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Title: 'Better Health Choices' by telephone: a feasibility trial of improving diet and physical activity in people diagnosed with psychotic disorders

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Abstract

The study objective was to evaluate the feasibility of a telephone delivered intervention consisting of motivational interviewing and cognitive behavioural strategies aimed at improving diet and physical activity in people diagnosed with psychotic disorders. Twenty participants diagnosed with a non-acute psychotic disorder were recruited. The intervention consisted of eight telephone delivered sessions targeting fruit and vegetable (F&V) consumption and leisure screen time, as well as smoking and alcohol use (as appropriate). F&V frequency and variety, and overall diet quality (measured by the Australian Recommended Food Score, ARFS), leisure screen time, overall sitting and walking time, smoking, alcohol consumption, mood, quality of life, and global functioning were examined before and 4-weeks post-treatment. Nineteen participants (95%) completed all intervention sessions, and 17 (85%) completed follow-up assessments. Significant increases from baseline to post-treatment were seen in ARFS fruit, vegetable and overall diet quality scores, quality of life and global functioning. Significant reductions in leisure screen time and overall sitting time were also seen. Results indicated a telephone delivered intervention targeting key cardiovascular disease risk behaviours appears to be feasible and relatively effective in the short-term for people diagnosed with psychosis. A randomized controlled trial is warranted to replicate and extend these findings.

Keywords: motivational interviewing; fruit; vegetables; sedentary lifestyle; smoking; psychotic disorder.

1. Introduction

The physical health of people diagnosed with psychotic disorders is poor compared to the general population, and life expectancy is 15 years shorter (Brown et al., 2000; Osby et al., 2001; Lawrence et al., 2003; Bushe et al., 2010; Laursen, 2011). Rates of cardiovascular disease (CVD) in people diagnosed with psychotic disorders are higher (27%) than in the general population (16%) (Morgan et al., 2011) and account for more premature deaths than suicide (Brown et al., 2000; Osby et al., 2001; Lawrence et al., 2003; Bushe et al., 2010). The Australian National Report Card on Mental Health recommended a clear set of strategies to reduce known CVD risk factors, namely improved diet and nutrition, increased physical activity, and reduced smoking (National Mental Health Commission, 2012). However, several factors may prevent people with psychotic disorders from receiving good physical health care: (i) lower rates of reporting physical symptoms spontaneously; (ii) features of the disorder, such as cognitive impairment, social isolation, and suspicion, that reduce treatment seeking or adherence; (iii) poorer social skills, and mental illness stigma, that reduce the likelihood of accessing good care; (iv) relatively short consultations in primary health care settings, which may not suit individuals with psychotic disorders; and (iv) mental health clinicians limited training in physical care or their pessimism about the possibility of change (Phelan et al., 2001).

Systematic reviews of randomised controlled trials (RCTs) of smoking cessation interventions targeting people with severe mental illness (SMI), including a large Australian RCT (Baker et al., 2006), have found comparable cessation rates to that achieved in general population studies (e.g., Banham and Gilbody, 2010). However, despite inadequate fruit and vegetable (F&V) consumption and physical inactivity being the most prevalent and preventable CVD risk behaviours, there is a paucity of research targeting these behaviours in

people with SMI. Population surveys of people with SMI indicate that rates of adherence to national targets for daily F&V consumption (2 serves of fruit; 5 serves of vegetables) are close to zero, and almost all respondents (97%) engage in low or very low levels of physical activity (e.g., Morgan et al., 2011). Higher diet quality scores are associated with reduced mortality, including from all causes (17–42% reduction), CVD (18–53% reduction) and cancer (13–30% reduction) (Wirt and Collins, 2009). Strong established links have been found between television watching and obesity, type II diabetes, CVD, metabolic syndrome and abnormal glucose (Clark et al., 2009).

Research into non-pharmacological interventions targeting diet and physical activity among people with SMI has generally focussed on weight loss or management (Bonfioli et al., 2012; van Hasselt et al., 2013). Weight loss studies (and their requisite control arms) tend to be complex and lengthy, and target people for whom substantial weight loss is the primary objective. Whilst around 75% of people with psychotic disorders are overweight/obese (Morgan et al., 2011), almost none meet guidelines for F&V consumption and physical activity, which are independent risk factors for CVD and specific cancers, regardless of weight. Thus, targeting F&V consumption and physical inactivity, rather than weight, may increase intervention reach, in addition to offering a less complicated, potentially more scalable and translatable approach.

Studies of health promotion lifestyle interventions for people with psychotic disorders do not report F&V consumption as an outcome (Bonfioli et al., 2012; van Hasselt et al., 2013), suggesting that this CVD risk behaviour is commonly overlooked. In a broadly focused behaviour change intervention in people with psychotic disorders, Baker and colleagues (2011) found no increase in F&V intake in either the intervention or control groups. Dietary

goals addressed a range of areas rather than targeting F&V, suggesting F&V consumption must be specifically targeted in order for changes to occur. Further, past research in both children (Epstein et al., 2008) and adults (Jenkins et al., 2011) indicates that encouraging people to eat more 'healthy' food is more effective than restricting 'unhealthy' foods.

However, the few existing RCTs specifically targeting F&V consumption or physical activity in people with psychotic disorders have produced poor results. These include loss of short term gains (McCreadie et al., 2005), low rates of attendance at external organisations (Beebe et al., 2011), and high rates of loss to follow-up (Scheewe et al., 2013), which are also seen in other lifestyle behaviour intervention studies among people with psychotic disorders (van Hasselt et al., 2013). These finding suggest a need for alternatives to interventions requiring attendance at external organisations.

Telephone interventions for CVD risk behaviours in the general population have been shown to be cost-effective (Graves et al., 2009; Smith et al., 2011) and at a lower cost than face-to-face interventions (Radcliff et al., 2012). A telephone intervention may also overcome attendance barriers. The authors recently completed an RCT evaluating a healthy lifestyle intervention targeting smoking, physical activity and diet in people with psychotic disorders (Baker et al., 2011). The number of sessions completed in the telephone based comparison group [mean=11.3 (SD=6.1)] was significantly higher than by the face-to-face group [mean=8.5 (SD=6.4), $p<0.001$)] (unpublished data). Further, tobacco 'quitlines' are being increasingly recognised as potentially effective for smokers with mental illnesses (e.g., Morris et al., 2009, 2011).

Spring and colleagues (2012) have argued that as suboptimal diet and a sedentary lifestyle tend to cluster together as health risk behaviours, increasing risk for disease, the opportunity exists to intervene more efficiently and perhaps synergistically by addressing multiple behaviours. In order to test which combination of diet and activity advice maximized healthy change, they randomly assigned 204 people with elevated saturated fat intake and low F&V consumption, high sedentary leisure (screen) time and low physical activity to one of four treatments: 1) increase F&V intake and physical activity; 2) decrease fat and sedentary leisure; 3) decrease fat and increase physical activity; or 4) increase F&V and decrease sedentary leisure. Coaches trained participants to monitor dietary intake and activity levels using a handheld device. Following two weeks of monitoring participants were randomly assigned to one of the four intervention conditions, focusing on one dietary and one activity goal. Coaches tailored behavioural strategies based on the individual's baseline data. Daily goals were set midway between the baseline level for each of the target behaviours and the ultimate daily goal for the first week. At the beginning of the second week, full goals were set and these were expected to be maintained during week 3. During the three treatment weeks, participants uploaded data daily and communicated as needed with their coaches via telephone or email, whichever they preferred. Goal thermometers were updated in response to data entry and participants were also able to look up potential impact of a food or activity choice. Participants could earn up to $175 as an incentive for meeting the goals for both targeted behaviours during the treatment phase.

During a 20 week follow-up period, incentives were continued in the Spring et al. (2012) study and contingent upon provision of recording and transmitting handheld device data. The intervention which targeted increasing F&V consumption and decreasing sedentary time increased composite diet-activity improvement scores more than the other interventions in the

first week of treatment ($p<.01$) and maintained superiority during the treatment and follow-up period. Substantial improvements were seen in daily F&V consumption (1.2 to 5.5 serves/day), screen time (219.2 to 89.3 min/day), and serendipitously, saturated fat intake (12% to 9.5% energy). The traditional approach (decreasing saturated fat and increasing physical activity) achieved lower levels of improvement than did the other three treatments in the first week of intervention ($p<0.05$) and through to the end of follow-up.

The aim of this pilot study was to evaluate the feasibility of an adaptation of the intervention developed by Spring et al. (2012) in reducing CVD risk behaviours among people with psychotic disorders, namely, the *Better Health Choices* intervention. *Better Health Choices* is a telephone-delivered intervention that uses motivational interviewing (Miller and Rollnick, 2012) and cognitive behavioural strategies to target low F&V intake and physical inactivity (leisure screen time) in people with a psychotic disorder. Conducted among the general population, Spring's (2012) intervention involved detailed daily self-monitoring and uploading of data and swift and sizeable dietary and activity goal setting, with directive suggestions for change, to be accomplished over three weeks. Allowing for possible socioeconomic, social, emotional and/or cognitive difficulties experienced by people with a psychotic disorder (Kavanagh and Connolly, 2007), the *Better Health Choices* intervention allowed behaviour change to occur over a longer interval, simplified self-monitoring to a weekly diary plus a 24 hour snapshot interview during each session, elicited self-motivational statements to identify a variety of possible goals and change strategies, and encouraged incremental goal attainments and behavioural activation in the form of increasing non-screen related activities. It was predicted that completion of the *Better Health Choices* intervention would be associated with a significant increase in F&V intake and a significant reduction in

leisure screen time compared to baseline. It was also hypothesised that the *Better Health Choices* telephone-intervention would be acceptable and satisfactory to participants.

2. Methods

2.1 Participants and procedures

This was a feasibility study, utilising a pre- versus post-treatment design, with no control group. Participants were recruited from the Australian Schizophrenia Research Bank (ASRB, http://www.schizophreniaresearch.org.au/bank/). Inclusion criteria were: aged ≥18 years; currently consuming <7 F&V servess per day and >2 hours of non-work sitting time per day; and a lifetime diagnosis of a psychotic disorder, as assessed by ASRB administration of the Diagnostic Interview for Psychosis (Castle et al., 2006). Exclusion criteria were: no access to a telephone or inability to communicate over the telephone; brain injury; and no current contact with a mental health professional and/or not currently being prescribed psychotropic medication.

All participants provided audiotaped informed consent via telephone; this procedure was approved by the regional Ethics Committee to broaden the potential reach of the intervention by not requiring attendance at a health centre. They were assessed before treatment and 4 weeks post-treatment completion (mean=112, SD=29 days from pre- to post-treatment); the timing of the post-treatment assessment avoided measurement overlap with the treatment period, since some of the measures covered two- or four-week periods. The pre-treatment assessment session was one-hour in duration and the post-treatment assessment session was approximately 40 minutes. Trained research assistants who were not involved in delivering the intervention conducted the screening, baseline and post-treatment assessments over the phone; after an appointment for session 1 of the intervention was made, participant details

were then provided to the therapist. Following the initial assessment, participants received a letter with simple graphs illustrating how their health behaviours (F&V intake, screen time, smoking and alcohol intake) compared with national health recommendations. With consent, a letter was sent to the participant's general practitioner regarding their involvement. Participants received $AUD20 for participating in each assessment and they also received a small mixed F&V box prior to commencing therapy (valued at $AUD25). A resources booklet was posted to participants, which included information on diet, sedentary behaviour, smoking and alcohol and recommendations for behaviour change. This research was approved by the Hunter New England Human Research Ethics Committee.

2.2 Intervention

The intervention consisted of eight manual-guided telephone delivered sessions developed specifically for the present study. Session 1 provided feedback from the baseline assessment regarding F&V consumption, sedentary (including screen) time, smoking and alcohol use. Motivational interviewing was employed to help participants identify goals for change. All participants were asked to focus on increasing F&V consumption. As a second target, they could choose to change one or more of sedentary behaviour, smoking or alcohol use. Target goals were guided by national guidelines and current research on CVD risk behaviours, with 100% targets being: 2 fruit and 5 vegetable serves/day for F&V consumption (National Health and Medical Research Council, NHRMC, 2013); ≤2 hours leisure screen time (Grontved and Hu, 2011); smoking abstinence; and alcohol consumption of ≤ 2 standard drinks per day (NHMRC, 2009). Initially, participants were encouraged to set goals representing a 25% or 50% improvement from baseline (e.g., an increase from 1 to 2 vegetable serves/day would be a 25% target goal; 3 serves/day would be a 50% target goal).

Sessions 2-8 consisted of motivational interviewing and behavioural strategies (e.g., reviews of self-monitoring, behavioural activation) and a check on mental health symptoms (mood, thoughts of self-harm and, for smokers who quit or reduced, common withdrawal symptoms and medication side-effect changes related to cessation). As completion of more sessions has been associated with better outcome (Baker et al., 2006), following Spring et al.'s (2012) use of contingency management, participants received $AUD20 for completion of each telephone intervention session. Clinical psychologists (ALB, AT, PJK, HD) and two clinical psychology interns delivered the intervention. Regular group supervision was held every two weeks by telephone. Clinical psychologists on the trial were experienced in motivational interviewing and cognitive behaviour therapy. Training in motivational interviewing and behavioural strategies as part of internship supervision was provided by ALB, which was followed by weekly face-to-face supervision, including review of audiotapes.

The resources booklet posted to participants also contained copies of forms to record each session's goals, a lifestyle diary, and relevant information for each of the CVD risk behaviours. Participants were encouraged to record session goals and strategies for change before ending each session, or a text message with this information was sent.

Treatment fidelity. With permission, intervention sessions were audio-recorded, with psychologists who were not involved with treatment delivery or assessments rating treatment sessions for fidelity and competence. Therapist competence was rated using the Behavior Change Counselling Index (BECCI) (Lane et al., 2005), with 11 items (rated 0-4) covering different behaviour change skills. The overall BECCI practitioner score is calculated as the mean of all available questionnaire items and indicates how often the practitioner is engaging in behaviour change counselling skills (0=Not at all, 1=Minimally, 2=To some extent, 3=A

good deal, and 4=A great extent). The BECCI demonstrates acceptable levels of validity, reliability and responsiveness (Lane et al., 2005).

2.3 Outcome measures: primary dependent variables

2.3.1 Fruit and vegetable intake

F&V intake frequency and variety was assessed using F&V subscales from the Australian Recommended Food Score (ARFS) (Collins et al., 2008; Wirt and Collins, 2009). The ARFS uses a subsample of questions from the Australian Eating Survey Food Frequency Questionnaire (FFQ) (Collins et al., 2011) to assess adherence to eating patterns recommended in the Australian Dietary Guidelines (NHMRC, 2013). The FFQ demonstrates good reproducibility and reasonable comparative validity against three-day weighted food records; for example, across 17 estimated daily nutrient intake categories, the median intra-class correlation coefficient (ICC) over a 6-month interval was 0.76 (range 0.68-0.88), while the median comparative validity ICC was 0.53 (range 0.34-0.73) (Collins et al., 2014). The ARFS subscales were chosen as the primary outcome rather than F&V serves to reduce confounding, as it is likely that participants' capacity to estimate portion size improves from baseline to follow-up due to education regarding serving size included in the intervention. Rather than requiring participants to accurately estimate serving sizes based on half-cup measures, the ARFS assigns points for the variety of both F&V that the participant reports consuming at least once per week. Hence, a higher score on the ARFS reflects regular consumption of a greater variety of F&V, as well as greater total intake.

Fruit consumption: One point is allocated for consumption of eight different fruits, including fruit salad, dried and canned fruit ≥ once per week and 1 point for total fruit consumption ≥2/day (score range 0-12).

Vegetable consumption: One point is allocated for consumption of 19 different vegetables ≥ once per week; and one point for consuming vegetables with dinner 3-4 nights/week or two points for ≥5 nights/week (score range 0-21).

2.3.2 Screen time

Leisure screen time was defined as weekday time spent watching television and/or using a computer at home, and assessed using specific questions from Marshall et al. (2010). Test-retest reliability for selected items has been found to be high (r=0.78-0.82) and validity fair (r=0.50-0.74) (Marshall et al., 2010).

2.4 Outcome measures: secondary dependent variables

Overall diet quality was assessed using the total ARFS score. Total serves of F&V were assessed using the following questions: "In the last week, how many serves of vegetables did you usually eat each day? *(Include fresh, canned or frozen. Do not include hot chips or potatoes cooked in oil).*" and "In the last week, not counting fruit juice, how many serves of fruit did you usually eat each day? (*Include fresh, frozen, canned and dried fruit*)" (Marks et al., 2001). Overall walking was assessed using the International Physical Activity Questionnaire item asking participants to report, for the last week, how many days they have walked for ≥10 minutes at a time, and how much time they spent walking on those days (minutes/day) (Craig et al., 2003). Overall sitting time was calculated using questions from Marshall et al. (2010) referring to time spent sitting in travel, work, TV, computer at home, and at leisure (not including TV time).

Smoking outcome measures were: point prevalence abstinence; number of cigarettes smoked/day; and smoking reduction status (% reduction) relative to baseline. Point

prevalence abstinence was defined as abstinence for the 7 days preceding the follow-up assessment. Alcohol consumption was assessed using the 2-week Timeline Follow Back alcohol use subscale (Sobell and Sobell, 1992). Alcohol consumption exceeding recommended guidelines (NHMRC, 2009) was classified as 'hazardous'. Cannabis use was assessed using the Opiate Treatment Index cannabis subscale (Darke et al., 1991).

Psychiatric symptomatology was assessed using the Beck Depression Inventory-Fast Screen (Beck et al., 2000), with higher scores indicating higher levels of depression. The WHO-8 EUROHIS Quality of Life (QoL) scale was administered (Schmidt et al., 2006), with higher scores indicating greater QoL. Global functioning was measured using the Global Assessment of Functioning (GAF), as defined by the DSM-IV (American Psychiatric Association, 1994), with higher scores indicating better overall psychological, social and occupational functioning.

2.5 Treatment satisfaction

Satisfaction with care received was measured using the 8-item Client Satisfaction Questionnaire (range 8-32), with higher scores indicating higher satisfaction (Attkisson and Zwick, 1982). The questionnaire also sought comments and suggestions from participants. Treatment attendance was used as an index of intervention engagement.

2.6 Statistical analysis

Data were analysed using IBM SPSS Statistics for Windows (version 20.0; SPSS, Chicago, IL, USA). In order to partially adjust for the number of statistical tests conducted, the significance threshold was set at $p<0.01$. Trends are also noted, for $p<0.10$. Difference between baseline and follow-up was assessed using 2-tailed paired samples t-tests. An inter-

rater difference was found in GAF measurements; therefore, a generalised estimation equation was used for the GAF change analysis, which controlled for the variance due to raters. Standardised change (effect size) scores were calculated by dividing the mean change (pre- minus post-intervention) by the corresponding SD of the change scores.

3. Results

3.1 Sample characteristics

As detailed in Figure 1, a total of 110 letters were sent to ASRB registrants inviting them to participate. Of 30 respondents, 24 could be contacted and were screened, and 20 (18%) were recruited into the study (1 refused and 3 were ineligible, two due to reporting fewer than the required CVD risk behaviours, and one with a history of brain injury). Nineteen (95%) completed all 8 therapy sessions (1 participant withdrew due to lack of privacy in their boarding house). Seventeen (85%) completed follow-up assessments and were included in the final sample (53%, male; mean age=33.9, SD=6.1, range=22-41 years). Most (77%) were single and had never married, 29% were employed, and 88% received welfare support.

Insert Figure 1 near here

DSM-IV (American Psychiatric Association, 2000) diagnoses, as assessed by the ASRB, included: schizophrenia (*n*=11, 65%); schizoaffective disorder, bipolar type (*n*=3, 18%); delusional disorder (*n*=1, 6%); major depressive episode with psychosis (*n*=1, 6%); and psychotic disorder not otherwise specified (*n*=1, 6%). Performance on the Wechsler Abbreviated Scale of Intelligence was in the average range, with a mean IQ estimate of 102.3 (SD=16.9, range 69-129). Mean time since illness onset (not including any prodromal phase) was 12.4 (SD=5.2; range 3-21) years.

3.2 Primary outcomes

There was a significant improvement in two of the three primary outcome variables (see Table 1). From baseline to follow-up, scores on the ARFS fruit subscale increased significantly, and there was a significant reduction in reported leisure screen time (watching TV and/or using the computer at home). There was also a trend for improvement on the ARFS vegetable sub-scale score. Among those who reduced their leisure screen time by 60 minutes or more per day (*n*=9), the average reduction was 264.4 minutes per day. For this sub-group, there was a mean reduction in sitting time per weekday of 238.3 minutes, which included an average increase of 24.6 minutes walking per day. Therefore, approximately 90% of the reduction in screen time for this sub-group translated into non-sedentary activity.

Insert Table 1 near here

3.3 Secondary outcomes

Overall diet quality and global functioning improved and overall sitting time decreased significantly from baseline to follow-up (see Table 1). A trend was seen for an increase in quality of life, and time spent walking (among the total sample), and a reduction in the number of cigarettes smoked per day for participants who smoked tobacco at pre-treatment (*n*=5).

Two (40%) of the five tobacco smokers (smoking 20 and 40 cigarettes/day) were abstinent at post-treatment and had been for at least a month prior, and were the only smokers who used nicotine replacement therapy (NRT) during the program (one used gum alone; the other used patches and gum). One smoker (20%) had reduced their cigarettes per day by 50% (20 to 10 cigarettes/day). Two of the three participants who reported using cannabis at baseline (one reported 12.5 uses per day; the other reported 1 use in the past month) were abstinent at post-

treatment and had been for at least the month prior. The remaining participant reported a 67% reduction (36 to 12 cannabis use occasions/day).

Only one person reported drinking alcohol above recommended levels at baseline, and this person, also a smoker, did not elect to target alcohol use.

3.4 Treatment fidelity and satisfaction

Participants could receive 1 or 2 sessions per week. Two participants elected to have two sessions per week and the remainder elected to have one session per week (mean treatment duration=59, SD=22, range=28-123 days). Reasons for inability to attend scheduled sessions included unavailability (e.g., attending university, doctor's appointment, unsuitable time, phone turned off), hospitalization, holidays, and feeling stressed. Therapist notes indicated all participants set F&V targets in at least 5 of the 8 sessions. For their second target behaviour, all smokers (tobacco and/or cannabis, *n*=6) chose to focus on smoking (with at least one in-session goal targeting sedentary behaviour) while the remaining participants (*n*=11) targeted sedentary behaviour. One participant with a history of alcohol misuse chose to target alcohol use in addition to sedentary behaviour as they started drinking again over the course of the program.

One person refused to have their sessions taped. A total of 117 sessions were recorded (86%); 77 (57%) were rated, while 40 were not rated due to poor recording quality (e.g., electrical interference between the recorder and nearby computers). Session 1 was an average of 60 (SD=15) minutes duration. The remaining 7 sessions were an average of 26 (SD=9) minutes per session. During session 1, average time spent discussing the behaviours was: 5 (SD=4) minutes for fruit; 6 (SD=6) minutes for vegetables; 9 (SD=6) minutes for F&V together; for

non-smokers, 24 (SD=6) minutes for sedentary behaviour; and for smokers, 28 (SD=12) minutes for smoking and 14 (SD=8) minutes for sedentary behaviour. In sessions 2-8, 2 (SD=2) minutes were spent discussing fruit; 4 (SD=4) minutes for vegetables; 3 (SD=3) minutes for F&V together; for non-smokers, 9 (SD=5) minutes for sedentary behaviour; and for smokers, 13 (SD=6) minutes for smoking and 3 (SD=2) minutes for sedentary behaviour.

The mean BECCI practitioner score for all rated audiotapes (*n*=76 sessions) was 2.41 (SD=0.26) (indicating behaviour change counselling skills were being utilised between "To some extent" and "A good deal" of the time); with no significant difference between therapists ($F_{(5, 70)}$=0.52, p=0.758). Future applications of the BECCI should consider excluding the portion of sessions routinely devoted to non-counselling activities (e.g., reviewing homework diaries), which would tend to increase the mean rating.

Results from the client satisfaction questionnaire can be seen in Table 2. Overall, program satisfaction was high, with all participants rating the quality of the service as good or excellent. Sixteen (94%) indicated they were mostly or very satisfied overall. Four participants commented on the helpfulness of the experience (e.g., "…helped out a fair bit"), two commented on therapists' skills ("very motivating therapist"; "… no pressure to change but encouragement"), and two commented on helpful components of the intervention (e.g., "... being aware of behaviours"; "…liked the booklet"). With regard to improving the intervention in the future, two participants stated they would have liked more information about healthier diets, and one participant would have liked more on cannabis. One person commented that the intervention was unable to alleviate their financial strain.

Insert Table 2 near here

4. Discussion

Completion of the *Better Health Choices* telephone intervention was associated with improvements in F&V and overall diet quality, reductions in leisure screen time and overall sitting time, and improved QoL and global functioning. The results support previous findings in the general population (Spring et al., 2012) and in people with psychosis (Baker et al., 2009; Baker et al., 2011) indicating that behaviour change across multiple domains is possible using non face-to-face modalities of treatment delivery.

Participants reported a significant reduction in overall sitting time and a non-significant increase in walking, suggesting a potential flow-on effect of targeting leisure screen time. Although analyses indicated that reduction in leisure screen time was largely replaced by non-sedentary activity, future trials should employ accelerometers to verify self-reported data. Fat intake was not measured in detail; as such, no comment can be made regarding whether a decrease in sitting time and increase in F&V is associated with reduced fat intake as has been seen previously (Spring et al., 2012). This should be evaluated in a larger trial.

Although only five participants were tobacco smokers at baseline, it is interesting to note that rates of reduction were comparable with past studies (Banham and Gilbody, 2010). NRT was not supplied as part of the intervention; the two participants who smoked at baseline and used it during the program were both abstinent by follow-up. Psychiatric symptoms did not worsen in the face of improvements in health behaviours. Indeed, both self-reported QoL and global functioning improved, and depression symptoms did not worsen (a small, non-significant improvement was seen).

There are several methodological limitations. No control group was utilised and an RCT is required to test the efficacy of the intervention as delivered in the present study against naturally occurring behaviour change. The trial conducted by Spring and colleagues (2012) upon which this work was based showed that a dietary intervention that did not target F&V consumption was associated with only a -0.10 effect size compared to an effect size of -1.2 (i.e., post-treatment improvement) for an intervention which targeted F&V serves. Thus, it seems likely that only relatively small changes in F&V consumption are achieved when F&V consumption is not directly targeted as a goal of intervention. In the present study, moderate to large effect sizes (-0.64 to -0.97, see Table 1) were obtained for F&V and dietary quality on the ARFS. This suggests that intervention related improvement attained in the present study was at least moderate, lending support to the need for an RCT.

A convenience sample was utilised and participant self-selection may have impacted on results. Recruitment via the ASRB within this time-limited pilot trial was intended to avoid common barriers to recruitment such as health organisation challenges, difficulties with finding eligible participants, and challenges with having professionals invite participants (Jørgensen et al., 2014). In order to determine how the ASRB database of volunteers may differ from people with psychotic disorders recruited from other settings, Loughland and colleagues (2004) compared characteristics of people diagnosed with schizophrenia or schizoaffective disorder and recruited from the ASRB with those recruited from general practice, the community, or public inpatient mental health services. Significant differences between these recruitment sources with respect to illness-onset factors, relationship and support factors, current functioning and course of illness were found. Moreover, Loughland and colleagues (2004) concluded that convenience samples of patients with schizophrenia drawn predominantly from psychiatric treatment facilities are not likely to be representative

of the population of people with schizophrenia. They recommend that drawing samples from several sources may lead to improved generalizability. Hence, a range of recruitment sources should be utilised in any future RCT, in addition to the ASRB.

Exclusion of potential participants because of lack of access to a telephone or inability to communicate over the telephone further limits generalizability of the results. Telephone access may be much more restricted in non-Western countries and hearing impaired people may not benefit from the intervention as tested here. However, if shown to be successful in an RCT, dissemination could be aided by provision of inexpensive mobile phones and substitution of email contact where necessary for hearing impaired people.

Furthermore, assessment relied on self-report instruments as interviews were conducted solely via telephone. As noted by Kypri and McAnally (2005), a social desirability bias (Crowne and Marlowe, 1960) might have affected responses at follow-up, such that some participants may have over-reported their F&V intake and physical activity, exaggerating the effectiveness of the intervention. Nevertheless, while potentially more susceptible to recall errors, the approach increases reach of the intervention and the self-report measures selected demonstrated good validity when compared with physiological or diary assessment measures. In addition, follow-up assessment was limited to a single post-treatment occasion. Further work needs to utilise an RCT with multiple longer-term follow-up assessment time points.

As in most trials employing interventions consisting of various components, the effectiveness of individual components is unknown. In addition to the telephone counselling, participants also received feedback about how their CVD risk behaviours compared with recommended levels and a resource book; contingency management was also employed to encourage

prompt session attendance. Further trials might separate these components to evaluate efficacy. The inclusion in a feasibility study of modest reimbursement for intervention sessions also raises potential concerns about generalizability of the findings to everyday settings. On the other hand, pragmatic research designs that increase treatment retention (e.g., engaging participants in more sessions) may also contribute to better estimates of treatment specific benefits. In real world (non-research) settings, a broader array of strategies and incentives may be both available and required, including transportation assistance and childcare (Woodall et al., 2011). In addition, implementation of strategies such as sample boxes of F&V and use of contingency management may require: (i) planning for funding and logistics; (ii) engagement of staff in specific roles (e.g., implementation leaders, champions, external agents); (iii) staged onset and practical adaptation during execution; and (4) fidelity-monitoring and cost-effectiveness analyses to allow evaluation (Hartzler et al., 2011).

This pilot study demonstrated a telephone intervention is highly feasible in this population, highlighted by high completion rates and positive participant feedback. All but one of the 20 participants originally recruited (95%) completed all 8 telephone sessions, albeit with marked variability in treatment duration (around 4 – 17 weeks), allowing for pauses in treatment due to travel, work commitments or illness. The flexibility in session timing probably contributed to the high proportion of treatment completion; and, overall, the relatively brief length of the treatment sessions (30 minutes) and the telephone delivery reduced the usual time and resource burdens to a client receiving such an intervention. In addition, telephone delivered interventions are potentially appealing to this population as there are often problems with motivation, anxiety, and paranoid symptoms. Telephonic interventions also have the potential to follow a dual diagnosis treatment framework, providing assertive and proactive outreach for engagement, stage tailored motivational interventions, culturally sensitive approaches,

CBT, social support, and taking a longer-term perspective (US Department of SAMSHSA). The intervention was delivered by a number of psychologists of varying levels of experience. While impact of clinician experience on treatment outcome was not directly assessed, this range of experience suggests the intervention may also be feasible in organisations where highly experienced clinicians are not available, which may be important for dissemination (Prochaska et al., 2007). Overall, the *Better Health Choices* program moves towards addressing the paucity of research into strategies targeting physical inactivity and F&V intake in those with psychosis.

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Table 1. Change from pre- to post-treatment on primary and secondary outcome measures.

Measure	*N*	Before treatment Mean (SD, range)	After treatment Mean (SD, range)	t-test scores (df, p-value)	Effect size (95% CI)
Primary Outcomes					
ARFS sub-scale – fruit	17	5.1 (3.1, 0-9)	6.6 (2.9, 1-12)	-3.03 (16, .008)	-0.73, (-1.25, -0.22)
ARFS sub-scale – vegetables	17	12.2 (4.0, 4-20)	13.5 (3.5, 5-18)	-2.64 (16, .018)	-0.64 (-1.15, -0.13)
Leisure screen time (minutes/day)	17	298 (200, 45-720)	163 (107, 20-420)	3.13 (16, .007)	0.76 (0.24, 1.27)
Secondary Outcomes					
Diet Quality (ARFS total score)	17	33.2 (10.5, 16-50)	38.2 (8.1, 23-51)	-3.99 (16, .001)	-0.97 (-1.48, -0.45)
Fruit and Vegetable serves/day	17	4.2 (2.0, 1-8)	5.0 (1.8, 1-8)	-1.64 (16, .120)	-0.40 (-0.91, 0.12)
IPAQ Walking (minutes/week)	17	252 (353, 0-1470)	356 (470, 0-1680)	-1.75 (16, .099)	-0.42 (-0.94, 0.09)
Total weekday sitting time (minutes/day)	17	555 (191, 165-885)	412 (211, 135-720)	3.01 (16, .008)	0.73 (0.22, 1.24)
Cigarettes per day	5	29.0 (10.3, 20-40)	13.2 (14.3, 0-31)	2.31 (4, .082)	1.03 (-0.21, 2.28)
Cannabis (use occasions per day)	3	16.2 (18.3, 0.04-36)	4.0 (6.9, 0-12)	1.76 (2, .220)	1.02 (-1.47, 3.50)
Beck Depression Inventory Fast Screen	17	4.5 (3.3, 0-12)	3.7 (2.8, 0-9)	1.52 (16, .149)	0.37 (-0.15, 0.88)
Quality of life	17	25.6 (5.6, 17-36)	28.4 (6.6, 10-38)	-2.67 (16, .017)	-0.65 (-1.16, -0.13)
Global Assessment of Functioning[$]	17	57.1 (6.7, 50-81)	62.7 (8.9, 50-80)	W^2=7.14 (1, .008)	-0.65 (-1.12, -0.17)

ARFS, Australian Recommended Food Score; IPAQ, International Physical Activity Questionnaire; OTI, Opiate Treatment Index.
[$]Inter-rater differences were controlled for using a generalised estimation equation; W^2, Wald chi-square.

Table 2. Individual items from the Client Satisfaction Questionnaire.

Satisfaction item	**Ranking** *n (%)*			
1. Quality of service	Excellent 14 (82.4%)	Good 3 (17.6%)	Fair 0	Poor 0
2. Received service they wanted	Yes, definitely 13 (76.5%)	Yes, generally 3 (17.6%)	No, not really 1 (5.9%)	No, definitely not 0
3. Needs met	Almost all needs met 5 (29.5%)	Most needs met 11 (64.7%)	Few needs met 0	No needs met 1 (5.9%)
4. Recommend to others	Yes, definitely 10 (58.8%)	Yes, generally 5 (29.4%)	No, not really 2 (11.8%)	No, definitely not 0
5. Satisfaction with amount of help	Very satisfied 10 (58.8%)	Mostly satisfied 6 (35.3%)	Indifferent or mildly dissatisfied 1 (5.9%)	Quite dissatisfied 0
6. Helped to deal more effectively with problems	Yes, a great deal 12 (70.6%)	Yes, somewhat 3 (17.6%)	No, didn't really help 2 (11.8%)	No, made things worse 0
7. Overall satisfaction	Very satisfied 13 (76.5%)	Mostly satisfied 3 (17.6%)	Indifferent or mildly dissatisfied 1 (5.9%)	Quite dissatisfied 0
8. Would come back to the program	Yes, definitely 12 (70.6%)	Yes, generally 2 (11.8%)	No, not really 2 (11.8%)	No, definitely not 1 (5.9%)
TOTAL			Mean (SD) = 28.5 (4.4)	Range = 17-32

Figure 1. Consort diagram.