (MVPA) was calculated in weighted minutes/week by adding time in walking for transport, walking for recreation and exercise, and moderate and vigorous PA, with vigorous activity weighted by two to allow for its greater intensity. To further avoid potential over-reporting, total MVPA times were truncated at 1680 minutes (28 hours/week) (Australian Institute of Health and Welfare, 2004).

Actigraph software was used to analyse the data retrieved from the GT3x+ accelerometers. Data were considered valid if the monitor was worn for at least eight hours/day on three days of the week. Accelerometer non-wear time was identified from consecutive zero counts for 60 minutes or longer. The cut-point criteria used were 100–2019 for light activity, 2020–5998 for moderate activity and 5999 or greater for vigorous activity (Troiano et al., 2008). Durations of moderate and vigorous PA were combined and time spent in light PA and MVPA were calculated as average minutes/day.

Data Analyses

Analyses were conducted using SPSS version 23. Data for self-report and objective PA were included in the analysis if both baseline and post-intervention data were

available. If data for any of these outcome measures were missing, that participant was case-wise deleted and not included in the analysis for the measure. For repeated measures data, (weight, WC, and BP), participants were case-wise deleted and not included in the analysis if data were not available for more than two assessment points (i.e. >6 weeks). For missing data that were <6 weeks apart, the last observation was carried forward.

Descriptive statistics were used to summarise quantitative data. Normality tests were conducted using the Shaprio-Wilk Test of Normality (used for samples <50). For each measure, paired t-tests were used to assess pre-post differences among normally distributed data and Wilcoxin sign rank tests were used to assess pre-post differences among non-normal distributed data. As this was an exploratory study, an alpha of p=<0.05 was kept to test for statistical significance, despite the number of comparisons. With a sample size of 16 and p <0.05, this study had a power of 72% to detect a change of 2cm in WC.

RESULTS

Participant engagement

Participant engagement is presented in Figure 1. During the recruitment period, 27 people were referred to the clinic; 100% met the study eligibility criteria and were invited to participate. Of these, 23 (85%) consented, and 21 (91%) attended baseline assessment. Of those who attended baseline assessment, 18 (86%) commenced the intervention, of which 16 (89%) attended the final counselling session at week 19.

Reasons for declining the study invite (n=4) included living too far away (>100 km) (n=2) and lack of interest (n=2). Two participants did not attend the baseline assessment and were unable to be contacted. Three participants did not start the intervention after completing the baseline assessment. Reasons included a deterioration in mental wellbeing (n=1) and a discontinued interest (n=2). Two participants did not complete the intervention. One dropped out after week four as she was satisfied with her progress and felt she no longer needed assistance, and the other dropped out after week 13 citing an increase in external stressors. Of the 16 participants who completed the intervention, all attended at least six of the eight physical activity counselling sessions.

Participant characteristics

Demographic and health characteristics of the participants who completed the intervention are summarised in Table 3. At baseline, the mean age was 38.8 years (SD 10.7) and 81% were female. The majority (69%) of participants had a depressive disorder and ten (63%) participants were prescribed at least one atypical antipsychotic with the most common being Quetiapine (n=7). All participants were categorised as obese, of which 31% were classified as morbidly obese. Twelve participants (75%) were categorised as having Metabolic Syndrome at baseline.

Metabolic health indicators

A summary of the metabolic health indicators at baseline and week 19 assessment are presented in Table 4. Mean WC and WHtR over time are presented in Figure 2. There was a statistically significant mean decrease in WC of 2.7cm and WHtR of

0.02 points. Eight participants (50%) had a decrease in WC of at least 2.5cm, with the greatest changes being -12.5cm and -11cm. Eight participants (50%) had a decrease in their WHtR with the greatest changes being –0.08 and -0.07 points. There was a non-significant decrease in weight of 1.8kg. Six (38%) participants had a weight change of more than -4.5kg, and the greatest change in a participant's weight was -11.6kg. Mean change for systolic BP was -3.5mmgHg and for diastolic BP, it was +0.29mmHg, which were not statistically significant.

Self-reported physical activity

Median self-reported domain specific PA over time is presented in Table 5. Three participants were excluded from the analysis, as they did not provide post intervention data. One participant had time spent in vigorous-intensity activity truncated to 840 minutes. Median time spent in walking for transport increased by 20 minutes/week, walking for recreation by 30 minutes/week and moderate intensity PA by 20 minutes/week, however these changes were not statistically significant. There were no significant changes in median time spent in MVPA. Six (46%) participants increased their MVPA by >100 minutes/week, with the greatest change being +1190 minutes/week.

Objective physical activity

Five participants were excluded from the analysis due to invalid accelerometry wear time at assessment points (n=1), poor physical health (n=1), poor mental health (n=2) and failing to return the accelerometer (n=1). Mean light-intensity PA at baseline was 151 minutes/day (SD 31.51) and at post assessment 135 minutes/day (SD 44.12), with a non-significant mean decrease of 16 minutes/day (t(10)=1.503,

p=0.164). Mean MVPA at baseline was 23 minutes/day (SD 15.51) and at post assessment 25 minutes/day (SD 15.23), with a non-significant mean increase of 2 minutes/day (t(10)=-0.383, p=0.710). Two participants had notable increases in time spent in MVPA: one had an increase of +25 minutes/day and another had an increase of +27 minutes/day.

Participant satisfaction

At the conclusion of the intervention, 14 of 16 participants provided feedback; 13 (93%) were either satisfied or very satisfied with each of the program, the progress reviews, the RN counselling sessions, the pedometer and the written materials. One participant was dissatisfied with the overall program and individual program components.

Participants' main difficulties in attending the program were the travel distance, poor physical or mental health, competing life demands, limited choice of appointment times and anticipating poor results since last assessment, e.g. weight increase. The majority of participants did not provide a comment when asked about the negative aspects of the clinic. Two participants identified difficulties with travel time, but acknowledged that this was more an individual concern.

Participants indicated positive aspects of the program included realistic goal setting; weight loss; friendly and patient practitioners; good follow-up; the knowledge gained (from written materials and practitioners) about physical health and the ongoing support, understanding and encouragement received. Suggestions for improving the program included having weekly versus three-weekly appointments and having more

appointment times to choose from. One participant suggested a smart phone/tablet app, which would make it easier to record information and track progress.

Participants voiced gratitude and satisfaction with the clinic. They found the staff knowledgeable and supportive, particularly in their approach, i.e. "*thank you for your holistic health care and your gentle words and manner*", and "*I appreciate the knowledge and support which I am given"*. Participants also expressed how their overall wellbeing had been improved by attending the clinic, i.e. *"The program has really helped me to realise how closely my mental health is linked to my physical health"* and *"This program has given me a new lease on life. Through attending the sessions, I have lost weight, found a better diet, managed my diabetes and learned the importance of physical activity and have been able to maintain it for a solid period."*

DISCUSSION

This study evaluated the effects of a nurse-led behavioural counselling program to improve metabolic health indicators and PA levels of outpatient adults with mental illness. There were statistically significant improvements between baseline and post intervention (19 weeks) in waist circumference (mean change -2.7cm) and weight to height ratio (mean change -0.02 points). Although trending in a positive direction, the changes observed in weight and PA were not statistically significant.

Participants and engagement

Recruitment for this study was dependent on medical referrals to the program, and was slow with 27 people recruited over a 7-month period. The small number of referrals received may have been due to medical practitioners' limited knowledge of the benefits of the program or perceived patient unsuitability.

Study participants had poor metabolic health, which is consistent with the extant literature on adults with mental illness (Charlson et al., 2014; Lawrence et al., 2013). All participants in this study were categorised as obese, and three quarters were categorised as having metabolic syndrome at baseline. The prevalence of obesity and metabolic syndrome in this study sample (N=16) was ~50% higher than in other studies of adults with mental illness in Australia (John et al., 2009). This may reflect the recruitment process, for example, only people who were considered to be of very poor physical health may have been referred to this program.

This study demonstrates that adults with mental illness across a range of diagnoses can engage in a nurse-led behavioural counselling intervention with a strong emphasis on PA. Of those who commenced the program, 16 (89%) completed. This completion rate is similar to other lifestyle counselling interventions for adults with mental illness. For example, 74% of 1071 adults with severe mental illness completed a 3-month weight management lifestyle counselling intervention (Attux et al., 2011), and 83% of 35 outpatient adults prescribed antipsychotics completed a 3-month behavioural counselling program for the treatment of obesity (Kalarchian et al., 2005). Completion was substantially higher in the current study than the 29% reported for an 18-week nurse led lifestyle behaviour program for outpatient adults

with mental illness (Knight et al., 2015). This may reflect differences in program delivery: the other program consisted of twice weekly group sessions, whereas the current study was every three weeks and had individual sessions.

Impact on metabolic health outcomes

The results from the current study indicate that the 19-week counselling program with face-to-face counselling every three weeks was effective in reducing WC and WHtR among outpatient adults with mental illness, with a reduction of 2.7cm ($p<0.035$) and 0.02 points ($p<0.037$) respectively. Another 18-week nurse led behavioural lifestyle program also suggested improvements with a reduction in WC of 4.4cm in males and 0.7cm in females, however those results were not statistically significant (Knight et al., 2015).

In the current study, mean total weight loss at post-intervention was 1.8kg, although this change was not statistically significant ($p=0.136$). Anecdotal reports from participants suggested steady increases in weight over the 6-12 months before commencing the counselling program, which were typically attributed to the commencement of a new atypical antipsychotic. In this study, the most commonly prescribed antipsychotic was Quetiapine. Evidence indicates the average Quetiapine related weight gain is 6.06kg over a period of 12 weeks (Correll et al., 2009). The intervention may, therefore, have reduced the impact of Quetiapine induced weight gain among participants over time. The results of this study indicated that there was an increase in mean weight between baseline assessment and the first intervention session (i.e. 2-3 weeks), which is consistent with the previously reported average weight gain associated with antipsychotic medications. However, once the

intervention commenced, a period of weight stabilisation occurred and then participants' weight appeared to decrease. It may be, therefore, that a longer period of time is required to demonstrate statistically significant weight loss, but that the intervention can contribute to prevention of weight gain.

During the intervention, no statistically significant improvements in systolic or diastolic BP were observed. Other research provides mixed results on the benefits of behavioural counselling for BP. A PA counselling study of older adults in the general population indicated no change in BP over 12 months (Kerse et al., 2005). However, a 12 month PA counselling program for people with T2DM indicated significant between group improvements in systolic BP between baseline and 6 months, (mean difference: -6.3mmHg, 95% CI: -24.7 to -2.0) (Kirk et al., 2004). Study differences may reflect different target populations (older adults, those with diabetes versus mental illness) and different impact on PA levels, which has a positive association with BP. Further research needs to be conducted regarding the effects of behavioural counselling on BP.

Impact on physical activity

Time spent in walking for transport and recreation, and in moderate-intensity PA were all trending in a positive direction after the intervention. These improvements however, were not statistically significant, which may reflect the study's small sample size. It may also be that adults with mental illness need a longer period of time to significantly improve and maintain PA levels. A Cochrane review found face-to-face counselling with community dwelling adults who were free from pre-existing medical conditions (including mental illness) tended to increase self-reported PA over at least

12 months, however these increases were not statistically significant (OR: 1.52, 95% CI: 0.88 to 2.61) (Richards et al., 2013). In the current study, it should be noted that many participants were initially meeting the Australian Physical Activity Guidelines of at least 150 minutes per week (Australian Government Department of Health, 2014), with a total median of self-reported MVPA of 180 minutes/week (IQR: 55–460) (~26 minutes/day) at baseline and post intervention (180 minutes/week, IQR: 97.5–705). It may be therefore, that ceiling effects constrained the impact of the counselling, and future research could consider recruiting participants with low activity levels to better determine the effectiveness of counselling on physical activity.

Qualitative observations

No distinctions were observed between the five participants with marked improvements in WC, weight and PA and the other participants in terms of session attendance, diagnosis, education, employment or BMI at baseline. Two of these five participants with improvement were however unable to complete PA assessment at week 19 due to poor physical or mental health, but anecdotally reported prior improvements in PA levels. Three participants with poor outcomes in metabolic health measures were all of poor physical health at baseline (i.e. BMI >39), and although they had small improvements in total weekly MVPA, this may not have been sufficient to positively impact on metabolic health measures. It also became apparent that clinicians need to create opportunities for continuing counselling around periods of hospitalisation, as during the intervention, four participants were hospitalised with admissions ranging from two to five weeks duration.

METHODOLOGICAL CONSIDERATIONS

A limitation of this study is the small sample size and therefore potential lack of power to assess change in some of the secondary outcome measures. Caution should be used in generalising the results to all adults with mental illness due to the sampling limitations. The study sample was not random, and not all who consented completed assessment. There was no control or comparison group to assess efficacy of the counselling sessions versus naturally occurring changes over time. The same Registered Nurse was involved in delivering the intervention, and conducting data collection and analysis, so the assessment was not blinded. The majority of participants in this study had depression as their primary diagnosis. Different results may have been obtained if there was a different mix of diagnoses. There was no way to ascertain if participants' reports of engagement in PA were at a sufficient intensity to constitute MVPA, and when combined with potential reporting errors, self-reported MVPA may have been over-estimated. The suggested effect of the intervention on self-reported PA levels needs to therefore be treated with caution. Not all participants who completed self-report measures completed accelerometry, and the self-reported recall period and the accelerometer data collection period may not have been at the exact same time. Due to the limitations imposed on the program by the outpatient facility, the content of participants' sessions with the medical practitioner were unable to be reported on in detail, as only the information documented in the participant's health record was made available. Dietary change was not monitored, and may have implications for the weight-related results of this study.

CONCLUSIONS

This study suggests that adults with mental illness can engage in a nurse-led behavioural counselling intervention. Results demonstrate that at least 19 weeks of behavioural counselling, with a session every three weeks, can be effective for significant reductions in waist circumference and waist to height ratio. A longer duration or more frequent sessions may be needed to increase PA, though counselling every three weeks may be effective for maintaining PA levels.

RELEVANCE FOR CLINICAL PRACTICE

The findings from this study provide preliminary support for nurse-led behavioural counselling programs to improve indicators of poor metabolic health (e.g. waist circumference) among adults with mental illness. In response to other research indicating that poor metabolic health is the leading cause for the significantly reduced life expectancy among this population (Charlson et al., 2014; Lawrence et al., 2013), behavioural counselling could be incorporated into the management/treatment of outpatient adults with mental illness. Other research suggests however, that nurses may lack the knowledge and educational preparation to perform this role effectively (Happell et al., 2011). Future education programs could therefore be directed towards improving the knowledge of mental health nurses regarding the poor metabolic health of adults with mental illness, the benefits of physical activity for this population, and how to do behavioural counselling. Behavioural counselling

programs for adults with mental illness need to be flexible to accommodate interruptions in regular attendance because of e.g., symptom escalation or readmission.

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Table 1

International Diabetes Federation definition of metabolic syndrome

For a person to be defined as having Metabolic Syndrome, they must have:	
Central obesity (defined as waist circumference (cm) with ethnicity specific values)	
Plus **two** of the following four factors	
Raised triglycerides	≥ 1.7 mmol/L or specific treatment for this lipid abnormality
Reduced HDL cholesterol	< 1.03 mmol/L in males < 1.29 mmol/L in females or treatment for this lipid abnormality
Raised blood pressure	Systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg or treatment of previously diagnosed hypertension
Raised fasting plasma glucose	≥ 5.6 mmol/L or previously diagnosed type 2 diabetes

Table 2

The 5As Model for behavioural counselling as applied to promote physical activity in this study

Stage	Intervention Activities
Assess	• Knowledge and beliefs regarding physical activity and mental health. • Current physical activity levels based on the FITT (frequency, intensity, type and time) principles. • Psychosocial factors related to activity. For example: readiness to change, reasons to change, barriers and enablers to change, past change experiences, social support and self-efficacy.
Advise	• Reflect personalised advantages and challenges for engaging in physical activity. • Confirm the individual's understanding of physical activity and correct any misconceptions they may have. • Clear and strong advice to do physical activity.
Agree	• Establish a contract with the individual to engage in physical activity change and agree on goals that are specific, measureable and attainable within an established timeframe. • Respond to any ambivalence the individual may have towards physical activity engagement.
Assist	• Collaborate to make an action plan for engaging in physical activity. This should consist of activities that are safe, enjoyable and are likely to be accomplished. The action plan should include the frequency, duration and location of physical activity and supports required to engage in the activity. • Provide the individual with a written copy of the agreed action plan, relevant printed support materials (i.e. community resources, local

	walking tracks) and self-monitoring tools (i.e. pedometer). • Explore approaches used to change activity in the past (differentiating between successful and unsuccessful). • Identify coping strategies that the individual can utilize to manage competing life demands and barriers to physical activity. • Provide support and positive reinforcement. • Provide written resources, e.g. national physical activity recommendations, fact sheet on how to increase steps.
Arrange	• Arrange a follow-up counselling session (i.e. face-to-face)

Table 3

Sociodemographic and health characteristics of participants

	N = 16	
Mean (SD) Age (years)	38.8 (10.7)	
	n	(%)
Gender		
Male	3	18.8
Female	13	81.3
Country of birth		
Australia	15	93.7
Other	1	6.3
Household composition		
Single living alone	2	12.5
Single living with others	4	25.0
Single living with children	1	6.3
Couple without children	4	25.0
Couple with children	5	31.3
Employment situation		
Not working [a]	4	6.3
Pensioner on benefits (not old age)	7	43.8
Paid part time / casual work	1	6.3
Full time paid employment	4	25.0
Income Management		
Difficult all the time	7	43.8
Difficult some of the time	4	25.0
Not too bad	5	31.3

Education		
School only	5	31.3
Trade certificate / apprenticeship / diploma	4	25.0
Bachelor / post-graduate degree	7	43.8
BMI (kg/m^2)		
Overweight: 25 – 29.9	0	0
Obese: 30 – 39.9	11	68.8
Morbidly obese: > 40	5	31.3
Diagnosis [b, c]		
Depression	11	68.8
Anxiety	3	18.8
Bipolar Affective Disorder	1	6.3
Psychosis	3	18.8
Post Traumatic Stress Disorder	2	12.5
Personality Disorder	1	6.3
Psychotropic Medication		
Atypical Antipsychotic	10	62.5
Mood Stabiliser	7	43.8
Antidepressant	14	87.5
Cigarette Smoking Status		
Yes	3	18.8
Metabolic Syndrome Profile [d]		
Diagnosis of Metabolic Syndrome	12	75.0
At risk of Metabolic Syndrome [f]	2	12.5
Missing data	2	12.5

[a] Not working: Looking for employment, full time house keeping, retired,

studying, volunteering

[b] Diagnosis: Some participants had more than one primary diagnosis.

[c] Psychosis: Schizophrenia, Schizoaffective Disorder; Psychotic Disorder

[d] At risk of Metabolic Syndrome: central obesity plus one other metabolic risk factor

Table 4

Change in metabolic health indicators after 19 weeks counselling (N = 16)

Outcome measure	Baseline	Post intervention		Statistics	
	Mean (SD)	Mean (SD)	Mean change (95% CI)		p value
Waist circumference (cm)	125.44 (8.77)	122.75 (11.71)	-2.69 (-5.15, -0.22)	t(15) = 2.322	0.035
Waist to height ratio	0.75 (0.049)	0.73 (0.065)	-0.016 (-0.031, -0.001)	t(15) = 2.294	0.037
Weight (kg)	107 (16.46)	105.2 (18.84)	-1.8 (-4.16, 0.62)	t(15) = 1.577	0.136
Systolic blood pressure (mmHg)	125.9 (11.51)	122.4 (13.67)	-3.56 (-9.61, 2.49,)	t(15) = 1.256	0.228
Diastolic blood pressure (mmHg)	80.4 (5.72)	80.69 (S7.75)	0.25 (-4.84, 5.34)	t(15) = -0.105	0.918

Table 5

Change in domain specific self-reported physical activity duration (weighted minutes/week) after 19 weeks (N = 13)

	BASELINE	POST INTERVENTION	STATISTICS	
	Median (IQR)	**Median (IQR)**		**p value**
Walking for transport	40 (17.5 – 120)	60 (15 – 150)	z = 49.5	0.142
Walking for exercise and recreation	60 (0 – 90)	90 (27.50 – 330)	z = 62.5	0.065
Vigorous gardening and yard work	0 (0 – 35)	0 (0 – 120)	z = 21	0.236
Vigorous physical activity	0 (0 – 120)	0 (0 – 55)	z = 13	0.866
Moderate physical activity	0 (0 – 65)	20 (0 – 90)	z = 22	0.575
Total self-reported moderate-vigorous physical activity [a]	180 (55 – 460)	180 (97.5 – 705)	z = 65	0.173

Items reported as median (25^{th} 75^{th} percentile)

[a] Total physical activity excludes vigorous gardening and yard work, and has vigorous activity weighted by two

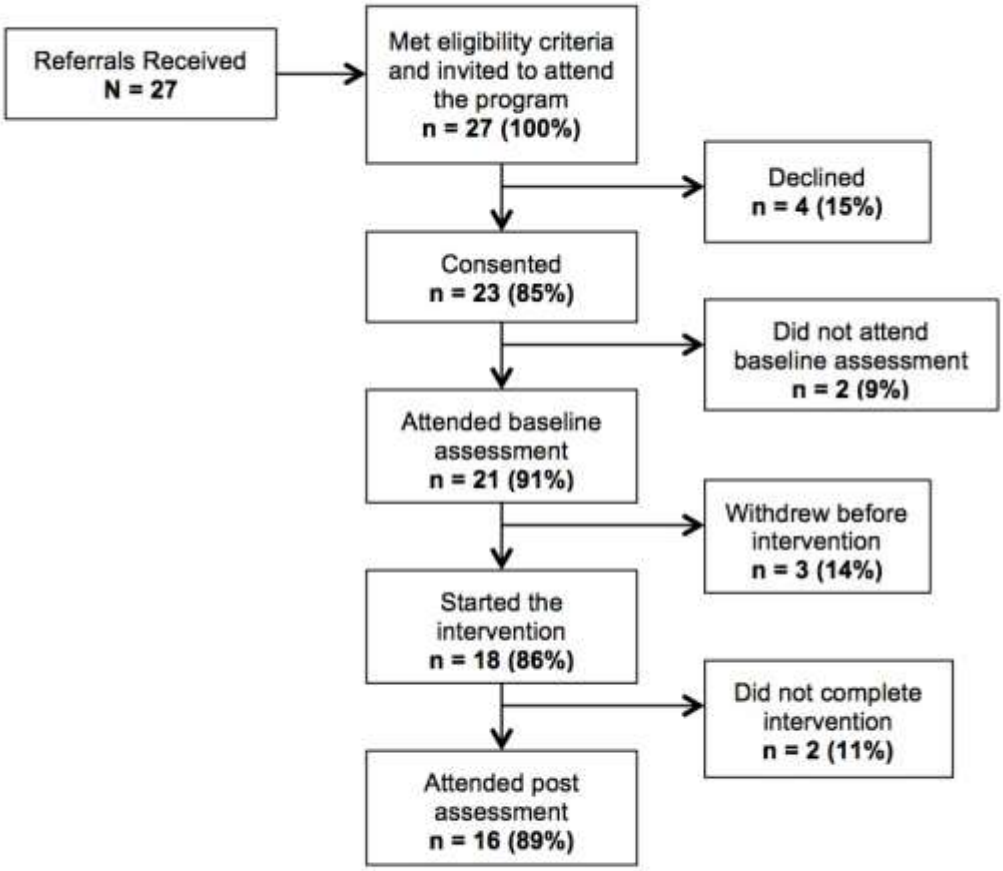

Figure 1: Participant flow chart

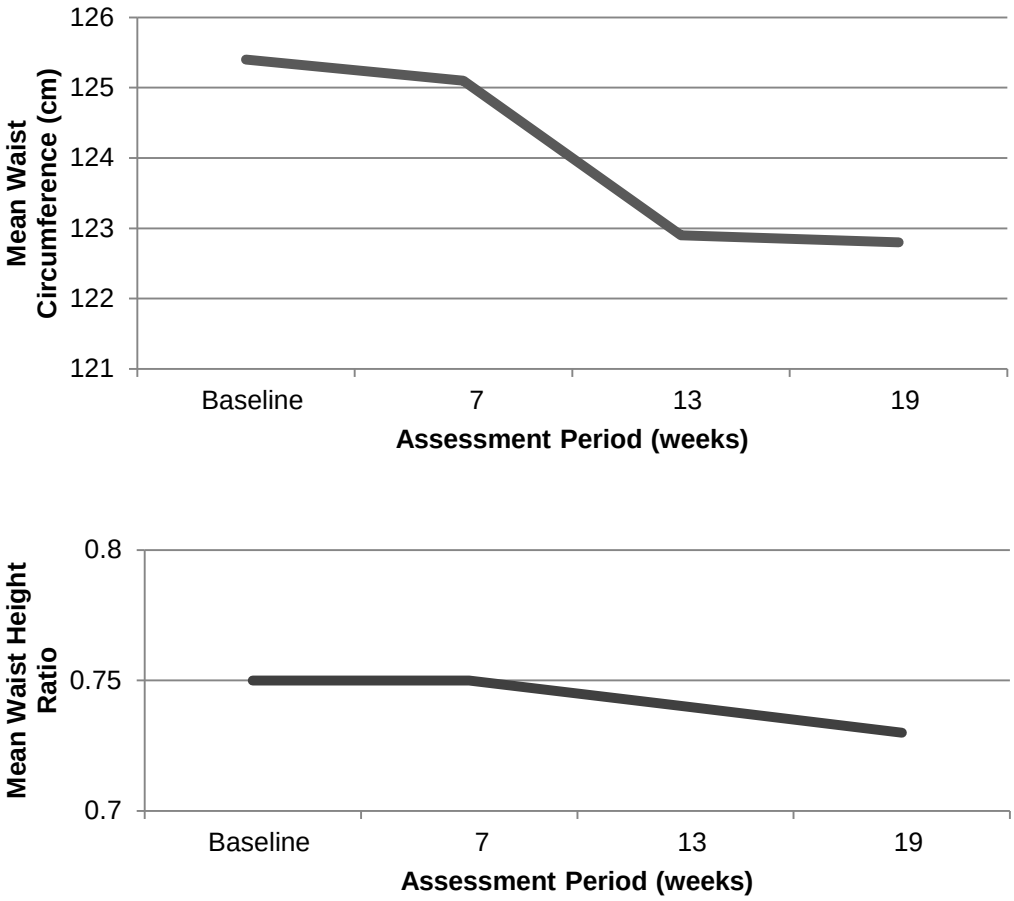

Figure 2: Mean waist circumference (cm) and waist to height ratio between baseline and week 19 (N = 16)