Behavioural and Cognitive Psychotherapy, 2019, 47, 200–216
First published online 9 July 2018 doi:10.1017/S1352465818000425

The Acceptability, Feasibility and Potential Outcomes of an Individual Mindfulness-Based Intervention for Hearing Voices

Stephanie Louise*

Centre for Mental Health, *Swinburne University of Technology*, *Melbourne*, *VIC*, *Australia and Monash Alfred Psychiatry Research Centre (MAPrc)*, *Central Clinical School*, *Monash University and The Alfred Hospital*, *Melbourne*, *VIC*, *Australia*

Susan L. Rossell

Centre for Mental Health, *Swinburne University of Technology*, *Melbourne*, *VIC*, *Australia*, *Monash Alfred Psychiatry Research Centre (MAPrc)*, *Central Clinical School*, *Monash University and The Alfred Hospital*, *Melbourne*, *VIC*, *Australia and Psychiatry, St Vincent's Hospital*, *Melbourne*, *VIC Australia*

Neil Thomas

Centre for Mental Health, *Swinburne University of Technology*, *Melbourne*, *VIC*, *Australia and Monash Alfred Psychiatry Research Centre (MAPrc)*, *Central Clinical School*, *Monash University and The Alfred Hospital*, *Melbourne*, *VIC*, *Australia*

Background: A prominent area of advancement in the psychological treatment for people with persisting psychosis has been the application of mindfulness-based therapies. Recent literature has recommended the investigation of focused mindfulness interventions for voices (auditory hallucinations) as a specific experience. To date, only mindfulness programs in group format have been examined. **Aims:** This non-randomized pilot study aimed to assess the acceptability, feasibility and potential outcomes of an individual mindfulness program for persistent voices on the negative impact of voices on the subjective experience of mental health and wellbeing, depression and voice-related distress and disruption. Also, it aimed to identify potential psychological and neurocognitive mechanisms of change. **Method:** A new 4-week individual Mindfulness Program for Voices (iMPV) was developed, and piloted with a group of 14 participants with a schizophrenia-spectrum disorder and persisting voices. Participants completed clinical and neurocognitive measures pre- and post-intervention and at 2-month follow-up. **Results:** Results revealed low attrition rates, high formal practice engagement levels and positive participant feedback. Pre–post outcomes suggested small to moderate effects for a reduction in the negative impact of voices on experience, depression and disruption.

* Correspondence to Stephanie Louise, Centre for Mental Health, Swinburne University of Technology, Mail H99, PO Box 218, Hawthorn, VIC, Australia 3122. E-mail: slouise@swin.edu.au

Large effects for changes in mindful responding and attentional switching were also identified. **Conclusions:** Our findings suggest that this novel treatment protocol is appropriate, engaging and safe for persistent voice hearers. Findings for mindful responding and attentional switching suggest these to be potential mechanisms of change for further investigation. Further RCTs are warranted to ascertain the feasibility and efficacy for focused mindfulness interventions for voices of individual format.

Keywords: mindfulness, meditation, psychosis, auditory verbal hallucinations, voices, voice-hearing, attention

Introduction

Up to 50% of individuals with psychosis experience persisting positive psychotic symptoms, such as auditory verbal hallucinations (or 'voices') and delusions, despite the use of anti-psychotic medication (Elkis, 2007). Treatment of these refractory symptoms has been a major target in the development of psychological therapies for psychosis (Burns et al., 2014). Cognitive behavioural therapy (CBTp) is currently the primary recommended psychological treatment targeting psychotic symptoms in clinical practice guidelines (e.g. NICE, 2014). CBTp has been found to be moderately effective for medication-resistant positive symptoms (Burns et al., 2014), and more specifically for the treatment of hallucinations (van der Gaag et al., 2014). However, there has been increasing interest in applying third-wave therapies that promote mindfulness and acceptance (Khoury et al., Thomas et al., 2014).

Mindfulness has been one of the most prominent areas of psychosis treatment advancement since the development of CBTp (Thomas et al., 2014), with small to moderate pre–post treatment effects on positive symptoms being reported by a previous meta-analysis (Hedge's $g = 0.32$; Khoury et al., 2013). Mindfulness involves non-judgementally, and purposely, paying attention to present-moment experiences (Kabat-Zinn, 1994), a skill that can be applied to positive psychotic experiences. In psychosis, as in other populations, mindfulness is typically cultivated through formal meditation practices and experiential exercises, via group-format courses (Strauss et al., 2015). However, mindfulness has frequently been included as a small, and often optional, component of broad multi-component interventions, such as acceptance and commitment therapy (ACT), with formal mindfulness practice often being encouraged but not a core element of the therapy (Strauss et al., 2015). Yet, qualitative feedback from such multi-component approaches often specifically mentions the acceptability and perceived benefits of mindfulness (Bacon et al., 2014).

More focused psychological interventions may be simpler to disseminate than formulation-based multi-component approaches (e.g. CBTp and ACT) that require advanced therapy skills (Thomas, 2015; Thomas et al., 2014). Given the widespread popularity of mindfulness among practitioners, development of a mindfulness protocol for voices is timely. In addition, extant research on interventions with a primary focus on mindfulness has been solely of group format delivery (Strauss et al., 2015). However, in practice, psychological therapies for people with psychosis are typically delivered one-to-one. Research needs to be pragmatic in considering the effectiveness of interventions in this format, in order to inform evidence-based practice and facilitate dissemination. Furthermore, hearing voices and psychotic phenomenology present heterogeneously, thus it is possible that one-to-one delivery of mindfulness-based interventions (MBIs) may have greater treatment effects than group delivery, as has been observed for individual versus group CBTp (van der Gaag et al., 2014).

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

Although several randomized control trials (RCTs) have considered outcomes of focused MBIs for psychosis (Chadwick et al., 2016; Chien and Lee, 2013; Chien and Thompson, 2014; Langer et al., 2012; López-Navarro et al., 2015), to date only one of these trials has focused on the impact of distressing voices (Chadwick et al., 2016). However, in two case studies, Newman Taylor et al. (2009) described the use of individual mindfulness therapy, involving 12 sessions of guided mindfulness practice, with two men with schizophrenia experiencing distressing voices. Following the intervention, both participants showed increased mindful responding to voices, decreased voice-related distress, decreased belief that voices were real, and feeling less overwhelmed by and better able to manage living with voices (Newman Taylor et al., 2009).

Strauss and colleagues (2015) have proposed several theoretical reasons for the potential benefits of MBIs for distressing voices: (1) active acceptance of voices as an alternative to suppression or resistance, (2) targeting of the rumination and worry found to be associated with persistent voice hearing, (3) decentring as a protective factor against negative voice content/cognitions, and (4) mindful observation as an alternative to preoccupation with verbal dialogue.

In addition, developing targeted therapeutic approaches enables more precision in examining the efficacy for, and potential mechanisms of change involved in mindfulness training for voices, by reducing the confounds of other therapeutic processes (Strauss et al., 2015; Thomas, 2015), akin to the interventionist-causal paradigm that has been applied to other experiences in psychosis (Brand et al., 2017; Farrelly et al., 2016; Freeman, 2011). Potential mechanisms of change identified by qualitative literature include: (1) reorientation of attention away from voices, (2) decentring, and (3) acceptance of voices (Strauss et al., 2015). For instance, previous literature has suggested that individuals who experience hearing voices have less control over their ability to switch their attention, which may be the result of increased attentional resources on the voice-hearing experience (Hugdahl, 2009; Waters et al., 2012). These deficits in attentional switching or set-shifting have also been evidenced through significantly poorer performance on the Trail Making Test-Part B, compared with healthy controls (Siddi et al., 2017). Past research has also suggested that mindfulness training, even in the short-term, can improve specific attention processes, such as attentional control or switching and sustained attention (Chambers et al., 2008; Jha et al., 2007; Tang et al., 2007).

In this study, an individual, brief mindfulness intervention for persistent voices (iMPV: individual Mindfulness Program for Voices) was developed and evaluated. The aim of the current *non-randomized pilot study* (Eldridge et al., 2016) was to ascertain the acceptability and feasibility of this program with persistent voice hearers. Small-scale studies are often conducted in advance of full RCTs to determine if procedures are sufficiently feasible for larger trials to be worthwhile (Eldridge et al., 2016; Lancaster et al., 2004). Whilst randomized pilot studies may include questions of recruitment and retention rates, in developing an MBI for voices, initial acceptability and feasibility questions concern whether such a focused intervention can be successfully delivered and engaged with, e.g. whether a client group with persisting psychosis would be able to engage in exercises during appointments, complete homework, and find the use of mindfulness acceptable. Hence, piloting this program with the aim of addressing these questions was the focus of this study. This study also examined the potential effects of this program to reduce the negative impact of voices on the subjective experience of mental health and wellbeing, as well as depression, voice-related distress and disturbance. Also, we aimed

to obtain further information on potential psychological and neurocognitive mechanisms of change, specifically mindfulness and attention.

Methods

Design

This non-randomized pilot study was designed to assess the feasibility and acceptability of the intervention and provide preliminary outcome data. The protocol was initially tested with four participants, who completed the assessment measures at two time points, approximately one month apart (Time 1 and Time 2). Following this, a baseline-controlled pilot study design was adopted including two pre-intervention time points 1 month apart (Time 0 and Time 1), as well as post-treatment (Time 2) and a follow-up 2 months later (Time 3). Given the small overall sample size, the authors decided, prior to analysis, to use data from the first four participants in the examination of pre- to post-effects as a method for maximizing numbers for analyses.

Participants

Overall, 14 participants were recruited from a specialist Voices Clinic and partner networks in Melbourne, Australia. Inclusion criteria were: (1) a self-reported previous diagnosis of schizophrenia or schizoaffective disorder, (2) between the ages of 18 and 65, (3) experienced hearing persistent medication-resistant voices for more than 2 years, and (4) these voices were currently experienced at least once per week. Exclusion criteria were: (1) history of stroke, neurological illness or epilepsy, (2) English as a second language, (3) a current substance abuse disorder, (4) a past head injury or significant loss of consciousness, (5) a Wechsler Test of Adult Reading (WTAR; Wechsler, 2001) estimated IQ < 70, or (6) having commenced a new anti-psychotic medication within the previous 2 months. A basic telephone screen of eligibility was conducted prior to participants providing informed written consent. Participants were financially reimbursed for assessment sessions.

Intervention

Individual Mindfulness Program for Voices (iMPV). The current intervention was developed by S.L. under the supervision of N.T. The intervention was based on mindfulness-based cognitive therapy (MBCT; Segal et al., 2002) and mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1994) approaches, incorporating adaptations described by Chadwick, Taylor, and Abba (2005) and Thomas et al. (2013) for individuals who hear voices, and previous experience of applying mindfulness to voices in a specialist Voices Clinic.

iMPV entailed four weekly one-hour sessions. The therapist was trained in MBCT and had received training in CBTp and ACT for psychosis. Sessions were of individual format and included guided mindfulness practice alongside discussions around mindful responding as an alternative to habitual reactions to voices, non-judgemental awareness of voices and acceptance of symptoms and self. Sessions 1 and 2 provided an introduction to the foundations of mindfulness and sessions 3 and 4 focused specifically on mindful responding to voices. Home mindfulness practice between sessions was facilitated with hand-outs, audio-recordings of guided mindfulness exercises on an MP3 device, and a home practice record.

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

Table 1. iMPV session content

	Theme	Formal practice	Home practice
Session 1	Current coping and an introduction to mindfulness	• Body scan (15 min)	• Body scan • Daily mindful activity
Session 2	Choiceless awareness	• Breathing space (3 min) • Mindful hearing (5 min) • Mindful stretching (10 min)	• Mindful stretching • Daily mindful activity
Session 3	Mindful observation: noting and observing voices	• Mindfulness of breath (10 min) –boring speech recording –specific voice content recording	• Breathing space • Mindfulness of breath • Mindful responding to voices
Session 4	Acceptance and letting go of habitual reactions	• Mindful hearing (5 min) • Mindfulness of breath (10 min) –specific voice content recording	• Breathing space • Mindfulness of breath • Mindful responding to voices

In contrast with existing mindfulness interventions, this mindfulness protocol for voices included several experiential practices that simulated the voice-hearing experience. These were used to produce voice-like stimuli with which to practise mindfulness skills with the therapist, given that the participants' own hallucinated voices are often not reliably present in-session. For instance, participants were first introduced to the concept of mindful responding to voices using a pre-recording of speech playing during a mindfulness of breath practice. This enabled participants to practise mindfully observing and noting voice topography. A recording of speech selected to be boring, rather than engaging, was used for initial practice to minimize its salience in capturing attention during initial practice. Subsequently, to simulate the emotional reaction to negative voice content often reported by clients, mindfulness-of-breath practices were completed with pre-recorded individual voice content from each participant playing in the background. This facilitated the practice of mindful responding to voices under more realistic conditions in regard to attentional resources and mood state.

Additional precautions were taken to reduce the likelihood for participants to become preoccupied with internal psychotic experiences for long periods of time. For instance, mindfulness practices were kept to a maximum of 15 minutes and participants were instructed to practice with their eyes open and gazed dropped, if this felt more comfortable. Lastly, the focus of home practice in the third and fourth sessions was practising letting go of habitual reactions to voices (e.g. resistance or avoidance) and informally and formally practising mindfulness observation and responding to voice-hearing experiences.

Further details of the session content are given in Table 1.

The use of technology to overcome participant engagement barriers. It is important to highlight the use of technology within iMPV. Participants often report difficulties engaging with home mindfulness practice. There are a variety of reasons for this, but one significant

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

barrier that has been identified by the authors, is the common use of audio CDs in mindfulness-based interventions. Participants often report they either do not have CD players, or if they do these players are located within common areas of their residence. To try and overcome this barrier for engagement, the iMPV trial provided audio-files of guided mindfulness practices on an MP3 player. This player was inexpensive and battery operated, with spare batteries provided to participants to address any charging complications.

In addition, a voice loop smartphone application was used to record participant's specific voice content to play during the mindfulness of breath practice in the third session. This application made this process time efficient and easy to complete in collaboration with participants within the session. Lastly, a portable speaker connected to a smartphone used by the therapist, was used to play the 'boring speech recording' and the specific voice content recorded on the voice loop application, during the mindfulness of breath practices within sessions 3 and 4.

Measures

Acceptability and feasibility

Attrition. Information regarding the number of sessions completed by participants, drop-outs rates and reasons for attrition, were recorded.

Engagement. Engagement with the mindfulness practices was assessed using the percentage of in-session formal mindfulness practices completed by participants during the intervention. In addition, information regarding the number of short (<5 min) and long (>5 min) mindfulness practices and the total minutes spent on practiced mindfulness at home were recorded.

Participant feedback

Participants provided feedback to assist with the program development process, in the form of a short qualitative interview during the post-assessment. Feedback items included 'do you think you are likely to continue with formal mindfulness practice?' and 'would you recommend mindfulness for other people who experience hearing voices?'.

Outcome measures

All assessments were conducted in face-to-face interviews (the current article presents data on main outcomes only). Prior to the baseline assessment, participants were asked to provide demographic information, the Wechsler Test of Adult Reading (WTAR; Wechsler, 2001) as an estimate of premorbid intellectual functioning, and the Positive and Negative Symptom Scale (PANSS; Kay et al., 1987) to index severity of baseline positive and negative psychotic symptomatology.

Primary outcome

Subjective Experience of Psychosis Scale (SEPS; Haddock et al., 2011) – *Negative impact of experience subscale.* The SEPS is a self-report questionnaire measure of the impact of

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

psychotic experiences in the last week on 29 domains identified by consumers as impacted upon by psychotic experiences (e.g. concentration, ability to socialize, levels of anxiety and stress). Items of the SEPS are answered using a 5-point response format (1: not at all, to 5: very much), with two ratings given for both the negative impact on the domain, and the positive impact. The negative impact of experience subscale has demonstrated excellent reliability, with a Cronbach's α of 0.93 and a high test–retest coefficient of 0.83 (Haddock et al., 2011). Adequate convergent evidence for construct validity has been supported by small to moderate correlations with the PANSS and PSYRATS scales of auditory hallucinations (Haddock et al., 2011). The SEPS was administered with a specific instruction to rate the impact of hearing voices.

Secondary outcomes

Psychotic Symptoms Rating Scales – Auditory Hallucinations (PSYRATS; Haddock et al., 1999). This is a measure of the specific characteristics of auditory hallucinations, consisting of 11 items assessing: frequency, duration, location, loudness, beliefs about origin, amount and degree of negative content, amount and intensity of distress, disruption and control. Items are 5-point (0 to 4) anchored interviewer-rated scales, with higher scores indicating greater severity. The PSYRATS has demonstrated excellent inter-rater reliability (item coefficients between 0.78 and 0.90) and good test–retest reliability and validity (Haddock et al., 1999). The scale was given to participants to obtain specific information about voice-related distress, disruption and voice topography (frequency, duration, loudness).

Calgary Depression Scale for Schizophrenia (CDSS; Addington et al., 1993). This is a measure of depressive symptoms over the previous 2 weeks designed to assess depression in individuals with schizophrenia, separate from positive and negative symptomatology. The scale consists of nine interviewer-rated items, each ranging from 0 (absent) to 3 (severe). The CDSS has demonstrated good reliability with a Cronbach's α of 0.79 and adequate convergent validity, as evidenced by high correlations with other measures of depression (e.g. BDI-II and the Hamilton Depression Scale; Addington et al., 1992). The CDSS was used to measure the severity of and changes in participants' depressive symptoms.

Process measures

Southampton Mindfulness Questionnaire (SMQ; Chadwick *et al.,* 2008). The SMQ was given to patients to measure usual responses to and relationships with distressing thoughts and images. The SMQ consists of 16 self-report items that are answered on a 7-point strongly disagree to strongly agree Likert scale, with eight items keyed positively and eight negatively. Item scores are summed to generate a total score ranging from 0 to 96, with higher scores indicating a greater degree of mindful responding. Four additional factor scores can be calculated for Mindful Observation, Letting Go, Absence of Aversion and Non-Judgement. The SMVQ has demonstrated a good level of internal reliability, with a Cronbach's α of 0.84 and moderate concurrent validity with a measure of everyday mindfulness (MAAS; Chadwick et al., 2008).

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

Attentional switching

Delis-Kaplan Executive Function System (D-KEFS; Delis *et al.,* 2001) - *Color-Word Interference Test – switching condition.* The D-KEFS Color-Word Interference Test is designed to assess inhibition and attentional switching or set-shifting in individuals aged between 8 and 89 years (Delis et al., 2001; Strauss et al., 2006). The test consists of four conditions, each consisting of 40 stimuli. Condition one required respondents to name patches of colour. In the second condition, respondents are required to read colour names written in black ink. The third condition requires respondents to name the dissonant ink colour that words are written in. In the fourth condition, respondents are required to switch between naming the dissonant ink colour and reading the words. Each condition is timed and both self-corrected and unknown errors are summed for each condition to calculate a score for both raw time and total errors, ranging from 1 to 40, with higher scores indicating greater number of errors (Delis *et al.*, 2001; Strauss et al., 2006). The Color-Word Interference Test has shown moderate to adequate reliability with Cronbach's α figures ranging from .70 to .79, and test–retest reliability, with a coefficient of 0.65 for the switching condition (Delis et al., 2001). It has also demonstrated good convergent evidence of construct validity, with an association with the California Verbal Learning Test-Second Edition (CVLT-II; Delis et al., 2001).

Trail Making Test-Part B (TMT-B; Reitan, 1992). The second component in the Trail Making Test, TMT-B is a paper and pencil task that was administered to participants as a measure of executive functioning and more specifically visual attention and cognitive switching. The test consists of 25 circles, randomly placed on a page, with numbers 1 to 13 and letters A to L within the circle. Participants are required to connect the circles in sequential order, but alternating between numbers, in ascending order, and letters, in alphabetical order. The aim of the task is to connect the circles as fast as possible, whilst still maintaining accuracy. The primary score calculated for TMT-B is the time taken to complete the task, with higher scores indicating poorer task performance. Practice effects on the TMT-B over several administrations have been noted by previous research (Wagner et al., 2011). Given that participants in recruitment phase 2 completed this task at four different time points, as little as 1 month apart, an alternate form for the test was used at time points 2 and 4. This form was developed by Wagner and colleagues (2011) and has demonstrated good reliability with the original form, with a Cronbach's α of 0.86.

Sustained attention

Continuous Performance Task (CPT; Riccio *et al.,* 2002). The CPT is a computer-based task that was given to patients to assess selective and sustained attention. The task requires participants to observe a series of digit sequences and respond with a mouse click each time a sequence is presented that is identical to the one shown just prior. The task consists of three trials: two-digit sequences, three-digit sequences and four-digit sequences. Scores are generated for the number of hits (correct responses) and two types of commission errors: false alarms (responses to nearly identical digits) and random errors. Signal detection analyses combine hit and false alarm information, for each of the three conditions, into d-prime (d') scores, which signify the ability to discriminate identical pairs from nearly identical pairs. These scores are averaged to create a total summary score, with higher scores indicating greater attention. The CPT-IP has demonstrated high test–retest reliability, with an intraclass correlation coefficient

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

Table 2. Demographic and clinical participant characteristics at baseline

Variable		Mean	*SD*
Age (years)		42.79	12.16
Illness duration (since diagnosis)		17.31	8.92
WTAR scaled score		106.85	13.82
Education (years)		14.96	2.30
Psychotic Symptoms (PANSS)			
	Positive subscale	21.79	4.90
	Negative subscale	16.14	7.17
	General subscale	37.79	8.15
	Total score	75.71	16.98
Calgary Depression Scale		4.43	3.23

of 0.84 (Nuechterlein et al., 2008). This particular version of the CPT task was chosen as it is included in the MATRICS Consensus Cognitive Battery, which was specifically designed to assess intervention outcomes in schizophrenia (Strauss et al., 2006). The neurocognitive battery was administered using counterbalancing to reduce order effects and fatigue.

Statistical analysis

All raw scores were processed using SPSS version 24 (SPSS Ltd) to produce the summary data. Differences on measures between the two pre-intervention time points (Time 0 and Time 1) were all small and non-significant ($p > .1$). Consequently, only pre-intervention data from Time 1 were included in further analyses, and the four cases from the initial phase of the study were included in Time 1 to Time 2 contrasts to maximize numbers for analyses and increase statistical power. Descriptive data were then derived to show change from Time 1 to Time 2, and Time 1 to Time 3, on each of the outcome variables. Confidence intervals for change scores were calculated using the t distribution for paired samples, also used to derive significance levels. Wilcoxon signed-ranks tests, most suitable for ordinal data, were conducted to derive significance levels for PSYRATS items. Standardized effect sizes were expressed as Hedge's g_{av} (bias-adjusted standardized mean difference) for all change scores, as recommended for sample sizes < 20 (Lakens, 2013). Analyses were conducted on a per-protocol basis for the participants ($n = 12$) who completed the iMPV program.

Results

Participant characteristics

Participants included 14 persistent voice hearers (43% men) with a mean age of 42.8 years (*SD* 12.2; range 26–62). All participants had a diagnosis of schizophrenia (79%) or schizoaffective disorder (21%). Further demographic and clinical participant characteristics at baseline are given in Table 2.

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

Acceptability and feasibility

Attrition. Of the 28 potential participants who were referred to the study and screened for eligibility, seven declined participation and seven did not meet inclusion criteria. Overall, 14 participants completed consent procedures and baseline assessments. Two participants dropped out of the study during the intervention phase: one participant (one session attended) said they preferred practising a different form of meditation (in which they detached from awareness of present moment experiences), and one participant (one session attended) only wanted to continue participation if paid for the therapy sessions in addition to research assessments (this was not part of the protocol or budget). The remaining 12 participants completed all four iMPV sessions.

Engagement

Formal practice completion rates. During sessions, the 12 participants completed all eight of the in-session formal mindfulness practices used. With regard to home practice, on average participants completed 10.29 ($SD = 10.94$) short (<5 min) and 4.56 ($SD = 2.25$) long (>5 min) formal mindfulness practices per week. In total, participants completed an average of 67.76 min ($SD = 37.64$) of formal home practice per week.

Safety. To examine if there was any evidence of the iMPV intervention leading to increases in hearing voice severity, the Reliable Change Index (RCI; Jacobson and Truax, 1991) was calculated for two participants whose PSYRATS Auditory Hallucination total scores were higher at post-intervention. Using baseline internal consistency to index reliability, neither of these participants showed an increase that represented reliable change (>1.96).

Participant feedback. All 12 participants said they would recommend mindfulness for other people who experienced hearing voices. Of the most elaborated quotes from the interview, one participant stated '…I think it can help everybody who experiences hearing voices. I think it can help everybody in general' and another participants stated 'Yes I would, to calm you down, focus your attention and get yourself away from the hassle and trial that you are going through and have a new focus on your wellbeing'.

Feedback also revealed that all 12 participants indicated that they thought they were likely to continue with formal mindfulness practice, with one participant stating '…I'll do it regularly, because it calms me down, slows me down' and another participant stating '…because now I've got meditation tapes, so it will be a lot easier to focus and practice'.

Outcomes

Post-intervention outcomes. Results on outcome and process variables are given in Tables 3 and 4, respectively. As recommend in guidelines for good practice for the analysis of pilot studies (Lancaster et al., 2004), the focus of the results is on the estimates of the treatment effects and corresponding 95% CIs for the mean difference, rather than providing definitive hypothesis tests, but *p*-values are reported for completeness.

On the primary outcome measure, SEPS Negative Impact of Experience, a moderate effect was observed from pre- to post-intervention, which was statistically significant in spite of the small sample. Among the secondary outcomes, moderate (and statistically significant)

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

Table 3. Pre–post descriptive statistics and paired samples *t*-test results

			Pre		Post					
Outcome		*n*	Mean	*SD*	Mean	*SD*	Mean difference [95% CI]	*p*	*t*	Hedge's g_{av}
SEPS Negative Impact of Experience		12	75.33	19.57	64.92	19.81	10.41 [0.49, 20.34]	.041	2.31	0.49
Calgary Depression Scale		12	5.00	3.10	3.50	2.58	1.50 [0.19, 2.81]	.029	2.51	0.49
PSYRATS	AH total score	12	25.42	6.60	23.50	7.96	1.92 [–1.03, 4.87]	.180	1.43	0.24
SMQ	Total score	12	43.25	13.92	53.75	14.06	–10.5 [–19.15, –1.85]	.022	–2.67	0.70
	Mindful Observation	12	13.42	5.37	13.17	5.37	0.25 [–1.46, 1.97]	.754	3.21	0.04
	Letting Go	12	10.25	5.36	12.42	3.29	–2.17 [–4.69, 0.36]	.086	–1.89	0.45
	Absence of Aversion	12	9.67	3.77	14.42	5.10	–4.75 [–7.95, –1.55]	.007	–3.27	0.99
	Non-Judgement	12	9.92	4.10	13.75	4.47	–3.83 [–7.43, –0.24]	.039	–2.35	0.83
D-KEFS	*CWIT-switching (time)*	12	1.42	11.31	0.68	11.19	0.74 [–5.00, 6.47]	.783	0.28	0.05
	CWIT-switching (total errors)	12	2.08	1.83	1.00	0.85	1.08 [0.02, 2.15]	.047	2.24	0.71
TMT-B	*Raw time*	11	66.53	19.39	59.48	12.80	7.05 [–3.87, 17.97]	.181	1.44	0.50
CPT	*Mean raw score*	12	2.34	0.96	2.41	0.92	–0.07 [–0.24, 0.10]	.402	–0.87	0.07

CWIT, Colour-Word Interference Test; PSYRATS, Psychotic Symptom Rating Scales; SEPS, Subjective Experience of Psychosis Scale; SMQ, Southampton Mindfulness Questionnaire; D-KEFS, Delis–Kaplan Executive Function System; TMT-B, Trail Making Test-Part B; CPT, Continuous Performance Test.

Table 4. Descriptive statistics and Wilcoxon signed-rank test results for PSYRATS items

		Pre			Post			Significance		Hedge's
	Outcome	Mdn	Min	Max	Mdn	Min	Max	(2-tailed)	*z*	g_{av}
PSYRATS	Voice-related distress (amount)	2.00	0.00	4.00	1.00	0.00	3.00	.075	–1.78	0.36
	Voice-related distress (intensity)	2.00	0.00	4.00	1.00	0.00	4.00	.313	–1.00	0.34
	Disruption	1.00	1.00	3.00	1.00	0.00	2.00	.034	–2.12	0.43
	Frequency	2.00	1.00	4.00	2.00	1.00	4.00	.157	–1.41	0.30
	Duration	2.00	1.00	4.00	2.00	1.00	4.00	.083	–1.73	0.25
	Loudness	2.00	0.00	4.00	1.50	1.00	4.00	.262	–1.12	0.29
	Location	2.50	0.00	4.00	3.00	1.00	4.00	.102	–1.63	0.44
	Beliefs about origin	3.00	1.00	4.00	3.00	1.00	4.00	.180	–1.34	0.23
	Negative content (amount)	2.00	0.00	4.00	3.00	0.00	4.00	1.000	0.00	0.00
	Negative content (degree)	3.00	0.00	4.00	3.00	0.00	4.00	.084	–1.73	0.30
	Control	4.00	1.00	4.00	4.00	2.00	4.00	.785	–0.27	0.09

PSYRATS, Psychotic Symptom Rating Scales.

effects were also observed for depressive symptoms, and voice-related disruption. Small-to-moderate effects were estimated on other PSYRATS dimensions, but these were not statistically significant.

Process measures. SMQ total scores increased with a large effect size following the iMPV program, found to be statistically significant. When examined on a factor level, the largest effects were seen for Absence of Aversion and Non-Judgement scores.

With regard to attentional switching, a significant and large effect for a reduction in errors on the switching condition of the Colour-Word Interference Test following mindfulness intervention was found. In contrast, no significant pre–post changes were observed for time on the switching condition of the Colour-Word Interference Test, TMT-B raw time or CPT mean raw score following iMPV.

Follow-up. A total of eight participants continued on to complete a 2-month follow-up assessment. With regard to the primary outcome, the change from pre (mean = 73.50, *SD* = 20.92) to follow-up (mean = 81.00, *SD* = 26.37) of 8.42 (95% CI [–9.47, 24.47], Hedge's $g_{av} = 0.28$) was in the small effect size range, and was not statistically significant, $t(7) = -1.05$, $p = .331$. Similarly, analyses revealed there were no longer significant changes from pre-follow-up on all secondary and process outcomes, with small effects identified.

Discussion

This article has described a novel brief MBI for persistent voice hearers of individual format (iMPV). Hallucination specific focused mindfulness programs are still emerging in the literature (Chadwick et al., 2016), and the authors believe this is the first reported MBI

https://doi.org/10.1017/S1352465818000425 Published online by Cambridge University Press

for persistent voices of individual delivery modality. The current study aimed to establish the acceptability, feasibility and potential effectiveness of this program on the negative impact of voices on the subjective experience of mental health and wellbeing, as well as depression, voice-related distress and disturbance. The study also aimed to identify potential psychological and neurocognitive mechanisms of change that warrant further examination, and is subsequently the first trial of an MBI for psychosis that has assessed for changes in executive attention.

Findings demonstrated low participant attrition rates, high session attendance, high in-session and at-home formal practice engagement levels, and positive participant feedback. These indicate that this program is both acceptable and feasible for individuals with psychosis, suggesting that not only are persistent voice hearers able to complete formal mindfulness practices, but they also value learning mindfulness. As suggested by previous literature, the fact that mindfulness is a practice adopted by many individuals, regardless of the existence of psychiatric diagnosis, potentially normalizes the process and empowers participants to explore new ways of responding to their experiences, without a focus on deficits or pathology (Davis et al., 2007). In addition, the safety for this intervention was supported by a lack of reliable or significant deterioration in hallucination symptoms. This is important given early fears for using mindfulness meditation with individuals with psychosis leading to increases in psychosis.

Results on pre–post measures suggest that after completing the iMPV program, participants reported that their experience of hearing voices was having significantly less negative impact on their mental health and wellbeing. Similarly, findings demonstrated a significant small-to-moderate pre–post reduction in depressive symptoms and voice-related disruption following the intervention. This significant improvement in depressive symptoms supports recent findings from an RCT of Chadwick and colleagues (2016), looking at group mindfulness for voices. Additionally, this is contrary to a lack of improvement in depressive symptomatology seen in large-scale trials evaluating CBTp for hallucinations (see examples using the Calgary Depression Scale: Birchwood et al., 2014; Trower et al., 2004). The current study failed to identify changes in voice-related distress on the PSYRATS, following the intervention. However, it should be noted that even the largest CBTp study reporting on voice-related distress also failed to find an effect on this measure (Birchwood et al., 2014), raising the possibility of measure insensitivity, given that large clinical changes are required to show improvements (Thomas et al., 2014).

With regard to process measure outcomes, large effects were identified for improvements in both mindfulness and attentional switching following the iMPV intervention. These findings suggest that changes in mindful responding, and more specifically an increased ability to not avoid or judge difficult internal experiences, may be a potential mechanism for observed changes in the subjective impact of voice hearing and depression. This is in line with large between-group effects on the SMQ reported by Langer and colleagues (2012) in a recent RCT of group MBCT for psychosis. These findings also suggest that improvements in ability to accurately shift attention from one task to another may also be a potential mechanism of observed symptom change in mindfulness training for voices. Taken together with a lack of observed pre–post changes in sustained attention, this suggests that mindfulness training is teaching individuals to switch their attention more easily between their experiences, rather than to focus on one experience to the exclusion of others (e.g. voice hearing) for long periods of time. Given that previous research has identified that individuals who experience hearing voices demonstrate deficits in control over attentional switching, this potential neurocognitive

mechanism may be particularly salient for interventions targeting this population (Hugdahl, 2009; Siddi et al., 2017; Waters et al., 2012).

However, it should be noted that the effects on the primary and secondary outcomes and process measures revealed by this study appeared to decrease at 2-month follow-up. This suggests that a longer course of mindfulness practice may be required to sustain positive changes to one's relationship with hearing voices. For instance, in contrast to the advanced clinical skillset required to deliver CBTp, routine mindfulness boosters delivered post-intervention by a range of allied health workers, including caseworkers may be a pragmatic approach to intervention delivery and continued care.

Limitations and recommendations

Although this pilot study yielded encouraging findings relating to the acceptability, feasibility and potential effects of a new MBI for voices, results are limited to small pre–post comparisons on outcome measures with limited experimental control. Further examination is needed, including more extensive examination of feasibility and acceptability in a larger sample (including of participant recruitment and retention as well as of the intervention). Examination of feasibility can be improved in future trials by setting out feasibility criteria for recruitment, participant retention and intervention engagement. The study design did not test efficacy, which would require a methodologically rigorous, randomized controlled design. Pre- and post-assessments with participants being conducted by the mindfulness therapist may have introduced bias into measures. Although the therapist completed a 3-month practitioner training in MBCT, more extensive training and supervision in delivering mindfulness has been recommended by the UK Network for Mindfulness-Based Teachers Good Practice Guidelines for Teaching Mindfulness-Based Courses. Additionally, the therapist was a graduate psychologist undertaking clinical psychology training, so generalization of the current results to other disciplines cannot be assumed. Given the need for broad dissemination of psychological therapies for psychosis, it is recommended that future research should include adequately trained mindfulness therapists from other allied health backgrounds to assess the suitability of this model in clinical practice. In line with much of the literature for therapies for hearing voices, the sample focused on people with schizophrenia-spectrum disorders, although this was not formally assessed. Generalization to other voice hearing populations is hence unknown.

Conclusion

This pilot study is the first trial to examine a mindfulness intervention for persistent voices of individual format. Our findings suggest this novel treatment protocol is appropriate, engaging and safe for individuals experiencing hearing voices. Small-to-moderate effects were revealed for pre–post improvements in the negative impact of voices, depressive symptoms and voice-related disruption. Large effects for changes in process measures of mindful responding and attentional switching accuracy suggest these to be potential mechanisms of change warranting further investigation. Although low levels of methodological control limit these findings, results suggest that further RCTs are warranted to ascertain the feasibility and efficacy for focused mindfulness interventions for voices. Such efforts should focus on aiding dissemination in clinical practice by using an individual delivery modality and include other mindfulness therapists in addition to those with clinical psychology training, as previously utilized.

Additionally, appropriate outcome measures of voice-related distress and disruption should be carefully considered, as opposed to relying on less sensitive single item measures.

Acknowledgments

The authors would like to thank all of the individuals who kindly participated in this research. We would also like to acknowledge Dr Justin Trounson for providing invaluable assistance drafting this article and Mr Sean Carruthers for his contribution to the follow-up data collection.

Ethical statement: During this research the authors have abided by the Ethical Principles of Psychologists and Code of Conduct as set out by the APA. Additionally, this research was conducted following ethical approval obtained from The Alfred Hospital Human Research Ethics Committee (138/14) and The Swinburne University of Technology Human Research Ethics Committee (2015/029). All procedures outlined in this article were in accordance with these relevant institutional ethics committee clearances and the Declaration of Helsinki.

Conflicts of interest: The authors have no conflicts of interest with respect to this publication.

Financial support: This work was supported by a grant from the Barbara Dicker Brain Sciences Foundation, Melbourne, Australia, (S.L., N.T. and S.L.R.) and an Australian Postgraduate Award scholarship (S.L.).

References

Addington, D., Addington, J. and Maticka-Tyndale, E. (1993). Assessing depression in schizophrenia: the Calgary Depression Scale. *British Journal of Psychiatry*, suppl 22, 39–44.

Addington, D., Addington, J., Maticka-Tyndale, E. and Joyce, J. (1992). Reliability and validity of a depression rating scale for schizophrenics. *Schizophrenia Research*, *6*, 201–208. doi: 10.1016/0920-9964(92)90003-N

Bacon, T., Farhall, J. and Fossey, E. (2014). The active therapeutic processes of acceptance and commitment therapy for persistent symptoms of psychosis: clients' perspectives. *Behavioural and Cognitive Psychotherapy*, *42*, 402–420.

Birchwood, M., Michail, M., Meaden, A., Tarrier, N., Lewis, S., Wykes, T. et al. (2014). Cognitive behaviour therapy to prevent harmful compliance with command hallucinations (COMMAND): a randomised controlled trial. *The Lancet Psychiatry*, *1*, 23–33.

Brand, R. M., Rossell, S. L., Bendall, S. and Thomas, N. (2017). Can we use an interventionist-causal paradigm to untangle the relationship between trauma, PTSD and psychosis? *Frontiers in psychology*, *8*, 306.

Burns, A. M., Erickson, D. H. and Brenner, C. A. (2014). Cognitive-behavioral therapy for medication-resistant psychosis: a meta-analytic review. *Psychiatric Services*, *65*, 874–880.

Chadwick, P., Hember, M., Symes, J., Peters, E., Kuipers, E. and Dagnan, D. (2008). Responding mindfully to unpleasant thoughts and images: reliability and validity of the Southampton mindfulness questionnaire (SMQ). *British Journal of Clinical Psychology*, *47*, 451–455. doi: 10.1348/014466508X314891

Chadwick, P., Strauss, C., Jones, A.-M., Kingdon, D., Ellett, L., Dannahy, L. and Hayward, M. (2016). Group mindfulness-based intervention for distressing voices: a pragmatic randomised controlled trial. *Schizophrenia Research*, *175*, 168–173. doi: 10.1016/j.schres.2016.04.001

Chambers, R., Lo, B. C. Y. and Allen, N. B. (2008). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy and Research*, *32*, 303–322.

Chien, W. T. and Lee, I. Y. M. (2013). The mindfulness-based psychoeducation program for Chinese patients with schizophrenia. *Psychiatric Services*, *64*, 376–379.

Chien, W. T. and Thompson, D. R. (2014). Effects of a mindfulness-based psychoeducation programme for Chinese patients with schizophrenia: 2-year follow-up. *British Journal of Psychiatry*, *205*, 52–59. doi: 10.1192/bjp.bp.113.134635

Davis, L. W., Strasburger, A. M. and Brown, L. F. (2007). Mindfulness: an intervention for anxiety in schizophrenia. *Journal of Psychosocial Nursing and Mental Health Services*, *45*, 23–29.

Delis, D. C., Kaplan, E. and Kramer, J. H. (2001). *Delis-Kaplan Executive Function System: Technical Manual.* San Antonio, TX: Harcourt Assessment Company.

Eldridge, S. M., Lancaster, G. A., Campbell, M. J., Thabane, L., Hopewell, S., Coleman, C. L. et al. (2016). Defining feasibility and pilot studies in preparation for randomised controlled trials: development of a conceptual framework. *PLoS ONE*, *11*, e0150205. doi: 10.1371/journal.pone.0150205

Elkis, H. (2007). Treatment-resistant schizophrenia. *Psychiatric Clinics of North America*, *30*, 511–533.

Farrelly, S., Peters, E., Azis, M., David, A. and Hunter, E. C. (2016). A brief CBT intervention for depersonalisation/derealisation in psychosis: study protocol for a feasibility randomised controlled trial. *Pilot and Feasibility Studies*, *2*, 47.

Freeman, D. (2011). Improving cognitive treatments for delusions. *Schizophrenia Research*, *132*, 135–139.

Haddock, G., McCarron, J., Tarrier, N. and Faragher, E. (1999). Scales to measure dimensions of hallucinations and delusions: the psychotic symptom rating scales (PSYRATS). *Psychological Medicine*, *29*, 879–889.

Haddock, G., Wood, L., Watts, R., Dunn, G., Morrison, A. P. and Price, J. (2011). The Subjective Experiences of Psychosis Scale (SEPS): psychometric evaluation of a scale to assess outcome in psychosis. *Schizophrenia Research*, *133*, 244–249. doi: 10.1016/j.schres.2011.09.023

Hugdahl, K. (2009). 'Hearing voices': auditory hallucinations as failure of top-down control of bottom-up perceptual processes. *Scandinavian Journal of Psychology*, *50*, 553–560. doi: 10.1111/j.1467-9450.2009.00775.x

Jacobson, N. S. and Truax, P. (1991). Clinical significance: a statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, *59*, 12.

Jha, A. P., Krompinger, J. and Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective and Behavioral Neuroscience*, *7*, 109–119. doi: 10.3758/CABN.7.2.109

Kabat-Zinn, J. (1994). *Whenever You Go There You Are*. New York: Hyperion.

Kay, S. R., Fiszbein, A. and Opler, L. A. (1987). The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. *Schizophrenia Bulletin*, *13*, 261–276. doi: 10.1093/schbul/13.2.261

Khoury, B., Lecomte, T., Gaudiano, B. A. and Paquin, K. (2013). Mindfulness interventions for psychosis: a meta-analysis. *Schizophrenia Research*, *150*, 176–184.

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, *4*, 863.

Lancaster, G. A., Dodd, S. and Williamson, P. R. (2004). Design and analysis of pilot studies: recommendations for good practice. *Journal of Evaluation in Clinical Practice*, *10*, 307–312.

Langer, Á. I., Cangas, A. J., Salcedo, E. and Fuentes, B. (2012). Applying mindfulness therapy in a group of psychotic individuals: a controlled study. *Behavioural and Cognitive Psychotherapy*, *40*, 105–109. doi: 10.1017/S1352465811000464

López-Navarro, E., Del Canto, C., Belber, M., Mayol, A., Fernández-Alonso, O., Lluis, J. et al. (2015). Mindfulness improves psychological quality of life in community-based patients with severe

mental health problems: a pilot randomized clinical trial. *Schizophrenia Research*, *168*, 530–536. doi: https://doi.org/10.1016/j.schres.2015.08.016

Newman Taylor, K., Harper, S. and Chadwick, P. (2009). Impact of mindfulness on cognition and affect in voice hearing: evidence from two case studies. *Behavioural and Cognitive Psychotherapy*, *37*, 397–402. doi: 10.1017/S135246580999018X

National Institute for Clinical Excellence (NICE) (2014). *Psychosis and Schizophrenia in Adults: Prevention and Management*. London: NICE.

Nuechterlein, K. H., Green, M. F., Kern, R. S., Baade, L. E., Barch, D. M., Cohen, J. D., Essock, S., Fenton, W. S., Frese III, P. D., Frederick, J. and Gold, J. M. (2008). The MATRICS Consensus Cognitive Battery, part 1: test selection, reliability, and validity. *American Journal of Psychiatry*, *165*, 203–213.

Reitan, R. M. (1992). *Trail Making Test: Manual for Administration and Scoring*. Reitan Neuropsychology Laboratory.

Riccio, C. A., Reynolds, C. R., Lowe, P. and Moore, J. J. (2002). The continuous performance test: a window on the neural substrates for attention? *Archives of Clinical Neuropsychology*, *17*, 235–272.

Segal, Z. V., Williams, J. M. G. and Teasdale, J. D. (2002). *Mindfulness-Based Cognitive Therapy for Depression: A New Approach to Preventing Relapse*. New York: Guilford Press.

Siddi, S., Petretto, D. R., Burrai, C., Scanu, R., Baita, A., Trincas, P. et al. (2017). The role of set-shifting in auditory verbal hallucinations. *Comprehensive Psychiatry*, *74*, 162–172. doi: https://doi.org/10.1016/j.comppsych.2017.01.011

Strauss, C., Thomas, N. and Hayward, M. (2015). Can we respond mindfully to distressing voices? A systematic review of evidence for engagement, acceptability, effectiveness and mechanisms of change for mindfulness-based interventions for people distressed by hearing voices. *Frontiers in Psychology, 6*, 1154.

Strauss, E., Sherman, E. M. S. and Spreen, O. (2006). *A Compendium of Neuropsychological Tests: Administration, Norms, And Commentary*. New York: Oxford University Press.

Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q. et al. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences*, *104*, 17152–17156.

Thomas, N. (2015). What's really wrong with cognitive behavioral therapy for psychosis? *Frontiers in Psychology*, *6*, 323.

Thomas, N., Hayward, M., Peters, E., van der Gaag, M., Bentall, R. P., Jenner, J. et al. (2014). Psychological therapies for auditory hallucinations (voices): current status and key directions for future research. *Schizophrenia Bulletin*, *40*, S202–212.

Thomas, N., Morris, E., Shawyer, F. and Farhall, J. (2013). Acceptance and commitment therapy for voices, in Morris, E., Johns, L. C. and Oliver, J. E. (eds), *Acceptance and Commitment Therapy and Mindfulness for Psychosis*, pp. 95–111. West Sussex, UK: John Wiley & Sons.

Trower, P., Birchwood, M., Meaden, A., Byrne, S., Nelson, A. and Ross, K. (2004). Cognitive therapy for command hallucinations: randomised controlled trial. *British Journal of Psychiatry*, *184*, 312–320.

van der Gaag, M., Valmaggia, L. R. and Smit, F. (2014). The effects of individually tailored formulation-based cognitive behavioural therapy in auditory hallucinations and delusions: a meta-analysis. *Schizophrenia Research*, *156*, 30–37. doi: 10.1016/j.schres.2014.03.016

Wagner, S., Helmreich, I., Dahmen, N., Lieb, K. and Tadić, A. (2011). Reliability of three alternate forms of the trail making tests a and B. *Archives of Clinical Neuropsychology*, *26*, 314–321. doi: 10.1093/arclin/acr024

Waters, F., Allen, P., Aleman, A., Fernyhough, C., Woodward, T. S., Badcock, J. C. et al. (2012). Auditory hallucinations in schizophrenia and nonschizophrenia populations: a review and integrated model of cognitive mechanisms. *Schizophrenia Bulletin*, *38*, 683–693. doi: 10.1093/schbul/sbs045

Wechsler, D. (2001). *Wechsler Test of Adult Reading*. New York: Psychological Corporation.