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Review Article

Cite this article: Baker AL, Turner A, Beck A, Berry K, Haddock G, Kelly PJ, Bucci S (2018). Telephone-delivered psychosocial interventions targeting key health priorities in adults with a psychotic disorder: systematic review. *Psychological Medicine* 1–21. https://doi.org/10.1017/S0033291718001125

Received: 18 December 2017 Revised: 4 March 2018 Accepted: 6 April 2018

Kev words:

Cardiovascular risk; medication compliance; psychosocial telephone intervention; psychotic disorder; relapse

Author for correspondence:

Alison Beck, E-mail: Alison.Beck@newcastle.edu.au

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Telephone-delivered psychosocial interventions targeting key health priorities in adults with a psychotic disorder: systematic review

Amanda L. Baker¹, Alyna Turner¹, Alison Beck¹, Katherine Berry², Gillian Haddock², Peter J. Kelly³ and Sandra Bucci²

¹School of Medicine and Public Health, University of Newcastle, Newcastle, Australia; ²Division of Psychology and Mental Health, School of Health Sciences, Faculty of Biology, Medicine and Health, University of Manchester, Manchester Academic Health Science Centre; Greater Manchester Mental Health NHS Foundation Trust, Manchester, UK and ³Illawarra Institute for Mental Health, School of Psychology and the Illawarra Health and Medical Research Institute, University of Wollongong, Wollongong, Australia

Abstract

Background. The mental and physical health of individuals with a psychotic illness are typically poor. Access to psychosocial interventions is important but currently limited. Telephone-delivered interventions may assist. In the current systematic review, we aim to summarise and critically analyse evidence for telephone-delivered psychosocial interventions targeting key health priorities in adults with a psychotic disorder, including (i) relapse, (ii) adherence to psychiatric medication and/or (iii) modifiable cardiovascular disease risk behaviours.

Methods. Ten peer-reviewed and four grey literature databases were searched for English-language studies examining psychosocial telephone-delivered interventions targeting relapse, medication adherence and/or health behaviours in adults with a psychotic disorder. Study heterogeneity precluded meta-analyses.

Results. Twenty trials [13 randomised controlled trials (RCTs)] were included, involving 2473 participants (relapse prevention = 867; medication adherence = 1273; and health behaviour = 333). Five of eight RCTs targeting relapse prevention and one of three targeting medication adherence reported at least 50% of outcomes in favour of the telephone-delivered intervention. The two health-behaviour RCTs found comparable levels of improvement across treatment conditions.

Conclusions. Although most interventions combined telephone and face-to-face delivery, there was evidence to support the benefit of entirely telephone-delivered interventions. Telephone interventions represent a potentially feasible and effective option for improving key health priorities among people with psychotic disorders. Further methodologically rigorous evaluations are warranted.

Cardiovascular disease (CVD), relapse and poor adherence to psychiatric medication are key health priorities for people living with a psychotic disorder. Life expectancy is 12–19 years shorter than that of the general population (Laursen, 2011), with CVD the single largest cause of death among this group (Brown *et al.*, 2000). Rates of major health risk behaviours associated with CVD (smoking, physical inactivity, alcohol use and low fruit and vegetable intake) are also elevated (Galletly *et al.*, 2012; Morgan *et al.*, 2012). Wellbeing is further compromised by high rates of relapse (Brissos *et al.*, 2011) and although medication can reduce relapse (Alvarez-Jimenez *et al.*, 2012) rates of non-compliance are as high as 50% (Lacro *et al.*, 2002) and early discontinuation is common (Lieberman *et al.*, 2005).

Importantly, increasing evidence supports the role of psychological interventions (e.g. cognitive behaviour therapy, family therapy) for improving symptoms (Wykes *et al.*, 2008; Jauhar *et al.*, 2014), reducing relapse (Bucci *et al.*, 2016; Oud *et al.*, 2016), improving medication adherence (Barkhof *et al.*, 2012) and modifying health risk behaviours (Baker *et al.*, 2009; Banham and Gilbody, 2010; Baker *et al.*, 2012). However, of those likely to benefit from psychological interventions, only 10% or less have access (Gulliver *et al.*, 2010; Haddock *et al.*, 2014; Schizophrenia Commission, 2015). Improving access to psychosocial interventions is, therefore, an important priority if we are to improve the wellbeing of individuals living with a psychotic illness. Contrary to assumptions that people with a psychotic disorder do not have access to and/ or are unwilling to engage in technology, accumulating evidence [e.g. (Firth *et al.*, 2016; Gay *et al.*, 2016)] suggests that the potential to use technology such as telephone-based intervention delivery is huge.

As far as the authors are aware, there has been only one previous systematic review of telephone-based interventions for mental health problems. However, people with a schizophrenia spectrum disorder were included in only one study (Leach and Christensen, 2006).

A more recent systematic review of telepsychiatry (telephone, internet or videoconferencing) in the assessment and treatment of people with a schizophrenia spectrum disorder included six studies (Kasckow *et al.*, 2014). However, neither review included studies targeting people with bipolar disorder. Moreover, neither reviewed the evidence for multiple key health priorities in adults with a psychotic disorder (namely relapse prevention, medication adherence and health behaviours).

Aims of the current review

Given the poor physical and mental health of people with a psychotic disorder, limited access to healthcare and the potential promise of telephone-delivered interventions, we aim to provide an overview and critical analysis of the current state of evidence for telephone-delivered psychosocial interventions for relapse prevention, medication adherence, and modifiable CVD risk behaviours among people with a psychotic disorder (schizophrenia spectrum disorder or bipolar disorder). The focus of this review will be on person-delivered interventions using the spoken word (i.e. interventions delivered entirely by text, web and/or automated systems were excluded) and one or more psychological strategies (see published protocol for further details; Beck *et al.*, 2015).

Methods

Protocol and registration

This systematic review is registered with PROSPERO (Registration Number CRD42015025402) and the protocol has been published (Beck *et al.*, 2015).

Criteria for selecting studies for this review

Methods were informed by Cochrane Guidelines for systematic reviews (Higgins and Green, 2011) and are extensively detailed in the review protocol (Beck et al., 2015). The population of interest was adults (≥18 years) with a psychotic disorder (as defined by any criteria). We included studies with populations involving adults with non-psychotic disorders only if more than 50% of participants had a psychotic disorder, or if data limited to those with psychotic disorders were available. The intervention of interest was telephone support targeting: (i) relapse prevention, (ii) adherence to psychiatric medication and/or (iii) smoking and other CVD health risk behaviours [see (Beck et al., 2015) for definitions]. These domains were targeted as they represent an important avenue for improving the health and wellbeing of adults with psychosis since they are common challenges that have profound implications for the individual and are amenable to change following psychological intervention. Telephone support was defined as a person delivered intervention of at least 10 min using spoken word and one or more psychological strategies (see published protocol for further details; Beck et al., 2015). The telephone support could be a standalone intervention or delivered in combination with other treatment components. However, studies with multiple components were only included if the telephone was the predominant method of intervention delivery (defined as ≥ 50% of the total number of participant contacts conducted by telephone). Interventions delivered in any setting (e.g. community, hospital, rehabilitation or residential treatment centre, etc.) were included. The telephone support

could be compared with inactive (e.g. standard care, waiting list control) and/or active controls (e.g. pharmacological and/or psychological alone and/or in combination with usual care) whereby telephone was not the predominant method of intervention delivery (e.g. individual, group, internet). Studies had to provide data for at least one of the following: (a) relapse, (b) medication adherence, (c) health risk behaviours/CVD risk, (d) process variables (e.g. treatment engagement) or (e) feasibility [see (Beck et al., 2015) for definitions]. Process variables are included in Supplementary File 1. Qualitative studies were the only study design excluded.

Search methods for identification of studies

Figure 1 summarises the procedure used to identify studies, (see online Supplementary Appendix 1 for the full MEDLINE search strategy). Abstract, title, keywords and subject headings specific to each of the identified databases were searched. All subject headings were exploded so that narrower terms were included. No limits were placed on publication year. Publications had to be available in English. Reference lists were hand searched to identify any additional publications. Publications were organised in reference manager Endnote. The first search was run in May 2015 and re-run just before final analyses (December 2016). Articles were identified and classified according to the following steps:

Step 1: Identification and screening

AKB performed the searches and reviewed the titles and abstracts of the identified 297 publications and used the inclusion criteria to exclude clearly ineligible articles. If eligibility was unclear, the full-text article was accessed.

Step 2: Eligibility and classification

The full-text version of 76 publications was manually reviewed and 42 publications were excluded. The remaining 34 were classified as 'evaluation', 'review', 'discussion' or 'other' according to published definitions (Beck *et al.*, 2015).

Step 3: Cross-checking

The 76 publications from step two were cross-checked by ALB. The 22 studies independently classified as 'evaluation' were retained for further examination.

Data collection and analysis

Data extraction was performed by ALB and checked by AT, SB and KB. When multiple reports of the same study were identified (Simon *et al.*, 2002, 2005, 2006) data were extracted separately and combined across data collection forms. Criteria for data extraction (detailed in the protocol; Beck *et al.*, 2015) were adapted from the Cochrane Handbook for Systematic Reviews (Higgins and Green, 2011) and the Downs and Black Scale (Downs and Black, 1998).

Assessment of methodological quality and risk of bias

Methodological critique and assessment of risk of bias on individual studies were performed independently by ALB and AT, with final ratings made by consensus. As we included both randomised and non-randomised designs multiple tools were used.

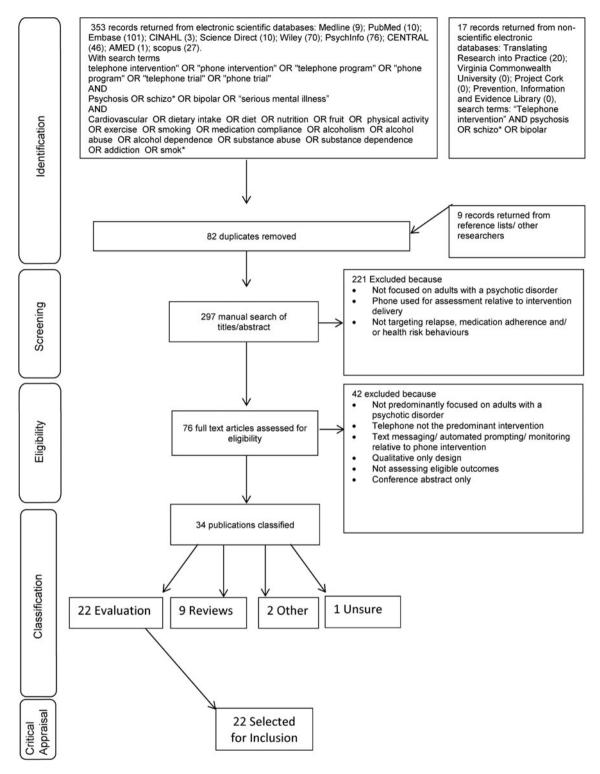


Fig. 1. PRISMA flow diagram summarising systematic search identifying evaluations of telephone delivered psychosocial interventions for relapse prevention, medication adherence and health risk behaviours in adults with a psychotic disorder.

Downs and Black scale

All studies were assessed against the Downs and Black Scale (Downs and Black, 1998). This scale is recommended by the Cochrane Guidelines for assessing the quality of non-randomised trials (Higgins and Green, 2011). Consistent with previous research (e.g. Baker $et\ al.$, 2012) two items were not used. Scoring of the final item (power) was unclear so the following convention was used: 0 = no power calculation reported; 1 = power analysis reported,

but insufficient power achieved and 2 = power analysis reported and sufficient power achieved. All other items were scored per published guidelines (Downs and Black, 1998) for a total maximum of 27, with higher scores reflecting greater methodological quality.

PEDro scale

Randomised controlled trials (RCTs) were assessed against the 11 item Physiotherapy Evidence Database (PEDro) scale (Maher

et al., 2003), a widely implemented and validated tool for assessing the quality of randomised trials. As per above, the two items regarding blinding were not used (e.g. Spring et al., 2011, Baker et al., 2012). The remaining nine criteria were assigned a yes (1 point) or no (0 points) rating, and a quality score ranging from 0 to 8 points was calculated for each study.

Cochrane collaboration's risk of bias tool

Risk of bias (within and across all studies) was assessed using the Collaboration's Risk of Bias tool, as described in the *Cochrane Handbook for Systematic Review of Interventions* (Higgins and Green, 2011). Each item was judged as being high, low or unclear risk as per the criteria provided by Higgins and Green (Higgins and Green, 2011). Given the evidence that sequence generation and allocation concealment represent particularly important potential sources of bias, studies were deemed to be at the highest risk of bias if either item was scored as 'high' or 'unclear'.

Summary measures

A study was considered to have a positive outcome if more than 50% of the reported outcome measures (primary and secondary) demonstrated a between-group difference in favour of the telephone group at the treatment end. Positive maintenance outcome(s) were identified when this effect was evident at short and/or medium and/or long-term follow-up (1–6; 7–12 and >12 months after intervention completion, respectively).

Synthesis of results

Comparability of study design and outcome measures across studies was assessed by a consultant statistician to determine the possibility of conducting meta-analyses on RCTs to examine effects on relapse, medication adherence and smoking and other health behaviours and CVD risk. A narrative synthesis of the findings was conducted, structured around intervention type, outcome, population and methodological quality. As Clinical Guidelines recommend an improved focus on personally meaningful recovery (e.g. quality of life, functioning) relative to traditional clinical outcomes (e.g. symptoms and relapse) in mental health care, to help inform clinical practice, the assessment, reporting and/ or change in these additional outcomes is also central to the structure of the review.

Results

Participant Characteristics

Across all studies, the total number of participants was 2473, with 867 in relapse prevention, 1273 in medication adherence and 333 in smoking and/or other health risk behaviour studies (see online Supplementary Table S1). The average age was 40.7 years (41.9 in relapse prevention, 39.5 in medication adherence and 42.2 in smoking and/or other CVD risk behaviours). Overall, the percentage of males across the studies was 50.1%. However, there was a higher percentage of males in studies of schizophrenia samples (64.5%) compared with studies of bipolar (37.7%) and mixed samples (44.2%). No study used a first episode sample.

Study characteristics

The 22 papers comprised a total of 20 trials, with Simon *et al.* (Simon *et al.* 2002, 2005, 2006) reporting on the same study. There were 16 controlled (Table 1) and four single-arm (Table 2) studies. Nine trials recruited people with bipolar disorder, six with schizophrenia spectrum disorder, four with schizophrenia and one a range of diagnoses (see online Supplementary Table S1). For the RCTs the telephone was the sole method of intervention delivery in one relapse prevention (Beebe, 2001) and three medication adherence trials (Salzer *et al.*, 2004; Cook *et al.*, 2008; Beebe *et al.*, 2016). For the studies without a comparison condition, the intervention was delivered entirely by telephone for two relapse prevention (Miklowitz *et al.*, 2012; Boardman *et al.*, 2014) and one healthy lifestyle (Baker *et al.*, 2014) study.

Outcomes assessed

Outcome measures utilised in each study are reported in Tables 1 and 2. There was considerable heterogeneity. In studies of relapse prevention, the primary outcome was typically relapse, which was variously defined according to number of days until psychiatric hospitalisation, number of days until DSM criteria (IV or IV-TR) were met for a mood episode [(hypo)mania, depression, mixed)] and/or severity of symptoms. All 10 studies included one or more measures of psychiatric symptomatology, but only three included measures of quality of life and/or functioning (Castle et al., 2007; Javadpour et al., 2013; Wenze et al., 2015) and only one utilised an index of personally meaningful recovery as a primary outcome (Haddock et al., 2017). In studies of medication adherence, the primary outcome was typically medication compliance, as per self-report or clinician administered assessment. Studies typically included one or more measures to assess the impact on symptoms, service utilisation and attitudes (including self-efficacy and insight), but only two assessed the impact on quality of life and/or functioning (Salzer et al., 2004; Montes et al., 2010). In studies of CVD/health risk behaviours, primary outcomes typically included an index of smoking (Baker et al., 2015; Heffner et al., 2015) or CVD risk (Kilbourne et al., 2012; Baker et al., 2015). One study (Baker et al., 2014) focused on sedentary activity and intake of fruit and vegetables. Functioning and/or quality of life were assessed in three of the four studies (Kilbourne et al., 2012; Baker et al., 2014; Baker et al., 2015).

Methodological quality and risk of bias in included studies

Studies are presented in descending order of methodological quality in Table 1 for controlled trials and Table 2 for single-arm studies. No clear pattern emerged between methodological rigour and whether or not the outcomes were in favour of the telephone condition. Across all trials, there was considerable variation in methodological quality scores on the Downs and Black scale, (total scores ranged from 9 to 25 out of 27). At least half of included studies scored 0 for the following items: adverse events; characteristics of those lost to follow-up; representativeness of the sample; attempts to have blinded outcomes assessors and adequate power (six studies reported power calculations, one had sufficient power). For the 12 RCTs Pedro scores ranged from two to eight out of eight. At least half of included studies scored 0 for 'blinding of outcomes assessors', and 'measures of at least one key outcome variable from at least 85% of original participants'.

Table 1. Summary of findings as a function of study focus (relapse prevention v. medication adherence v. smoking/healthy lifestyles) and comparison condition (active v. treatment as usual), structured in descending order according to the quality rating

Author study design	Clinical	N		Intervention	delivery methods	5	O.	ıtcomes		Q	ualit	y rat	ing
	0 1		Telephone	e condition	Comparisor	condition		. <u>⊑</u>		.⊑	Black		ş
			Phone	Face to Face ^f	Phone	Face to Face ^f	Primary	Outcome in Favour of	Secondary/Process	Outcome in Favour of	Downs &	PEDRO	Overall Risk of Bias
						Re	lapse prevention						
						Telephone v.	active comparison condition						
Komatsu et al. (2013) RCT	SZ	Phone (n = 22) v. control (n = 23)	Weekly (? min) intervention × 12 months	Home visits (as indicated) to support intervention compliance	Weekly (? min) assessment ×12 months	×	Number of hospitalisations two treatment (9.1%) v. 8 control (34.8%), $p = 0.071$ Period until hospitalisation: Longer for treatment than control, log rank, 4.53, $p = 0.0033$	T T	Non-hospitalised relapses (due to worsening psychiatric symptoms, based on physician judgement). No significant difference between groups (p value not reported)	NSD	21	6	Low
							Risk of Rehospitalisation Reduced in treatment v . control (hazard ratio = 0.21, 95% CI 0.04–0.99, p = 0.049; Number needed to treat = 4; 95% CI = 2.1–35.5)	Т	Psychiatric symptoms (BPRS) at the time of rehospitalisation No significant difference between groups for mean change in total scores ($p = 0.135$)	NSD	-	-	-
							Total number of rehospitalisation days: 37 intervention v . 710 control, p = 0.023. Number of inpatient days on each hospitalisation Lower for treatment (18.5 days) than control (88.8 days); p = 0.036	Т	Posthoc: Mean change in total BPRS scores at relapse was less for treatment, changing by 11.3 points compared with 17.2 for control ($p = 0.019$)	Т	-	-	-
Castle <i>et al.</i> (2007) Pilot RCT	ВР	Phone (<i>n</i> = 8) <i>v</i> . Control (<i>n</i> = 9)	Weekly (? min) follow- up phone checks× 12 weeks	✓ Weekly 90 min group × 12 + Monthly	✓ Weekly (? min) supportive phone calls × 12 weeks	×	Rates of relapse (meet DSM-IV criteria for manic or depressive episode, and/or required hospital admission) Treatment = $1 \text{ v. control} = 4 \text{ relapsed}$ over the 10-month period ($p = 0.3$).	Т	General functioning (GAF): Significant improvement for Treatment: baseline M = 56.0 (s.D. = 12.0), 6m M = 72.0 (s.D. = 11.0) v. Control baseline M = 61.0 (s.D. = 10.0), 6m M = 62.0 (s.D. = 9.0); p < 0.05.	T	18	8	High
				90 min booster group × 3					Quality of life (WHOQoL BREF): Social relationships Significant improvement for Treatment: baseline M = 52.0 (s.d. = 28.0), 6m M = 60.0 (s.d. = 14.0) v. Control baseline M = 68.0 (s.d. = 19.0), 6m = 66.0 (s.d. = 21.0), p<0.05). Satisfaction with health/Physical Health/Psychological Health/ Environment No significant change within or between groups reported	NSD	_	-	-

Table 1. (Continued.)

Author study design	Clinical group	N		Intervention	n delivery method	ls	Ou	utcomes		Q	uality	y rati	ing
	8		Telephone	e condition	Compariso	n condition		e in of		e in	k Black		Risk
			Phone	Face to Face ^f	Phone	Face to Face ^f	Primary	Outcome i Favour of	Secondary/Process	Outcome in Favour of	Downs & Black	PEDRO	Overall I
									<u>Depression</u> (MADRS) No significant change within or between groups reported	NSD	-	-	-
									Mania (YMRS) No significant change within or between groups reported	NSD	-	-	-
									Medication adherence (MARS) No significant change within or between groups reported	NSD	-	-	-
Wenze et al.(2015)	ВР		✓ 11× (15-	√ 3×	×	✓ 3× Ax's	Faster and greater improvement for treatment v . control (all $p < 0.05$) for:		No secondary outcomes specified. Process Variable:	-	18	6	High
Pilot RCT		v. Control	30 min) weekly for 1	individual 1× family		(Baseline, 3 and 6	<u>Depression</u> (QIDS-C; $f^2 = 0.24$)	Т	Attendance:	?	-	-	-
		(n = 16)	month then at decreasing	across 1month		months) & treatment providers	<u>Mania</u> (CARS-M; $f^2 = 0.37$)	Т	M = 2.71 (s.b. 0.73) in-person individual		-	-	-
			frequency for 4			given a written	Valued living (VLQ; $f^2 = 0.31$)	Т	$\underline{M} = \underline{0.36 \text{ (s.d. } \underline{0.50) in-person family}}$	-	-	-	-
			months			summary	Functional impairment (WHODAS 2.0 Brief; $f^2 = 0.12$)	T	$\underline{\text{M}} = 9.50$ (s.p. $\underline{4.67}$) individual phone Significant Others completed M = 4.07 (s.p. 4.58) phone	-	- -	- -	-
							'Marginal effect in favour of treatment' (ρ < 0.10) for:			-	-	-	-
							Suicidal ideation (QIDS-C item 12 ^a)	NSD		-	-	-	-
							Medication adherence (MCQ ^a)	NSD		-	-	-	-
							Mental Health Care Service Use – including hospitalisation (THxI ^a)	NSD		-	-	-	-
							<u>Days using drugs</u> (excl. alcohol; TLFB ^a)	NSD		-	-	-	-
							Satisfaction (CSQ-8): Treatment significantly higher (29.67; s.d. = 2.45 ν . 25.17; s.d. = 4.61, p = 0.02)	T		-	-	-	-
							Expectancies for Improvement (CES) High across both groups. 'Marginally higher' for treatment Baseline M = 40.07 (s.D. = 8.96) v . control M = 34.13(s.D. = 8.85) (out of a possible total of 54); $t_{(27)} = -1.80$, $p = 0.08$). 6m M = 29.67(s.D. = 2.45) v . control M = 5.17(s.D. = 4.61) (out of a possible total of 32); $t_{(19)} = -2.65$, $p = 0.02$	Т		-	-	-	-

Castle et al. (2010) RCT	BP	Phone (n = 32) v. control	Weekly (? min) follow- up phone	✓ Weekly 90 min group× 12	Weekly (? min) supportive phone calls×12	×	Survivor function for first relapse (of any type, meeting DSM-IV-TR criteria): Lower rates of relapse for treatment (hazard ratio = 0.43, 95% CI 0.20–0.95; ρ = 0.04).		<u>Depression</u> (MADRS) No significant change within or between groups ($p = 0.8$)	NSD	17	7	Low
		(n = 40)	checks× 12 weeks	+ Monthly 90 min booster group×3	weeks		No relapse v . at least one relapse (DSM IV-TR criteria): No relapse (23 treatment v . 18 control) v .one or more relapse (nine treatment v . 22 control) $p = 0.03$.		Mania (YMRS) No significant change within or between groups ($p = 0.3$)	NSD	-	-	-
							Fraction of time spent unwell (during the 9-month follow-up): Significantly less time unwell for treatment ($p = 0.02$)	Т					
Beebe (2001) Pilot	SZ	Phone (n = 15) v. control	✓ Weekly intervention (~10 min)×3	×	2 × assessment (1–3 min) at 6 and 12	×	Community survival (number of days until first psychiatric rehospitalisation or study end) Phone M = 81.4 v. control 78.3 (p = 0.70)	NSD	No Secondary Outcome(s) Specified	-	14	3	High
Randomised Post-test		(n = 22)	months		months		Length of rehospitalisation/s (days): Phone M = 19.0 v. Control 26.1 (p = 0.51)	NSD		-	-	-	-
Control Group							Frequency of rehospitalisation: Phone 13% v . control 23% readmitted (p = 0.52)	NSD		-	-	-	-
						Telephone	e vs. treatment as usual						
Simon et al (2002, 2005, 2006) RCT	BP	Phone (n = 212) v. Control (n =	Monthly (? Duration) over 24 months	1× individual assessment/ care	×	x	Mania severity (PSR): Lower in treatment group throughout the 2-year follow-up (<0.04). If symptomatic at baseline treatment had a significant effect on meania scores ($z=2.27$, $p<0.02$).	р	Mania duration (weeks PSR scores ≥ 3) Significantly lower for treatment (M = 19.2, s.b. = 20.2) v . control (M = 24.7, s.b. = 24.3), p = 0.01.	Т	25	8	Low
		229)		planning Up to 48 group sessions (5× weekly, then twice-			Depression severity (PSR) No significant difference between the two groups ($z = 0.19$, $p = 0.85$)	NSD	Depression duration (weeks PSR scores ≥3) No significant treatment effect on time (47.6 v . 50.7 weeks; F_1 = 0.56, p = 0.45).	NSD	-	-	-
				monthly) Outreach					Outpatient Mental Health, Appts (Computerised Registration Data)	NSD	-	-	-
				visits 'as needed'					Medication Management (p = 0.5)		-	-	-
									Individual Psychotherapy ($p = 0.45$)	-	-	-	-
									$\frac{\text{Psychiatric Hospitalisation (N)}}{p = 0.91}$	NSD	-	-	-
									Medication Use	NSD	-	-	-
									Mood Stabiliser: $p = 0.59$	-	-	-	
									Antidepressant: $p = 0.85$	-	-	-	-
									Antypical Antipsychotic: $p = 0.23$	-	-	-	-
									Cost	NSD	-	-	-
									Outpatient mental health visit: $p = 0.53$	-	-	-	-
												_	

Table 1. (Continued.)

Author study design	Clinical group	N		Intervention	n delivery metho	ds	Out	tcomes	3	Q	ualit	y rati	ing
study design	Біопр	,,	Telephon	e condition	Comparis	on condition		ë		ë	Black		isk
			Phone	Face to Face ^f	Phone	Face to Face ^f	Primary	Outcome in Favour of	Secondary/Process	Outcome in Favour of	Downs & Black	PEDRO	Overall Risk of Bias
									Psychiatric hospitalisation: Treatment $p = 0.34$	-	-	-	-
									Psychotropic drug prescription <i>p</i> = 0.08	-	-	-	-
									Total Cost Intervention M = \$8046 (s.d. = 5974) v. control M = \$6743(6695), p = 0.06	-	-	-	-
									Process Variable:				
									Attendance:	?	-	-	-
									203 (95.8%) completed ≥1 telephone & 180 (84.9%) completed ≥12 telephone contacts. 137 (64.6%) attended ≥ 1 group session, 125 (59.0%) completed 5 weekly sessions & 108 (50.9%) continued for ≥12 months	-	-	-	-
Javadpour et al. (2013) RCT	ВР	Phone (n = 54) v. control	✓ 18× monthly (~10 min)	✓ 8×weekly (~50 min) individual	x	x	Number of hospital admissions (hospital file audit): $M = 0.22$ treatment ν . $M = 1.41$ control hospitalised due to bipolar disorder, $\rho = 0.000$.	T	No secondary outcomes specified	-	16	6	High
		(n = 54)	follow-up care for 18 months	sessions			<u>Depression severity</u> (HDRS): Lower for treatment (baseline M = 4.2; 6m M = 6.3; 12m M = 6.0; 18m M = 5.8) v. control (baseline M = 5.2; 6m M = 10.2; 12m M = 11.2; 18m M = 11.2), $p = 0.000^{b}$	Т	Process Variable:				
							Mania (BRMAS): Lower for treatment (baseline M = 4.2; 6m M = 4.6; 12m M = 4.9; 18m M = 4.1) v. control (baseline M = 4.3; 6m M = 8.8; 12m M = 10.0; 18m M = 7.3), p = 0.000. ^b	Т	Attendance: Mean number of face-to-face sessions attended was 7.3 & 15.3 of the telephone follow-up programme	?	-	-	-
							<u>Depression or mania recurrence</u> (HDRS >7 or BRMAS >9): Fewer recurrences for treatment (M = 0.77) ν . control (M = 2.02) $p = 0.000$) ^b	Т					
							$\frac{\text{Medication adherence}}{\text{for treatment (6m M=7.9; 12m M=7.8;}} \\ 18m M=7.9) \ v. \ \text{control (6m M=4.7; 12m M=4.0; 18m M=3.7)}, \ p=0.008.^{\text{b}}$	Т					

Price (2007) SZ SZ				
Filed RCT v. control (n=7) 1-2 calls 1x within 2 wk structured (n=6) wk structur			subscales higher for treatment <i>v</i> . control (all <i>p</i> = 0.000). ^b Physical health M = 63.8 <i>v</i> . M = 53.3; Mental Health M = 66.7 <i>v</i> . M = 54.3; Social Health M = 74.1 <i>v</i> . M = 51.7;	
et al. (2017) Spectrum Phone TS: TS: Trial Ax's of preference protection (incl. BP) (inc	Pilot RCT v. within 2 control of disch (n = 6) +190 ph minutes use over three months	Ills 1× Structured 2 wk structured Interview 2–3 harge interview 2– days before hone 3 days discharge es to before er discharge s	(through hospital records): Treatment M = 4.0 (range 0-19) v . 10.33 (range 0-28) control (p = 0.2389) Compliance with outpatient appointments (reported by case managers): Treatment kept appointments 5/7 times (71.4%) v . 3/6 (50%) controls, (p = 0.4126) Compliance with medications (reported by case managers and participants): 4/7 (57%) intervention v . 2/6 (33.3%) control (p = 0.3834)	Process Variable: Attendance: Two participants used all 190 prepaid mobile minutes in the first week after discharge, so that 30-min increments were then added (amount unspecified)
TS completed significantly more	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	TS: Trial Ax's (Up to 2 × (Baseline, 9 & (Baseline, 9 & (Initial session final session fidesired') HS: As per TS + TS up to 12 biweekly, 2-hour group sessions delivered over 6	significant differences in strength of preference between groups, with strong preferences reported (>8/10). Process of Recovery (QPR) NSD No overall treatment effect at 9 (p = 0.58) or 15 months (p = 0.82) Recovery from Psychosis (SEPS) Negative C Impacts Subscale 15-month follow-up, significant difference in adjusted means in favour of the control group (16.85 units; 95% CI 1.36–32.35, p =	No within or between group differences for NSD positive and negative symptom severity (PANSS) ^c Distress in relation to positive NSD symptoms (PSYRATS) ^c Personal and social functioning NSD (PSP) ^c Depression (CDS) ^c NSD Anxiety (BAI) ^c NSD Therapeutic alliance (WAI). NSD Therapeutic alliance (WAI). NSD Therapeutic alliance (Teached and the prior trials of face-to-face CBT for psychosis. Strength of preference for chosen treatment arm significantly associated with higher client rated therapeutic alliance [r (22) = 0.49, p = 0.021] Process Variable Attendance: Telephone sessions: TS: ? 15.8 (s.o. 10.8); HS: 9.8 (s.o. 9.5); Group sessions: 3.0 (s.o. 3.6). Total telephone DNAs: TS: 4.4 (s.o. 5.0); HS: 4.5 (s.o.
				· · · · · · · · · · · · · · · · · · ·

10

Table 1. (Continued.)

Author study design	Clinical group	N		Intervention	delivery me	ethods	Ou	tcomes	i	_ Q	uality	/ rati	ng
otaay acoigii	g. 0 u.p		Telephor	ne condition	Comp	parison condition		Ë		. <u>. </u>	Black		isk
			Phone	Face to Face ^f	Phone	e Face to Face ^f	Primary	Outcome in Favour of	Secondary/Process	Outcome in Favour of	Downs &	PEDRO	Overall Risk of Bias
									Satisfaction: Preferred treatment associated with satisfaction. (Dis) satisfaction with current treatment also informed treatment preference	?	-	-	-
						Med	ication adherence						
						Telephone v.	active comparison condition						
No studies													
						Telephon	e v. treatment as usual						
Montes et al. (2010) RCT	SZ	Phone (n = 456) v. control (n = 472)	✓ 3×monthly (? min)	Psychiatrist visit (as indicated)	×	1×psychiatrist visit at 4 months	Clinician rated adherence to antipsychotic medication (RAT): 96.7% treatment <i>v.</i> 91.2% control, <i>p</i> = 0.0007. (Increase in % adherence: 8.5% treatment <i>v.</i> 1.1% control).	Т	Illness severity (CGI-SCH-SI): Positive Symptoms: Treatment (M = 2.4, 95% CI = 2.28–2.44) superior to control (M = 2.5, 95% CI = 2.40-2.55), p = 0.02 ^b Negative Symptoms	T NSD	22 - -	7 -	Low -
							Treatment significantly more likely to be adherent than control (adjusted OR = 3.3, 95% CI = 1.6-6, p = 0.0001)		Depressive Symptoms Cognitive Symptoms Global Symptoms:	NSD NSD NSD	- - -	- - -	
							Greater % of non-adherent patients becoming adherent in treatment (10.4%, p = 0.0013) v . control (5.2%, p = 0.43)		Clinical improvement (CGI-SCH-DC): Positive Symptoms Treatment (M = 3.0) superior to control (M = 3.2), $p = 0.0088^b$	Т	-	-	-
							Significantly higher percentage of treatment (25.7%, $n = 109$) improved adherence at the end of the study vs. control (16.8%, $n = 74$), $p = 0.0013$		Depressive Symptoms Treatment (M = 3.0) superior to control (M = 3.2), $p = 0.01^{b}$ Cognitive Symptoms	T T	_	-	_
							Hospitalisations (RAT): eight treatment (1.8%) v. 5 control (1.1%), ns ^c	NSD	Treatment (M = 3.2) superior to control (M = 3.4), $p = 0.02^b$ Global Symptoms Treatment (M = 3.1) superior to control M = 3.3), $p = 0.0099^b$	т	- -	_ _	-
									Attitudes to medication (DAI-10): Treatment (M = 6.1, 95% CI = 5.75-6.35) superior to control (M = 5.2, 95% CI = 4.91-5.48), p < 0.0001 ^b	Т	-	-	-
									Quality of Life (EQ-5D): 0.80 treatment v . 0.78 control, ($p = 0.07$).	NSD	-	-	-
									Process Variable:	7			

									Attendance: 865 attended at least one follow-up phone call. Of 34 patients classified as non-adherent during at least one telephone call, 20 kept their psychiatrist appointment				
Beebe <i>et al.</i> (2016) RCT	SZ/SZ-A	Phone (<i>n</i> =?) <i>v</i> .	✓ Weekly (? min) over 3	×	×	×	Self-reported medication adherence (MARS): ns ^c .	NSD	No secondary outcomes specified	-	13	2	High
		control (n =?)	months				Medication adherence self-efficacy (MASES): ns ^c .	NSD					
		(Total N = 140)					Symptom level (PANSS): ns ^c	NSD					
Salzer <i>et al.</i> (2004)	SZ Spectrum	Phone (<i>n</i> = 13) <i>v</i> .	✓ Weekly (<10 min/	×	×	×	'Treatment effect sizes in the direction of telephone' for: Distress from side-effects ES = 0.85	f T T	No secondary outcomes specified	-	9	2	High
RCT		control	session)				(p = 0.06)		Process Variable		-	-	-
		(n = 10)	over 52 weeks				Number of extreme side effects $ES = 0.85 (p = 0.04)$	NSD	Attendance: 15/18 intervention (84%)	?			
							Insight		≥1 session, 14/15 at least 35/52				
							ES = 0.64 ($p = 0.14$); Attitudes toward medication	NSD	scheduled weeks. M = 2.01 calls needed to make one contact. Average			_	_
							ES = 0.58 (p = 0.11)		contact length: 8.54 minutes (range 5.31–12.17). Average total phone				
							Number of side-effects ES = 0.60 $(p = 0.16)$;	NSD	time: 4 h 32 min (range 35 min– 8 h 19 min)				
							Symptoms and functioning ES = 0.26 $(p = 0.54)$;	NSD					
							Staff relationships ES = $0.64 (p = 0.12);$	NSD					
							Treatment satisfaction ES = 0.50 $(p = 0.24)$.	NSD					
							No significant differences for:						
							Subjective response to medication ES = 0.01, p = 0.96	NSD					
							Self-reported treatment adherence: ES = .02, $p = 0.87$	NSD					
Cook <i>et al.</i> (2008)	Range of diagnoses (including	V.	✓ 1 x initial screening (?	×	×	×	Emergency Department (ED) utilisation (healthcare plan administrative data). M = 1.11 treatment v. M = 5.03 control;	Т	Pharmacy-based adherence (<=14-day gap between prescription fill dates).	Т	19	-	High
Non- randomised	BP and SZ-A)	control (n =	min)				p<.001; ES 0.28 ^b		6m adherence: 48% treatment v . 26% control, $p = 0.004$, ES = 0.20.				
controlled trial,		151).	'Low-risk' = toll free				Exploratory PostHoc:		<u> </u>	Т	-	-	_
pre-post.			number + 1× follow- up at 6 months				Treatment group: 1.5 times pre- intervention v . 0.39 times during the intervention ($p < 0.001$).		=>80% doses in last 7 days): 6m adherence = 50% treatment 'which was higher than the comparison rate' (not specified) $p = 0.002$, ES = 0.22).				
			(A + win -) -						Process Variable:				
			'At-risk' = mean 3.5 (~11 min)						Attendance: Nurses made a mean of 2.1 attempts per completed call. Participants at risk for non-	?	-	-	-

12

Table 1. (Continued.)

Author study design	Clinical group	N		Intervention o	lelivery r	methods		Ou	tcomes	3		Quality	y rati	ing
study design	group		Telephone	condition	Con	nparison condition	1		Ë		. <u>.</u>	Black		isk
			Phone	Face to Face ^f	Pho	one Face to I	Face ^f	Primary	Outcome i Favour of	Secondary/Process	Outcome in Favour of	Downs &	PEDRO	Overall Risk of Bias
			completed calls over an average of 4.4 months							adherence (90%): An average of 7.2 call attempts; 3.5 calls over 4.4 months; 11 min/call; 38 min' total contact/participant				
						s	moki	ng/healthy lifestyles						
						Telephoi	ne v.	active comparison condition						
Baker et al.		Phone	7× weekly,		×	1× initial		10-year CVD risk (ASSIGN score):		Psychiatric symptomatology (BPRS)		22	7	Low
(2015) RCT ^d	Spectrum (Incl. BP)	v. HL	3× f/nightly, 6×monthly (~10 min/ session) over	(90 min) Weeks 4 and 8 (30 min each)		(90 min) 7× weekl 3× f/nigh 6×month	tly,	15w: Improvement in both groups. No significant between group difference ($p = 0.420$)	NSD	15w: Stable in both groups. No significant between group difference ($p = 0.632$)	NSD	-	-	-
			24 weeks			(~60 min session) 24 weeks	over	12m: Improvement only in telephone: Phone M = -1.6 , 99% CI = -3.2 to -0.0 ; p = 0.009 ; HL = -0.7 , 99% CI = -2.4 ,1.0, p = 0.276). No significant between group difference (p = 0.789)	?T	12m: Improvement only in telephone: Phone = -4.6 , 99% CI = -8.8 , -0.4 ; $p = 0.005$; HL = -0.5 , 99% CI = -4.5 , 3.5 $p = 0.758$). No significant between group difference ($p = 0.032$)	5,	-	-	-
								Smoking 7-day point prevalence (biochemically validated by a CO reading ≤ 10 ppm):	S	Psychiatric symptomatology (BDI-II) 15w: Stable in both groups. No significant between group difference ($p = 0.915$)	NSD	-	-	-
								15w: improvement in both groups. No significant between group difference (p = 0.233)	NSD	12m: Improvement only in HL: Phone = -3.8 , 99% CI = -8.1 , 0.4; p = 0.018; HL = -3.6 , 99% CI = -6.8 , -0.3, $p = 0.005$). No significant between group differences ($p = 0.940$)	C?	-	-	-
								12m: Improvement only in telephone (expired CO): Phone M = -7.9 (99% CI = -13.6 , -2.1), p <.001 v . HL M = -4.9 (99% CI = -10.7 to 0.8), p = 0.026. No significant between group difference (p = 0.864)	?T	Global functioning (GAF): Improvement in both groups 15w & 12m. No significant between group differences at either time point	NSD	-	-	-
								Smoking reduction status (at least 50% relative to baseline): Significant reduction in both conditions at 15w and 12m. No significant between group difference at either time point (p 's>0.099).	NSD	Weight and its impact on quality of life: (IWOQOL-Lite): Stable in both groups at 15w and 12m. No significant between group difference at either time point (ρ 's>0.556)	NSD	-	-	-

					<u>Cigarettes per day:</u> Significant reduction in both conditions at 15w and 12m. No significant between group difference at	NSD	Quality of Life (SF-12): Stable in both groups at 15w and 12m No significant between group difference		-	-	-
					either time point (<i>p</i> 's>0.565).		at either time point (<i>p</i> 's >0.042). Health Behaviours & Biomedical Measures Stable in both groups at 15w and 12m No significant between group differences	NSD	-	-	-
							Treatment retention: Significant overall difference between phone (mean 12.4, s.o. 5.2) & HL (mean 9.2, s.o. 6.0). 67% (76/113) of phone had high levels of attendance (9–17 sessions) v. 48% (58/122) of HL condition (p < 0.001).		-	-	-
							Smoking cessation for those attending more $(9-17)$ v . fewer $(1-8)$ sessions: 7-day point prevalence abstinence 15w 16.0% more session v . 4.0% fewer session $(p = 0.006)$ 12m $(p = 0.199)$		-	-	-
							Reduction of 50% or greater CPD 15w: 51% more session v . 16% fewer session (p < 0.001) 12m: 25% more session v . 6.9% fewer session (p < 0.001)	?T	-	-	-
Kilbourne et al. (2012) BP (n = 34) Pilot RCT V. RCT Control (n = 34)	(20 min/ session) session) delivered across the remaining 5 months of the	4× weekly group sessions (2 h/session)	×	×	Cardiometabolic risk (BMI & Blood Pressure) Stable in both groups. No between groud differences (all p's >0.58) Health related QoL (SF-12): Mental and Physical Component Subscales Stable in both groups. No between groud differences (all p's >0.38)	NSD	Post-hoc exploratory analyses for participants with elevated cardiometabolic risk (BMI≥30 or systolic BP>140): Greater improvement in intervention fo functioning and depressive symptoms (p=0.04 for both) Not significant after correcting for multiple comparisons		21	7	High
	intervention period				Functioning (WHODAS): 'trend in favour of intervention': ES 0.20 (μ = 0.11).	?T p	12 Month Service Utilisation No significant differences between groups. Process Variable:	NSD	-	-	-
					Symptoms (Internal State Scale): Depressive: 'trend in favour of intervention': ES 0.23 (p = 0.15) Manic: Stable in both groups. No significant differences between groups (p = 0.68)	?T NSD	Attendance: 79% of intervention participants completed at least three self-management sessions (i.e. ≥80% of session topics). The mean number of monthly follow-up contacts by phone or in-person was 4.5 (s.b. 1.5)	?	_	-	-
										(Co	ntinued)

(Continued)

Table 1. (Continued.)

Author study design	Clinical group	N		Intervention	delivery method	s	Out	tcomes		Q	uality	rati	ng
, ,			Telephon	Face to	Comparison	r condition Face to Face	Primary	Outcome in Favour of	Secondary/Process	Outcome in Favour of	Downs & Black	PEDRO	Overall Risk of Bias
Heffner et al. (2015) Pilot Two sequential single arm	BP	Phone (n = 6) v. In- person (n = 10)	10× 30 min sessions delivered weekly	×	10× 30 min sessions delivered weekly	x	Acceptance (AIS): Comparable change: 55% phone v. 54% in-person average increase from baseline	-	Depression (MADRS in person; PHQ-9 phone). 'No clinically significant change in either group' Mean change for phone of -1.2 (s.D. = 9.9) V1.3 (s.D. 4.0) in-person.		13	-	High
studies: ^e							7-day point prevalence abstinence (TLFB): End of treatment: 33% phone v. 40% in-person 1 m:17% phone v. 30% in-person	-	Mania (YMRS in person; ASRM phone): 'No clinically significant change in either group' Mean change for phone of 0.8 (s.D. 4.3) v0.1 (s.D. 1.1) in-person	-	-	_	-
							4-week prolonged abstinence (TLFB): End of treatment: 30% in-person v. 17% phone; 1m: 17% phone v.10% in-person Cigarettes/day: (50% or greater reduction between baseline and end of treatment) 67% phone v. 50% in-person	- - 1	Adherence Mean attendance was 8.3/10 sessions (s.D. 2.2) in-person; 6.7 (s. 2.9) for telephone. The proportion of treatment completers who used at leas 80% of the NRT was 62.5% for inperson & 0% for phone. Average NRT adherence was 72.8% (s.D. 32.0) for in-person & 40.2% (s.D. 18.7) for phone condition.	o. st	-	_	IT
							Notes: CO verification in the in-person condition. Missing = smoking imputation for all cessation outcomes and return to baseline smoking for the reduction outcomes.	-	Treatment satisfaction 100% phone and 90% in-person participants found the intervention helpful and would recommend the treatment. Adverse events: four psychiatric events (no suicide attempts) for phone v. four psychiatric (including one suicide attempt) in-person	-	-	-	+
						Telephon	e v. Treatment as Usual						
N. atualia													

No studies

Note: aCohens f2 not reported.

^fAny face-to-face elements that are specified in addition to routine care.

f2, Cohen's Effect Size; AlS, Acceptance of Illness Scale; Ax's, Assessments; BAI, Beck Anxiety Inventory; BDI, Beck Depression Inventory; BP, Bipolar; BPRS, Brief Psychiatric Rating Scale; BRMAS, Bech-Rafaelsen Mania Scale; CARS-M, Clinician Administered Rating Scale for Mania; CDS, Carroll Depression Scale; CES, Credibility and Expectancy Scale; CGI-SCH, Clinical Global Impression-Schizophrenia (-DC, degree of change; -SI, Severity of illness); CPD, Cigarettes per day; ns, non-significant; CSQ-8, Consumer Satisfaction Questionnaire; DAI-10, Drug attitude inventory; EQ-5D, EuroQol five dimensions questionnaire; ES, effect size; FTND, Fagerstrom Test for Nicotine Dependence; GAF, Global Assessment of Functioning; HDRS, Hamilton Rating Scale for Depression; IWOQOL-Lite, Impact of Weight on Quality of Life; M, Mean; MADRS, Montgomery Asberg Rating Scale; MARS, Medication Adherence Report Scale; MASES, Medication Adherence Self-Efficacy Scale; MCQ, Medication Compliance Questionnaire; NSD, No significant difference; OTI, Opiate Treatment Index; PANSS, Positive and Negative Symptoms Scale; PHQ-9, Patient health questionnaire; PSP, Personal and Social Performance Scale; PSR, Psychiatric Status Rating Scale; PSYRATS, Psychotic Symptoms Rating Scales; QPR, Questionnaire about the Process of Recovery; RAT, Register of Adherence to Treatment; s.D., Standard Deviation; SEPS, Subjective Experience of Psychotic Symptoms; SERS, Self Esteem Rating Scale; SF-12, Short Form Health Survey; SZ, Schizophrenia; SZ-A, Schizoaffective; THxl, Treatment History Interview; TLFB, Timeline Follow Back; VLQ, Valued Living Questionnaire; WAI, Working Alliance Inventory; WHODAS, WHO Disability Assessment Schedule; WHOQOL-BREF, WHO Quality of Life Brief Scale; YMRS, Young Mania Rating Scale.

bs.d. not reported.

cp value not reported.

^dFindings presented as mean change unless otherwise specified.

^eWithin subjects analysis only.

Table 2. Key outcomes for studies without a comparison condition (structured in descending order according to quality rating)

Author study design	Clinical group	N	Intervention deliver	y methods	Primary outcome	Summary of effect	Secondary outcome/ process variable	Summary of effect	Qualit	y rating
			Telephone	Face to face					Downs and black	Overall risk of bias
					Relapse prevent	tion				
Miklowitz et al. (2012) Two sequential single arm studies	ВР	19	✓ 5-6× weekly; bi-weekly and then monthly (30 min) for the 4-5-month duration of the	×	<u>Depression</u> (QIDS-SR): Baseline previous 4 week mean 7.4 (s.b. 5.6). Reduction of -0.11 points per week over time	? (Data did not meet normality assumptions)	No secondary outcomes specified	-	16	High
			intervention + Daily texts and emails		Mania (ASRM): Baseline previous 4-week median score was 1. Average increase of 0.08 points per week over time	? (Data did not meet normality assumptions)	-	-	-	-
					Changes in self-reported knowledge of mood management strategies (BMMQ): Significant increase in total knowledge score, mean of 54.2 (s.d. 8.8) at week 1–66.9 (s.d. 9.5), p < 0.001	Improvement	Process Variable: Attendance: Mean time to complete program of 9.2 weeks (s.b. 3.4; range 5–17) for Pilot I & 7.6 weeks (s.b. 0.9; range 7–9) for Pilot II. Participants responded to an average of 81%	?	-	-
					Treatment retention: 19 agreed, 17 completed all sessions in the required time frame (mean ± s.b.: Pilot I: 9.2 ± 3.4, range: 5–17 weeks and Pilot II: 7.6 ± 0.9, range: 7–9 weeks). 94.7% follow-up rate	Feasible	of the daily text or email prompts during treatment. Number of telephone sessions delivered was not reported	-	-	-
					Facilitators' fidelity to the manual (TCAS): 78.2% of rated sessions met the threshold for 'good' fidelity (>5)	Good fidelity	-	-	-	-
					Medication adher	rence				
McKenzie & Chang (2015) Single group pre-post	BP	14	✓ 2× (20–30 min) delivered weekly	1× initial (45– 60 min) session	Self-reported adherence: MARS: Improved adherence: mean 4.3 (s.d. 2.6) to 2.2 (s.d. 1.6) (p < 0.01) Total rate of adherence (TLFB): 67.8–94.3% (p < 0.01)	Improvement	Motivation to change (10-point Likert scales): Significant improvement on importance, motivation and confidence regarding medication adherence Pre-test M = 24.7 (s.d. 5.4) to mid-test M = 27.1 (s.d. 2.7) (p = 0.025); Mid-test to post-test M = 28.7 (s.d. 1.7) (p = .001); Pre- to post-test (p = 0.004)	Improvement	15	High

Table 2. (Continued.)

Author study design	Clinical group	N	Intervention delive	ry methods	Primary outcome	Summary of effect	Secondary outcome/ process variable	Summary of effect	Quality	y rating
			Telephone	Face to face					Downs and black	Overal risk o bias
							Self-efficacy (SEAMS): Significant improvement, Pretest M = 26.8 (s.d. 5.9) to midtest M = 29.6 (s.d. 3.6) ($p = 0.026$), Mid-test to post-test M = 33.4 (s.d. 3.5) ($p = 0.000$) Pre- to post-test ($p = 0.001$)	Improvement	-	-
							Treatment satisfaction (5 × 5- point Likert scales). Mean scores for each question ranged from 4.6 to 5 on the five-point scale plus positive qualitative data from two participants	Satisfied	-	-
							Process variable:	?		
							Attendance: Of the 14 participants, there were two occasions where participants had to reschedule their phone sessions			
Boardman et al. (2014) Single group pre-post- follow-up	SZ	22	✓ Weekly (~20 min/ session) ×8 weeks	x	Self-reported adherence (missed medication doses previous 4 weeks): Baseline 7.8 (s.p. 5.5, range 5–30), 8-week 1.3 (s.p. 1.4, range 0–4), 14-week 1.2 (s.p. 2.5, range 0–11), p = 0.0001	Improvement	Psychiatric symptoms (BPRS). Baseline mean (s.b.) 36 (8.8), 8-week 32 (s.b. 7.7), 14-week 32.2 (6.8), p = 0.003	Improvement	11	High
					υ 11,, ρ – 0.0001		Process variable:			
							Attendance: 22/28 (78.6%) described as completing the intervention	?		
Smoking/health	ny lifestyles									
Baker et al. (2014) Single group	SZ Spectrum (including BP)	17	/ 1× (~60 min) + 7× (~26 min) delivered once to	×	Fruit intake (ARFS): Sig. increase from 5.1 (s.p. = 3.1) to 6.6 (s.p. = 2.9), ES -0.73	Improvement	<u>Depression</u> (BDI-FS): 4.5 (s.b. = 3.3) to 3.7 (s.b. = 2.8), ES 0.37, ns	NSD	14	High
pre-post	DF)		twice weekly		Vegetable intake (ARFS): Trend for improvement 12.2 (s.d. = 4) to 13.5 (s.d. = 3.5), ES -0.64	? Improvement	<u>Diet quality</u> (ARFS): Sig. increase, 33.2 (s.b. = 10.5) to 38.2 (s.b. = 8.1), ES -0.97	Improvement	-	-
					Leisure screen time (weekday	Improvement	Total servings of fruit and	?	-	_

time watching television and/ or using a computer at home): Sig. reduction from 298 (s.p. = 200) to 163 (s.p. = 107) min/ day, ES 0.76	vegetables/day: Increased 4.2 (s.D. = 2.0) to 5.0 (s.D. = 1.8), ES -0.4, ns	Improvement		
au,, 20 0.10	Time spent walking (IPAQ): 252 (s.b. = 353) to 356 (s.b. = 470) min/day, ES -0.42, ns	? Improvement	-	
	Overall sitting time: Sig. decrease 555 (s.b. = 191) to 412 (s.b. = 211) min/day, ES 0.73	Improvement	-	-
	Smoking: Of five smokers, two reported abstinence at post- treatment. A third reported a 50% reduction in cigarettes per day (ES 1.03 for CPD)	? Improvement	-	-
	Alcohol consumption (2-week TLFB): 1 hazardous drinker at baseline, alcohol use not targeted	?	-	-
	<u>Cannabis</u> (OTI): three users at baseline, two abstinent post-treatment, one reduced use by 67% (ES 1.02)	? Improvement	-	-
	Quality of life (WHO-8 EUROHIS): 25.6 (s.d. = 5.6) to 28.4 (s.d. = 6.6), ES -0.65, ns	NSD	-	-
	Functioning (GAF): Significant improvement 57.1 (s.d. = 6.7) to 62.7 (s.d. = 8.9), ES-0.65	Improvement	-	-
	Satisfaction: All participants rated the quality of the service as 'good' (17.6%) or 'excellent' (82.4%). The majority indicated they were 'mostly' (17.6%) or 'very' satisfied (76.5%) with one person (5.9%) 'indifferent or mildly dissatisfied'	Satisfied	-	-
	Process Variable: Attendance: 19 (95%) completed all eight intervention	?	-	-

sessions, with one person withdrawing due to lack of privacy in their boarding house

ASRM, Altman Self-Rating Mania Scale; ARFS, Australian Recommended Food Score; BDI-FS, Beck Depression Inventory Fast Screen; BMMQ, Bipolar Mood Management Questionnaire; BP, bipolar; BPRS, Brief Psychiatric Rating Scale; CPD, cigarettes per day; ES, effect size; GAF, Global Assessment of Functioning; IPAQ, International Physical Activity Questionnaire; M, Mean; MARS, Medication Adherence Report Scale; NSD, no significant difference; OTI, Opiate Treatment Index; QIDS, Quick Inventory of Depressive Symptomatology (-C, clinician rated; -SR, self-rated); s.b., standard deviation; SEAMS, Self-Efficacy for Appropriate Medication Use Scale; SZ, schizophrenia; TCAS, Therapist Competence/Adherence Scale; TLFB, Timeline Follow Back; WHO-8 EUROHIS, Shortened version of the World Health Organisation Quality of Life Instrument-Abbreviated Version.

Cochrane risk of bias assessments is presented in online Supplementary Fig. S1a and S1b, with overall risk of bias scores in Tables 1 and 2. To summarise, eight studies reported adequate random sequence generation, four reported allocation concealment procedures, four stated that assessors were blinded to intervention status, nine were unlikely to be subjected to attrition bias, and 11 may have been affected by reporting bias. Regarding the overall risk of bias, all non-RCTs were automatically rated as 'high' for overall risk of bias. Eight RCTs were rated as having a high overall risk of bias (Beebe, 2001; Salzer et al., 2004; Castle et al., 2007; Price, 2007; Kilbourne et al., 2012; Javadpour et al., 2013; Wenze et al., 2015; Beebe et al., 2016), with all rated as unclear regarding one or both of two key items (sequence generation and allocation concealment). The remaining five RCTs were rated as having a low overall risk of bias, although only two (Simon et al., 2006; Baker et al., 2015) had adequately blinded outcomes assessors and a pre-published protocol.

Synthesis of results

Results of individual studies are presented in Table 1 (controlled trials) and 2 (single arm studies). Heterogeneity of form of intervention delivery (telephone only or in combination), control group (active or inactive control) and outcome measures precluded a meta-analysis on (within outcomes or collapsed across groups). A narrative synthesis is presented below.

Effects of Interventions

Relapse prevention

Of the 10 trials assessing relapse prevention, there were eight RCTs (Beebe, 2001; Simon et al., 2006; Castle et al., 2007; Price, 2007; Castle et al., 2010; Javadpour et al., 2013; Komatsu et al., 2013; Wenze et al., 2015), one partially randomised preference trial (Haddock et al., 2017) and one open trial (Miklowitz et al., 2012). Numbers in the RCT component of the preference trial were low (only three participants chose to be randomised), therefore this study has been categorised as an observational for the purpose of this review. Five RCTs reported at least 50% of outcomes significantly in favour of the telephone intervention, over time periods of up to 18 months (Javadpour et al., 2013); four relative to an active comparison condition (Castle et al., 2007; Castle et al., 2010; Komatsu et al., 2013; Wenze et al., 2015) and one relative to TAU (Javadpour et al., 2013). For the remaining RCTs, Beebe and colleagues (the only study in which the telephone was the sole delivery method) did not detect significant differences between active treatment conditions on the three indicators of relapse used (Beebe, 2001); Simon and colleagues demonstrated significant effects in favour of the telephone condition in two of the eight outcomes, but otherwise equivalent performance to TAU (Simon et al., 2002; 2005,) while Price found that the difference seen in hospital admissions and treatment compliance for the telephone condition (relative to TAU) did not reach statistical significance (Price, 2007). For the two non-RCTs, Haddock et al., did not detect significant differences between active treatment conditions and/or TAU for eight of the nine outcomes assessed, with the remaining outcome (Recovery from Negative Impacts of Psychosis) in favour of TAU [although the authors urge caution when interpreting this finding due to multiple comparisons (Haddock et al., 2017)] and Miklowitz et al. found significant improvement in knowledge of mood management strategies, but was unable to calculate the

statistical significance of observed improvements in mania and depression (Miklowitz et al., 2012).

As seen in Table 1, seven RCTs reported readmission or rehospitalisation data [all except (Castle *et al.*, 2010)], with six in favour of the telephone intervention and three attaining statistical significance (Castle *et al.*, 2007; Javadpour *et al.*, 2013; Komatsu *et al.*, 2013). Six RCTs reported symptom outcomes (Simon *et al.*, 2002; Simon *et al.*, 2005; Simon *et al.*, 2006; Castle *et al.*, 2007; Castle *et al.*, 2010; Javadpour *et al.*, 2013; Komatsu *et al.*, 2013; Wenze *et al.*, 2015), five demonstrated significant advantages of the telephone intervention on at least one symptom (Simon *et al.*, 2002; Simon *et al.*, 2005; Simon *et al.*, 2006; Castle *et al.*, 2010; Javadpour *et al.*, 2013; Komatsu *et al.*, 2013; Wenze *et al.*, 2015).

Medication adherence

Of the six trials reporting on medication adherence as the primary outcome three were RCTs (Salzer et al., 2004; Montes et al., 2010; Beebe et al., 2016), one non-randomised (Cook et al., 2008) and two single-group pre-post designs (Boardman et al., 2014; McKenzie and Chang, 2015). For the RCTs, the larger study (Montes et al., 2010) was the only to report at least 50% of outcomes in favour of the telephone condition. Although Salzer (Salzer et al., 2004) demonstrated effect sizes in the direction of the telephone for eight of the ten outcomes evaluated (using an intervention delivered entirely over the telephone). However, the two medication adherence outcomes (subjective response to medication and self-reported treatment adherence) did not significantly differ between groups (Salzer et al., 2004). Similarly, in their entirely telephone-delivered intervention Beebe (Beebe et al., 2016) did not detect a between-group difference for medication adherence. Conversely, in their non-randomised trial of an intervention delivered entirely by telephone, Cook reported improved adherence (both pharmacy based and self-report measures) in favour of the telephone condition (Cook et al., 2008). Both open trials reported improved self-reported medication adherence post-treatment (Boardman et al., 2014; McKenzie and Chang, 2015).

Smoking or CVD risk behaviours

There were four studies reporting smoking or CVD risk behaviour outcomes (Kilbourne et al., 2012; Baker et al., 2014; Baker et al., 2015; Heffner et al., 2015), with two RCTs (Kilbourne et al., 2012; Baker et al., 2015) - one of those a pilot trial (Kilbourne et al., 2012). Both RCTs utilised an active comparison condition and neither demonstrated at least 50% of outcomes in favour of the telephone condition. Baker et al. (2015), demonstrated significant improvements in CVD risk and smoking at 12 months following either a largely telephone-delivered intervention or a multicomponent face-to-face intervention. Significant improvements in global functioning were also seen in both conditions (Baker et al., 2015). Neither condition demonstrated significant improvements in health behaviours other than smoking (Baker et al., 2015). Cardiometabolic risk (BMI and blood pressure) and health-related quality of life also remained stable for both conditions in the pilot RCT by Kilbourne et al. (2012) and between-group differences for functioning and depression symptoms approached significance, in favour of the telephone condition (Kilbourne et al., 2012). Further, for individuals at greater risk (BMI≥30 or systolic BP>140), post hoc analyses demonstrated superior improvement in functioning and depressive symptoms for the telephone condition (Kilbourne et al., 2012). For the

single-arm studies, results from Heffner *et al.* (2015) suggest largely equivalent performance of the phone and face-to-face delivery for a smoking cessation intervention, although between groups comparisons were not performed. Finally, in a single-group pre-post design Baker *et al.* (2014) demonstrated clinically important change across a range of health behaviours following an intervention delivered entirely by telephone.

Discussion

This review aimed to capture all relevant studies of interventions delivered on at least 50% of session occasions by telephone to improve relapse prevention, medication adherence or reduce smoking and/or other CVD risk behaviour. We sought to comment on the feasibility and efficacy of telephone-delivered psychosocial interventions in people with a psychotic disorder. A total of 20 trials were reviewed in full, with 13 RCTs. Overall, the literature is split relatively evenly across schizophrenia or schizoaffective disorder and bipolar disorder. Studies typically included one or more 'traditional' clinical outcomes (e.g. symptomatology, relapse, medication compliance), with considerably fewer assessing the quality of life or functioning. Little is known about the process variables that may influence treatment outcome and only one study conducted economic analysis.

Although the modest body of literature and diversity of methods precludes definitive comments on efficacy, positive effects were found. Five of eight RCTs evaluating relapse prevention and one of three RCTs evaluating medication adherence reported at least 50% of outcomes in favour of the telephone-delivered the intervention, for time periods up to 18 months. As for smoking and other CVD risk behaviour studies, comparable levels of improvement were seen across treatment conditions. Of note, the comparison condition for one of the studies (Baker *et al.*, 2015) was an intensive, multi-component face-to-face delivered intervention with longer session duration. Accordingly, the equivalent level of improvement seen is important and points to the potential efficiency of telephone-delivered interventions for promoting clinically meaningful change.

The results in each domain of relapse prevention, medication adherence and smoking and CVD risk behaviour interventions are encouraging. Although most interventions combined telephone and face-to-face delivery, there were indications that entirely telephone-delivered interventions might be effective (e.g. Baker et al., 2014, Boardman et al., 2014), with evidence of at least equivalent (Beebe, 2001; Beebe et al., 2016) if not superior performance (Salzer et al., 2004; Cook et al., 2008) relative to standard care. In addition, in the relapse prevention preference trial conducted by Haddock et al., (2017), strong preferences were nominated by study participants for either telephone or telephone plus group delivery, with a significantly greater number of telephone sessions attended in the telephone only condition and few group sessions attended, on average. Thus, this review suggests that telephone-delivered interventions may be popular among service users, well attended, and at least as effective, if not superior to treatment as usual. Clearly, further methodologically rigorous research is warranted.

Limitations

Firstly, this review identified a modest sample of heterogeneous studies. Differences in outcome assessment, intervention and comparator conditions precluded meta-analysis. Accordingly, it is difficult to draw strong conclusions about the impact of telephone-delivered interventions on the outcomes of interest. There was also considerable variation in methodological quality. Most studies were uncontrolled and less than half of the RCTs identified were deemed to be at low risk of bias. In addition to poor reporting around randomisation and allocation concealment, many studies did not report using blinded outcomes assessors. Adequately powered RCTs were also rare. Many had small sample sizes, and all but one of those reporting power calculations were underpowered to detect significant differences. The crosscultural generalisability of our findings is also restricted as we limited our search to English language publications.

Implications for practice

Despite psychological interventions being recommended (Galletly et al., 2016; National Institute for Health and Care Excellence, 2014a, 2014b) for the treatment of schizophrenia and other psychotic disorders, of those likely to benefit, only 10% or less have access (Gulliver et al., 2010; Haddock et al., 2014; Schizophrenia Commission, 2015). Our findings lend further support to the potential role of phone delivered interventions in improving access. Importantly, the treatment protocols included in the current review were delivered by a variety of health professionals and ranged from brief time-limited 'check-in's' (e.g. Price, 2007) to full psychological interventions (e.g. Baker et al., 2014). Accordingly, telephone delivery may help to overcome barriers related to accessibility of support services and availability of trained clinicians (Gulliver et al., 2010; Haddock et al., 2014; Schizophrenia Commission, 2015), while maintaining the verbal contact and social connectedness of face-to-face delivery. Moreover, contrary to reservations from service providers, especially with regards to severe mental illness [SMI (Perle et al., 2013)], evidence from the current, and other (Kasckow et al., 2014) reviews suggest that telephone interventions are acceptable and well attended by adults with SMI.

Implications for research

To better establish the effectiveness of telephone interventions for people with a psychotic disorder, high quality, adequately powered studies are an important priority. The latter might best be conducted within existing practice settings to better evaluate the real-world impact of telephone-delivered interventions. To better understand the comparative clinical and cost effectiveness of telephone-delivered interventions, more head to head trials are needed. This would also help inform what, if any modifications are needed to ensure that telephone-delivered interventions meet the needs and preferences of service users. With the increasing focus on peer workers in mental health services, future research may also benefit from examining the acceptability and effectiveness of using peer workers to deliver telephone interventions. While it is challenging in studies of psychological interventions to use a double-blind design, the use of blinded outcomes measurement [e.g. a prospective, randomised, open, blinded endpoint (PROBE) design] has been argued to be a sufficient alternative (Hansson et al., 1992). Greater attention to non-symptom indicators of wellbeing (e.g. quality of life and functioning) and process variables (e.g. therapeutic alliance) is also warranted. To allow comparison between studies, greater uniformity in outcome measures would be beneficial. Accordingly, agreement upon and

adherence to standard definitions of common outcome variables is an important priority for future research.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0033291718001125

Acknowledgements. Professor John Attia (Director, Clinical Research and Statistical Support Unit, the Hunter Medical Research Institute) for advice regarding meta-analyses. Dayle Raftery (School of Medicine and Public Health, University of Newcastle) for her contribution to editing, formatting and referencing.

Declaration of interest. Dr Bucci is a Director of Affigo CIC, a social enterprise providing digital health solution for mental health problems. Dr Bucci, Dr Berry and Professor Haddock are current grant holders for a mobile application delivered CBT intervention for early psychosis (Medical Research Council: R116690). Professor Baker is an author on two studies included in this systematic review. Dr. Turner is an author on one included study. A/ Professor Kelly is an author on one included study. Professor Haddock and Dr Berry are authors on one included study.

Registration. PROSPERO: International prospective register of systematic reviews

Registration Number: CRD42015025402

Date: 17 August 2015

Author contribution. AKB conducted the searches and oversaw article selection. ALB cross-checked selected articles and extracted data. AT, KB and SB cross-checked extracted data. ALB and AT conducted quality assessments. ALB, AT, AKB, KB and SB drafted the article. All authors made substantial contributions to the conception and design of this systematic review; interpretation of findings; critically reviewing this document, and provided final approval of the version to be published.

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