



The effectiveness of interventions to increase preventive care provision for chronic disease risk behaviours in mental health settings: A systematic review and meta-analysis

Caitlin Fehily^{a,b,c,*}, Rebecca Hodder^{b,d,e}, Kate Bartlem^{a,b,c,d}, John Wiggers^{b,c,d,e}, Luke Wolfenden^{b,c,d,e}, Julia Dray^{a,b,d}, Jacqueline Bailey^{a,b}, Magda Wilczynska^a, Emily Stockings^f, Tara Clinton-McHarg^{a,b,c}, Timothy Regan^a, Jenny Bowman^{a,b,c}

^a School of Psychology, Faculty of Science, The University of Newcastle, NSW, Australia

^b Hunter Medical Research Institute, Clinical Research Centre, NSW, Australia

^c The Australian Preventive Partnership Centre (TAPPC), Sax Institute, Ultimo, NSW, Australia

^d Population Health, Hunter New England Local Health District, NSW, Australia

^e School of Medicine and Public Health, Faculty of Health and Medicine, The University of Newcastle, NSW, Australia

^f National Drug and Alcohol Research Centre, Randwick, NSW, Australia

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ABSTRACT

Clinical practice guidelines direct mental health services to provide preventive care to address client chronic disease risk behaviours, however, this care is not routinely provided. The aim of this systematic review was to synthesise evidence regarding the effectiveness of interventions to increase provision of preventive care by mental health services; by care element (ask, assess, advice, assist, arrange) and risk behaviour (tobacco smoking, poor nutrition, harmful alcohol consumption, physical inactivity). Electronic bibliographic databases, Google Scholar, relevant journals, and included study reference lists were searched. Eligible studies were of any design with a comparison group that reported the effectiveness of an intervention to increase the provision of at least one element of preventive care for at least one risk behaviour in a mental health setting. Twenty studies were included, most commonly examining smoking ($n = 20$) and 'ask' ($n = 12$). Meta-analysis found interventions involving task shifting were effective in increasing smoking 'advice' ($n = 2$ RCTs; $p = 0.009$) and physical activity 'advice' ($n = 2$ RCTs; $p = 0.002$). Overall, meta-analysis and narrative synthesis indicated that effective intervention strategies (categorised according to the Effective Practice and Organisation of Care taxonomy) were: task shifting, educational meetings, health information systems, local consensus processes, authority and accountability, and reminders. The most consistent findings across studies were with regard to preventive care for smoking, while conflicting or limited evidence was found regarding other risk behaviours. While further rigorous research examining key risk behaviours is recommended, the findings may inform the selection of strategies for future interventions and service delivery initiatives.

1. Introduction

Chronic disease risk behaviours (tobacco smoking, poor nutrition, harmful alcohol consumption, and physical inactivity) are more prevalent among people with a mental illness compared to the general population (Australian Institute of Health and Welfare, 2014; Bartlem et al., 2015; Davidson et al., 2001; Kilian et al., 2006; Stubbs et al., 2016). As a consequence, the life expectancy of people with a mental illness is considerably reduced by a median of ten years (Walker et al., 2015). Contact with a mental health service offers an opportunity to

systematically and routinely provide 'preventive care' to a large proportion (Australian Institute of Health and Welfare, 2017; Whiteford et al., 2014; Center for Behavioural Health Statistics and Quality, 2015; Mental Health Foundation, 2016) of people with a mental illness: support provided by a health professional to encourage positive changes to chronic disease risk behaviours (Galletly et al., 2016; Royal Australian College of General Practitioners, 2015; World Health Organisation, 2018; NSW department of health, 2017). The '5As' framework has been developed to guide provision of such care within clinical consultations: 'ask' about engagement in risk behaviours (i.e. screening), 'assess'

* Corresponding author at: School of Psychology, University of Newcastle, University Drive, Callaghan, NSW 2308, Australia.
E-mail address: caitlin.fehily@uon.edu.au (C. Fehily).

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interest in change, provide ‘advice’ to change, provide behaviour change ‘assistance’, and ‘arrange’ referral to behaviour change services (Royal Australian College of General Practitioners, 2014; Schroeder, 2005). This framework is recommended by clinical practice guidelines in Australia (Royal Australian College of General Practitioners, 2015) and other high income countries (Raw et al., 2002; Partnership on smoking cessation, 2006; Ministry of Health, 2007; Fiore et al., 2008), and has consistently been reported as effective in helping clients to reduce their risk behaviours (Alexander et al., 2011; Goldstein et al., 2004; Gordon et al., 2007; Quinn et al., 2009; Royal Australian College of General Practitioners, 2015; Rueda-Clausen et al., 2014; Vallis et al., 2013). An abbreviated framework has been advocated as the minimum recommendation: the ‘AAR’ framework (ask, advise, and refer; Schroeder, 2005; Gordon et al., 2007, 2010).

A recent international systematic review of 38 studies found that the prevalence of preventive care provision by mental health services varied by risk behaviour and care element (Bailey et al., 2019). However, overall suboptimal provision (i.e. care provided to < 80% of clients) was evident. These data highlight the need to identify effective interventions to increase the delivery of evidence-based preventive care by these services. Consideration of the costs and cost-effectiveness of such interventions is also required to inform decision-makers (Hoomans and Severens, 2014; Sutton et al., 2018).

To increase adherence to clinical practice guidelines and policies generally, Cochrane review evidence supports a range of intervention strategies, including: staff training (Forsetlund et al., 2009), audit and feedback (Jamtvedt et al., 2006), and electronic reminder systems (Arditi et al., 2012). However, less is known regarding the effectiveness of these strategies within mental health service settings; with individual studies suggesting effectiveness varies across care elements and risk behaviours (Bartlem et al., 2016; Osborn et al., 2010). Two previous systematic reviews have synthesised evidence regarding the effectiveness of interventions to increase physical health care in mental health settings (Druss and von Esenwein, 2006; Lamontagne-Godwin et al., 2018). Narrative synthesis from these reviews indicates that intervention strategies such as staff education, electronic reminders, facilitated referrals, and dedicating staff members to the role of providing physical health services, may be effective in increasing the provision of physical health care (including: screening and/or treatment for physical health conditions, biomedical risks, and the four chronic disease risk behaviours). However, no previous systematic review has examined the effectiveness of interventions in increasing the provision of recommended preventive care elements (5As) specifically for the four key risk behaviours (tobacco smoking, poor nutrition, harmful alcohol consumption, and physical inactivity) to all clients of mental health services (irrespective of severity of mental illness); nor examined intervention effectiveness by care element or risk behaviour.

1.1. Objective

The aim of this systematic review was to determine the effectiveness of interventions designed to increase the provision of preventive care (at least one component of the 5As) to address chronic disease risk behaviours (at least one of: tobacco smoking, poor nutrition, harmful

alcohol consumption, and physical inactivity) in the context of mental health service delivery.

2. Methods

The review was prospectively registered with PROSPERO (CRD: 42017074360) and the methods prospectively published (Fehily et al., 2018). Reporting follows the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines (see Supplementary Material 1 for PRISMA checklist) (Moher et al., 2009).

2.1. Study inclusion criteria

2.1.1. Study design

Eligible studies were of any design with a comparison group such as randomised controlled trials (RCTs), quasi-randomised trials, interrupted time-series (ITS) trials, and pre-post studies. Consistent with recommendations (Higgins and Green, 2011), non-randomised studies were included given the previously acknowledged difficulty of conducting rigorous trials in the context of ongoing health service delivery (Bondemark and Ruf, 2015).

2.1.2. Participants

Participants were clinicians or clients of eligible mental health services. Eligible services had a primary aim of supporting the mental health and well-being of adults (at least 50% over 18 years) with any mental illness, and could include: bed-based (psychiatric inpatient), specialised community mental health care (outpatient services such as community mental health services and private psychologists or psychiatrists), and community managed organisations (including non-government mental health organisations providing support for people with a mental illness to live independently in the community). Settings exclusively providing care for substance use and addiction were excluded.

2.1.3. Interventions

Eligible interventions aimed to increase the delivery of at least one preventive care element for at least one of the four risk behaviours by staff or clinicians of the service. All intervention strategies were considered, including but not limited to: delivery arrangements (targeting how, when, and where care is delivered and by whom), financial arrangements (targeting funding and purchasing of services, as well as financial incentives), governance arrangements (changes to the rules that affect authority and accountability), and implementation strategies (supporting changes in healthcare professional behaviour or patient service use) (Effective Practice and Organisation of Care EPOC, 2015). There were no eligibility criteria regarding who delivered the interventions.

2.1.4. Primary outcomes

Eligible studies quantitatively reported any measure of clinician provision or client receipt of at least one of the 5As (see Table 1 for definitions Royal Australian College of General Practitioners, 2014; Schroeder, 2005) for at least one of the four risk behaviours (tobacco

Table 1

Definitions of the care elements in the ‘5As’ framework for providing preventive care (Royal Australian College of General Practitioners, 2014; Schroeder, 2005).

Care element	Definition
Ask	Asking clients about their current behaviour levels
Assess	Assessing readiness to change risk behaviours, and/or dependence (for tobacco smoking and alcohol consumption)
Advise	Providing advice to change behaviours or education around what constitutes risk, the individual’s level of risk, and/or guidelines for behaviours
Assist	Discussion of the benefits and barriers to change, providing counselling to change behaviours (such as motivational interviewing), and/or providing additional supports including pharmacotherapy, educational materials or self-help materials
Arrange	Referring the client to any health care provider or support service (such as a telephone coaching service, dietician or support group) or providing a prescription for medications (such as nicotine replacement therapy) to support behaviour change

smoking, poor nutrition, harmful alcohol consumption or physical inactivity) in the context of mental health service delivery.

Outcome data could be collected from any source, such as client report, clinician report, or record audit. Studies were eligible if they: 1) reported outcome data regarding the provision of elements of care separately or combined across elements; or 2) reported outcome data for the risk behaviours separately or combined. Studies were not included if eligible outcome data was not able to be disaggregated from combined scores (e.g. care for tobacco smoking and blood pressure combined). Where applicable, authors were contacted to determine if disaggregated data were available.

2.1.5. Secondary outcomes

Secondary outcomes were:

- Effects of interventions on client risk behaviours, including any measure of: smoking, nutrition, alcohol consumption, and/or physical activity.
- Estimates of absolute costs and/or cost-effectiveness of interventions.

2.2. Search methods

The search terms are provided in Supplementary Material 2. Seven electronic databases were searched for peer-reviewed publications in English from the past 20 years (between January 1998 and May 2019): MEDLINE; PsychINFO; Excerpta Medica database (EMBASE); Psychology and Behavioural Sciences Collection; Scopus; Cochrane Central Register of Controlled Trials (CENTRAL); and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). Hand searching of the first 200 citations of Google Scholar, papers published in relevant journals from the past three years (Psychiatric Services, Implementation Science, British Journal of Psychiatry Bulletin, and BMC Health Services Research), and the reference lists of all included studies was conducted. Corresponding authors of included studies and experts in the field were contacted to check for further publications.

2.3. Study selection process

Pairs of review authors independently screened titles and abstracts of identified records (from CF, ES, JBa, MW, TCM, JD, TR, and a research assistant) and full texts of potentially eligible studies (CF and one of ES, JBa, MW, TCM, TR) in Covidence, with conflicts resolved via consensus or by a third reviewer (JBo). Authors were contacted for clarification where information was not sufficient to determine eligibility or to obtain missing primary outcome data.

2.4. Data extraction

Two review authors independently extracted data (CF and one of JBa, JD, MW, TCM, TR) from the included studies using a piloted Microsoft Word based form. Data were extracted for the longest follow-up only. For multiple baseline, ITS, cohort, and pre-post studies, the baseline measure taken prior to the commencement of the intervention was considered to be the comparison group/time-point. Any discrepancies were resolved by consensus, or a third reviewer (RH).

Information extracted included: study characteristics, intervention characteristics, care element(s) and risk behaviour(s) addressed, and primary and secondary outcome data. Intervention strategies were classified according to the four domains and subcategories of the Cochrane Effective Practice and Organisation of Care (EPOC) taxonomy for health systems interventions (Effective Practice and Organisation of Care EPOC, 2015). Individual intervention strategies (EPOC subcategories) are contained within each of the four domains: delivery arrangements, financial arrangements, governance arrangements, and implementation strategies.

2.5. Assessment of risk of bias in included studies

Risk of bias for RCTs was assessed on each of the domains of the Cochrane Risk-Of-Bias tool for randomised trials (RoB 2.0; overall ratings: low, some concerns, or high risk of bias; Cochrane Scientific Committee, 2017; Higgins et al., 2019). The RoB (2.0) extension for clustered trials was used for cluster-RCTs (overall ratings: low, some concerns, or high risk of bias; Eldridge et al., 2016). The Risk Of Bias In Non-Randomised Studies – of Interventions (ROBINS-I) was used to assess risk of bias for non-randomised studies, including multiple baseline, ITS, cross-sectional, and cohort studies (overall ratings: low, moderate, serious, critical, or no information; Sterne et al., 2016). The quality of pre-post studies was assessed using the National Heart, Lung, and Blood Institute Quality Assessment Tool for pre-post studies (overall ratings: poor, fair, or good quality; National Heart, Lung, and Blood Institute). Risk of bias for each study was assessed independently by two review authors (CF and one of JD, MW, and a research assistant) for the primary outcomes of the review, and discrepancies were resolved through consensus or via a third reviewer where necessary (RH).

2.6. Assessment of quality of evidence

The strength of the body of evidence across included RCTs for the primary outcomes of the review was assessed using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) approach (Higgins and Green, 2011; Schünemann et al., 2013) by two review authors (CF and JBa), and a third reviewer (RH) resolved conflicts where necessary (see Supplementary Material 3).

2.7. Data analysis and synthesis

Effects of interventions were synthesised separately for RCTs, non-randomised, and pre-post studies, (Cochrane Consumers and Communication Review Group, 2016) and each of the risk behaviours across each of the care elements.

Where possible, RCTs reporting similar interventions, comparison groups (where no intervention and minimal intervention were considered similar), and outcomes were combined in a random effects meta-analysis conducted using RevMan software. Statistical heterogeneity was assessed by examining the I^2 statistic, with $I^2 < 75\%$ and chi-square $p > 0.01$ indicating studies were sufficiently homogenous. Outcomes were pooled, reported as odds ratios for binary outcomes and as mean differences for continuous outcomes where outcomes were similar (or standardised mean differences to enable comparable outcomes). Where cluster-RCTs did not adjust for clustering, design effects and effective sample sizes were calculated to enable inclusion in meta-analysis using the study intra-class correlation (ICC) or an estimate was derived from a similar study accessed from the Health Services Research Unit's database of intraclass correlations for implementation studies (Health Services Research Unit, 2019) (ICC 0.24; effective sample size: smoking advice $n = 10$, smoking assist $n = 10$, nutrition advice $n = 6$, physical activity advice $n = 6$; Osborn et al., 2010).

Trials unable to be pooled in meta-analysis and non-RCTs were described narratively (Higgins and Green, 2011).

2.8. Deviations from protocol

The planned examination of funnel plots to assess reported bias was not possible due to the small number of trials (less than ten; Sedgwick, 2013). Planned sub-group analyses (by mental health service type and intervention strategies) and sensitivity analyses were not conducted due to the small number of included studies.

3. Results

The search retrieved 24,779 unique records; 24,575 were excluded

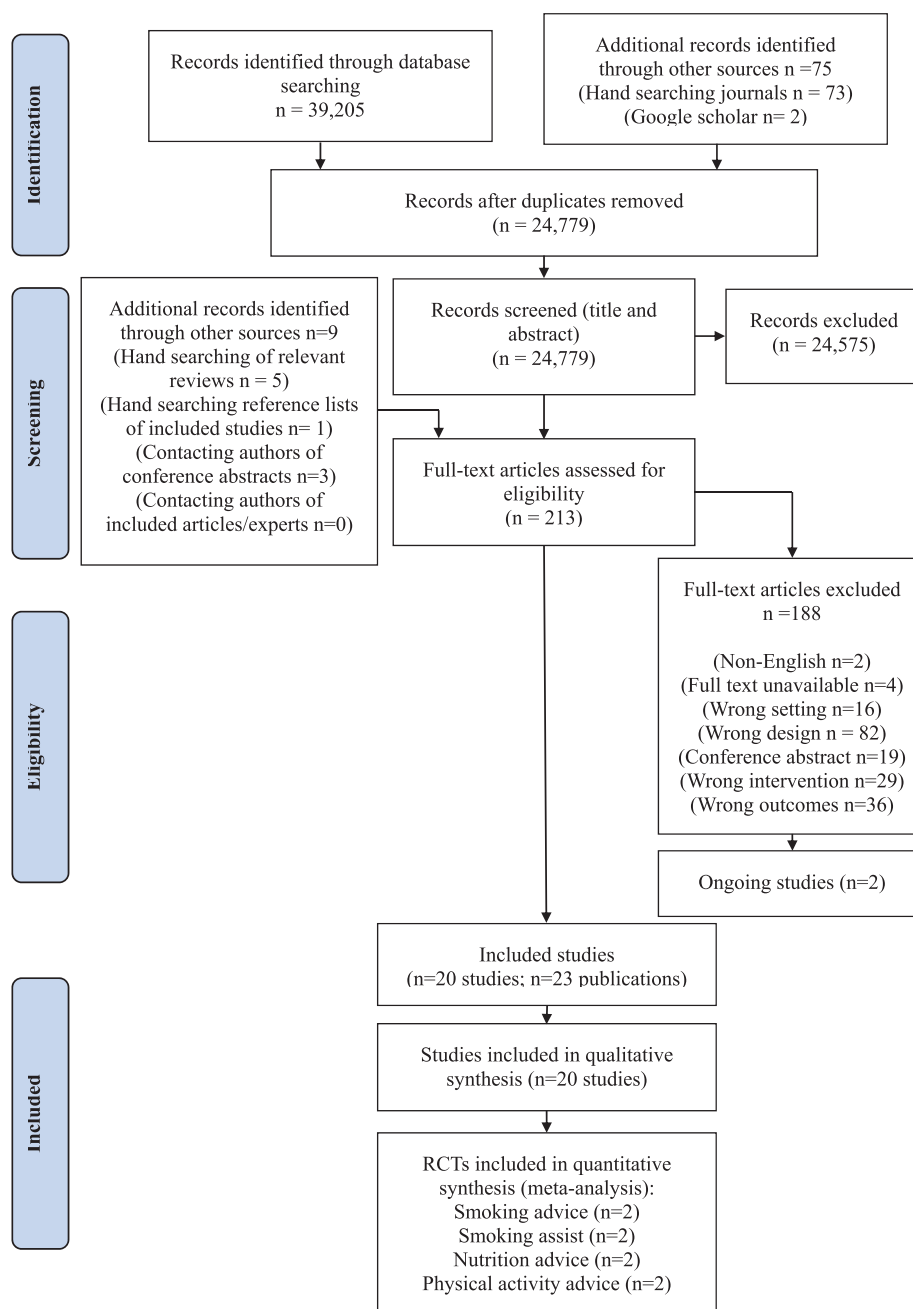


Fig. 1. PRISMA flow diagram.

based on title and abstract screening (Fig. 1 displays PRISMA flow diagram). A total of 213 full-texts were screened; 188 were excluded (see Fig. 1 for reasons); 20 studies across 23 publications were included, and two ongoing studies included (Fehily et al., 2017; Baker et al., 2019).

3.1. Study characteristics

Supplementary Material 4 contains the detailed characteristics of included studies table. Most studies ($n = 11$) were conducted in the USA (Carrillo et al., 2017; Chen et al., 2018; Correa-Fernández et al., 2018; Dixon et al., 2009; Druss et al., 2001; Maki and Bjorklund, 2013; McFall et al., 2005; Prochaska et al., 2008; Scharf et al., 2011; Rubin et al., 2005; Muladore et al., 2018). There were four RCTs (Osborn et al., 2010; Druss et al., 2001; McFall et al., 2005; Rubin et al., 2005) two multiple baseline (Bartlem et al., 2016; Dixon et al., 2009), one

interrupted time series, (Wye et al., 2017) one cross-sectional study, (McKenna et al., 2014) two equivalent group pre-post studies (Prochaska et al., 2008; O'Callaghan et al., 2011), and ten non-equivalent group pre-post studies (Maki and Bjorklund, 2013; Scharf et al., 2011; Muladore et al., 2018; Carrillo et al., 2017; Chen et al., 2018; Correa-Fernández et al., 2018; Etter et al., 2008; Green et al., 2018; Greenwood and Shiers, 2016; Huddleston et al., 2018).

Studies were mainly conducted within specialised community mental health services ($n = 11$) (Bartlem et al., 2016; Osborn et al., 2010; McKenna et al., 2014; O'Callaghan et al., 2011; Greenwood and Shiers, 2016; Correa-Fernández et al., 2018; Dixon et al., 2009; Druss et al., 2001; Maki and Bjorklund, 2013; McFall et al., 2005). Preventive care outcomes were collected from client self-report ($n = 3$) (Bartlem et al., 2016; Dixon et al., 2009; Etter et al., 2008), clinician self-report ($n = 3$) (Correa-Fernández et al., 2018; Prochaska et al., 2008; Etter et al., 2008), and clinical records ($n = 15$) (Osborn et al., 2010; Carrillo

Table 2
Intervention strategies tested in included studies.

EPOC category	Strategy	Definition ^a	# of studies tested in (reference)
Implementation strategies	Educational meetings	Courses, workshops, conferences or other educational meetings.	14 (Bartlem et al., 2016; Muladore et al., 2018; Wye et al., 2017; Carrillo et al., 2017; Chen et al., 2018; Correa-Fernández et al., 2018; Dixon et al., 2009; Maki and Bjorklund, 2013; McFall et al., 2005; Prochaska et al., 2008; Scharf et al., 2011; Etter et al., 2008; Green et al., 2018; Greenwood and Shiers, 2016)
Delivery arrangements	Health information systems	Technology based methods to transfer healthcare information and support the delivery of care.	9 (Bartlem et al., 2016; Osborn et al., 2010; Carrillo et al., 2017; Dixon et al., 2009; Maki and Bjorklund, 2013; Scharf et al., 2011; Wye et al., 2017; O'Callaghan et al., 2011; Green et al., 2018)
Implementation strategies	Educational materials	Distribution to individuals, or groups, of educational materials to support clinical care, i.e., any intervention in which knowledge is distributed.	8 (Bartlem et al., 2016; Osborn et al., 2010; Chen et al., 2018; Dixon et al., 2009; Scharf et al., 2011; Muladore et al., 2018; Wye et al., 2017; Etter et al., 2008)
Governance arrangements	Authority and accountability for quality of practice	Policies that regulate authority and accountability for the quality of care or safety, for example implementation of clinical guidelines.	6 (Bartlem et al., 2016; Carrillo et al., 2017; Correa-Fernández et al., 2018; Scharf et al., 2011; Etter et al., 2008; Huddleston et al., 2018)
Governance arrangements	Audit and feedback	A summary of health workers' performance over a specified period of time, given to them in a written, electronic or verbal format. The summary may include recommendations for clinical action.	6 (Bartlem et al., 2016; Chen et al., 2018; Maki and Bjorklund, 2013; Wye et al., 2017; Green et al., 2018; Greenwood and Shiers, 2016)
Governance arrangements	Local consensus processes	Formal or informal local consensus processes, for example agreeing a clinical protocol to manage a patient group, adapting a guideline for a local health system or promoting the implementation of guidelines.	6 (Bartlem et al., 2016; Maki and Bjorklund, 2013; Wye et al., 2017; O'Callaghan et al., 2011; Green et al., 2018; Greenwood and Shiers, 2016)
Implementation strategies	Reminders	Manual or computerised interventions that prompt health workers to perform an action during a consultation with a patient, for example computer decision support systems.	5 (Bartlem et al., 2016; Osborn et al., 2010; Maki and Bjorklund, 2013; McFall et al., 2005; Wye et al., 2017)
Delivery arrangements	Task shifting ^b	Expanding tasks undertaken by a cadre of health workers or shifting tasks from one cadre to another, to include tasks not previous part of their scope or practice. This may include substituting one cadre of healthcare work for another.	4 (Osborn et al., 2010; Druss et al., 2001; Rubin et al., 2005; McKenna et al., 2014)
Delivery arrangements	Communication between providers	Systems or strategies for improving the communication between health care providers, for example systems to improve immunization coverage in LMIC.	3 (Osborn et al., 2010; Carrillo et al., 2017; Rubin et al., 2005)
Implementation strategies	Local opinion leaders	The identification and use of identifiable local opinion leaders to promote good clinical practice.	3 (Bartlem et al., 2016; Dixon et al., 2009; Greenwood and Shiers, 2016)
Delivery arrangements	Case management	Introduction, modification or removal of strategies to improve the coordination and continuity of delivery of services i.e. improving the management of one "case" (patient).	2 (Carrillo et al., 2017; Druss et al., 2001)
Delivery arrangements	Referral systems	Systems for managing referrals of patients between health care providers.	2 (Bartlem et al., 2016; Carrillo et al., 2017)
Delivery arrangements	Care pathways	Aim to link evidence to practice for specific health conditions and local arrangements for delivering care.	1 (Huddleston et al., 2018)
Governance arrangements	Community mobilisation	Processes that enable people to organize themselves.	1 (Correa-Fernández et al., 2018)
Implementation strategies	Continuous quality improvement	An iterative process to review and improve care that includes involvement of healthcare teams, analysis of a process or system, a structured process improvement method or problem solving approach, and use of data analysis to assess changes.	1 (Greenwood and Shiers, 2016)
Delivery arrangements	Environment	Changes to the physical or sensory healthcare environment, by adding or altering equipment or layout, providing music, art.	1 (Etter et al., 2008)
Implementation strategies	Monitoring the performance of the delivery of health care	Monitoring of health services by individuals or healthcare organisations, for example by comparing with an external standard.	1 (Osborn et al., 2010)
Delivery arrangements	Packages of care	Introduction, modification, or removal of packages of services designed to be implemented together for a particular diagnosis/disease, e.g. tuberculosis management guidelines, newborn care protocols.	1 (Etter et al., 2008)
Implementation strategies	Patient mediated interventions	Any intervention aimed at changing the performance of healthcare professionals through interactions with patients, or information provided by or to patients.	1 (Etter et al., 2008)
Financial arrangements	Pay for performance	Transfer of money or material goods to healthcare providers conditional on taking a measurable action or achieving a predetermined performance target, for example incentives for lay health workers.	1 (Carrillo et al., 2017)
Financial arrangements	Pricing and purchasing policies	Policies that determine the price that is paid or how commercial products are purchased, for example health technologies, drugs.	1 (Etter et al., 2008)
Delivery arrangements	Shared decision making	Sharing healthcare decision making responsibilities among different individuals, potentially including the patient.	1 (Green et al., 2018)

(continued on next page)

Table 2 (continued)

EPOC category	Strategy	Definition ^a	# of studies tested in (reference)
Governance arrangements	Stakeholder involvement in policy decisions	Policies and procedures for involving stakeholders in decision-making.	1 (Correa-Fernández et al., 2018)
Delivery arrangements	The use of information and communication technology	Technology based methods to transfer healthcare information and support the delivery of care.	1 (Carrillo et al., 2017)

^a Definitions taken from EPOC taxonomy (Effective Practice and Organisation of Care EPOC, 2015).

^b Note. The World Health Organisation defines ‘task shifting’ as explicitly shifting tasks from highly skilled and/or qualified workers to less skilled/qualified workers (World Health Organisation, 2007). For the purpose of this review the EPOC taxonomy definition contained above is applied, where this is not necessarily the case.

et al., 2017; Chen et al., 2018; Druss et al., 2001; Maki and Bjorklund, 2013; McFall et al., 2005; Scharf et al., 2011; Rubin et al., 2005; Muladore et al., 2018; Wye et al., 2017; McKenna et al., 2014; O’Callaghan et al., 2011; Green et al., 2018; Greenwood and Shiers, 2016; Huddlestone et al., 2018).

3.2. Intervention characteristics

Table 2 reports the types, definitions, and frequency of intervention strategies tested across studies. A range of intervention strategies were tested and no studies tested the same combination of strategies. The three most common were: educational meetings ($n = 14$) (Bartlem et al., 2016; Muladore et al., 2018; Wye et al., 2017; Carrillo et al., 2017; Chen et al., 2018; Correa-Fernández et al., 2018; Dixon et al., 2009; Maki and Bjorklund, 2013; McFall et al., 2005; Prochaska et al., 2008; Scharf et al., 2011; Etter et al., 2008; Green et al., 2018; Greenwood and Shiers, 2016), health information systems ($n = 9$) (Bartlem et al., 2016; Osborn et al., 2010; Carrillo et al., 2017; Dixon et al., 2009; Maki and Bjorklund, 2013; Scharf et al., 2011; Wye et al., 2017; O’Callaghan et al., 2011; Green et al., 2018), and educational materials ($n = 8$) (Bartlem et al., 2016; Osborn et al., 2010; Chen et al., 2018; Dixon et al., 2009; Scharf et al., 2011; Muladore et al., 2018; Wye et al., 2017; Etter et al., 2008). Targets of interventions were all staff ($n = 16$) (Bartlem et al., 2016; Muladore et al., 2018; Wye et al., 2017; Carrillo et al., 2017; Chen et al., 2018; Correa-Fernández et al., 2018; Dixon et al., 2009; Maki and Bjorklund, 2013; McFall et al., 2005; Prochaska et al., 2008; Scharf et al., 2011; O’Callaghan et al., 2011; Etter et al., 2008; Green et al., 2018; Greenwood and Shiers, 2016; Huddlestone et al., 2018) or select staff ($n = 4$) (Osborn et al., 2010; Druss et al., 2001; Rubin et al., 2005; McKenna et al., 2014). For RCTs, comparison groups were usual care (Druss et al., 2001; McFall et al., 2005; Rubin et al., 2005) or usual care plus minimal intervention (educational materials) (Osborn et al., 2010).

3.3. Preventive care outcomes

The most commonly examined element of preventive care was ‘ask’ ($n = 12$ studies) (Bartlem et al., 2016; Osborn et al., 2010; Carrillo

et al., 2017; Correa-Fernández et al., 2018; Maki and Bjorklund, 2013; Prochaska et al., 2008; Green et al., 2018; McKenna et al., 2014; O’Callaghan et al., 2011), followed by: ‘arrange’ ($n = 11$) (Bartlem et al., 2016; Osborn et al., 2010; Carrillo et al., 2017; Correa-Fernández et al., 2018; Dixon et al., 2009; Wye et al., 2017; Greenwood and Shiers, 2016; Prochaska et al., 2008; Scharf et al., 2011), ‘assist’ ($n = 11$) (Osborn et al., 2010; Chen et al., 2018; Correa-Fernández et al., 2018; McFall et al., 2005; Prochaska et al., 2008; Etter et al., 2008; Greenwood and Shiers, 2016; Muladore et al., 2018; Wye et al., 2017), ‘advice’ ($n = 8$) (Bartlem et al., 2016; Osborn et al., 2010; Correa-Fernández et al., 2018; Druss et al., 2001; Prochaska et al., 2008; Wye et al., 2017; Etter et al., 2008; Huddlestone et al., 2018), and ‘assess’ ($n = 3$) (Correa-Fernández et al., 2018; Prochaska et al., 2008; Wye et al., 2017). Ten studies examined one care element (Chen et al., 2018; McKenna et al., 2014; O’Callaghan et al., 2011; Druss et al., 2001; Maki and Bjorklund, 2013; Scharf et al., 2011; Rubin et al., 2005; Muladore et al., 2018), three examined all 5As elements (Correa-Fernández et al., 2018; Prochaska et al., 2008; Wye et al., 2017), and three examined all AAR elements (Bartlem et al., 2016; Osborn et al., 2010; Huddlestone et al., 2018).

All 20 studies sought to improve preventive care for smoking, of which 14 examined only smoking (Muladore et al., 2018; Wye et al., 2017; Carrillo et al., 2017; Chen et al., 2018; Correa-Fernández et al., 2018; Dixon et al., 2009; Maki and Bjorklund, 2013; McFall et al., 2005; Prochaska et al., 2008; Scharf et al., 2011; Etter et al., 2008; Green et al., 2018; Greenwood and Shiers, 2016; Huddlestone et al., 2018). The remaining six addressed multiple risk behaviours; three examined alcohol (Bartlem et al., 2016; Rubin et al., 2005; O’Callaghan et al., 2011), four physical activity (Bartlem et al., 2016; Osborn et al., 2010; Druss et al., 2001; McKenna et al., 2014), and three nutrition (Bartlem et al., 2016; Osborn et al., 2010; Druss et al., 2001). One examined all four risks (Bartlem et al., 2016). Length of follow-up ranged from three to 36 months (mean = 10.47; median = 6).

3.4. Risk of bias in included studies

3.4.1. Randomised controlled trials

Of the four RCTs, two (Osborn et al., 2010; Rubin et al., 2005) were

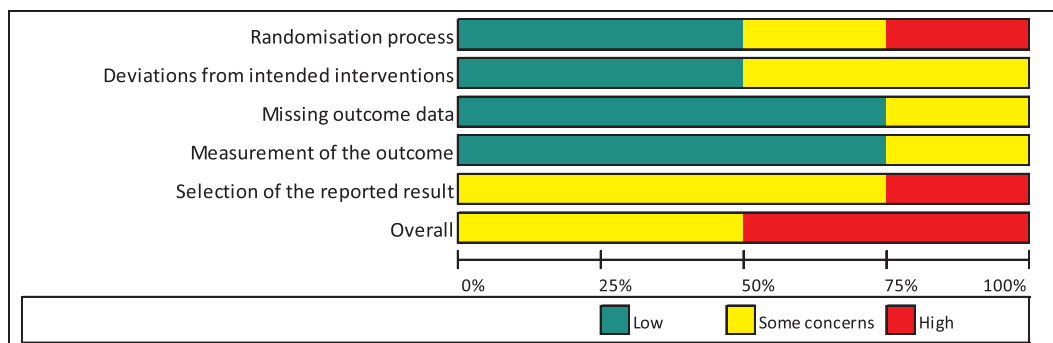


Fig. 2. Risk of bias of Randomised Controlled Trials.

Table 3
Summary of findings across review primary outcomes.

	Smoking			Nutrition			Alcohol			Physical activity					
	Ask	Assess	Advise	Assist	Arrange	Ask	Assess	Advise	Assist	Arrange	Ask	Assess	Advise	Assist	Arrange
Randomised controlled trials															
Druss et al. (2001)			✓												✓
McFall et al. (2005)				✓	✓ ^a										
Osborn et al. (2010)	✓		X	X	X										✓ ¹
Rubin et al. (2005)				✓										✓	
Non-randomised studies															
Bartlem et al. (2013, 2016)	X		X		X	X			X	X					X
Dixon et al. (2009)															
McKenna et al. (2014)	-														
O'Callaghan et al. (2011)	✓		✓	✓	✓										
Prochaska et al. (2008)	✓		✓	✓	✓										
Wye et al. (2017)	✓		✓	✓	✓										
Pre-post studies															
Carrillo et al. (2017)	✓														
Chen et al. (2018)				✓											
Correa-Fernández et al. (2018), Correa-Fernandez et al. (2017)	✓		✓	✓	✓										
Eter et al. (2008), Eter and Eter (2007)			✓	✓	✓										
Green et al. (2018)															
Greenwood and Shiers (2016)	-														
Huddleston et al. (2018)	-														
Maki and Bjorklund (2013)	-														
Muladore et al. (2018)	-														
Scharf et al. (2011)				X											

✓ = statistically significant effect reported; X = effect was not statistically significant; - = statistical tests not conducted.

^a At least one significant result.

^b A combined measure of assist and arrange.

Table 4
Results of meta-analyses of including studies.

Outcome	OR (95% CI)	p	I ² (%)	n	N of studies
Smoking advice	3.03 (1.31–6.97)	0.009	0	196	2 (Osborn et al., 2010; Druss et al., 2001)
Smoking assist	5.46 (0.07–415.93)	0.440	90	196	2 (Osborn et al., 2010; Rubin et al., 2005)
Nutrition advice	1.88 (0.33–10.76)	0.480	34	139	2 (Osborn et al., 2010; Druss et al., 2001)
Physical activity advice	3.49 (1.60–7.60)	0.002	0	133	2 (Osborn et al., 2010; Druss et al., 2001)

rated as having a 'high' risk of bias and two (Druss et al., 2001; McFall et al., 2005) as 'some concerns' (Fig. 2).

3.4.2. Non-randomised studies

Three (Maki and Bjorklund, 2013; McKenna et al., 2014; O'Callaghan et al., 2011) of the six non-randomised studies were assessed as being of overall 'serious' risk of bias and three (Bartlem et al., 2016; Dixon et al., 2009; Wye et al., 2017) as 'moderate' (Supplementary Material 5).

3.4.3. Pre-post studies

Two (Chen et al., 2018; Prochaska et al., 2008) pre-post studies were assessed as overall being of 'good' quality, four (Carrillo et al., 2017; Scharf et al., 2011; Muladore et al., 2018; Etter et al., 2008) 'fair', and four (Chen et al., 2018; Green et al., 2018; Greenwood and Shiers, 2016; Huddleston et al., 2018) 'poor' (Supplementary Material 6).

3.5. Effects of interventions

Table 3 summarises primary outcome findings. Table 4 presents meta-analysis results and Supplementary material 3 contains quality of evidence (GRADE) assessments.

3.5.1. Smoking

3.5.1.1. Ask. One RCT assessed the impact of an intervention on 'ask' for smoking (Osborn et al., 2010). The study reported a positive effect of a task shifting intervention (shifting the responsibility to perform tasks from one group of healthcare providers to another group, individual provider, or service) involving the employment of a nurse to either provide, or encourage treating clinicians to provide, preventive care (supported by additional implementation strategies), as compared to usual care plus minimal intervention. Findings of the non-randomised studies were mixed, with two (Wye et al., 2017; O'Callaghan et al., 2011) of the five (Bartlem et al., 2016; Prochaska et al., 2008; Wye et al., 2017; McKenna et al., 2014; O'Callaghan et al., 2011) reporting a positive intervention effect on 'ask'; with strategies in common across effective interventions being health information systems and local consensus processes. One of these studies did not conduct statistical testing on outcome measures (receipt of 'ask': 78% in a service that received a task shifting intervention vs 2% in a service that did not) (McKenna et al., 2014). Two (Carrillo et al., 2017; Correa-Fernández et al., 2018) of the six (Carrillo et al., 2017; Correa-Fernández et al., 2018; Maki and Bjorklund, 2013; Green et al., 2018; Greenwood and Shiers, 2016; Huddleston et al., 2018) pre-post studies reported a positive intervention effect on 'ask', with strategies in common across effective interventions being educational meetings and authority and accountability for quality of practice. The remaining four did not conduct statistical testing, with the absolute differences in 'ask' between pre and post interventions ranging from -15% to +17% (Maki and Bjorklund, 2013; Green et al., 2018; Greenwood and Shiers, 2016; Huddleston et al., 2018).

3.5.1.2. Assess. Two non-randomised studies examined 'assess' (Prochaska et al., 2008; Wye et al., 2017). One reported a positive effect of an intervention adopting multiple implementation, delivery, and governance strategies (Wye et al., 2017), the other found no

positive intervention effect of educational meetings alone (Prochaska et al., 2008). One pre-post study reported a positive intervention effect of multiple implementation and governance strategies (Correa-Fernández et al., 2018).

3.5.1.3. Advice. Two RCTs examined smoking 'advice' (Osborn et al., 2010; Druss et al., 2001) with both testing interventions involving task shifting (supported by additional strategies, Table 2), as compared to usual care (Druss et al., 2001) or usual care plus minimal intervention (Osborn et al., 2010). Meta-analysis of these studies (n = 2) indicated an overall positive intervention effect on 'advice' (OR 3.03, 95% CI: 1.31–6.97; p = 0.009; GRADE: low quality of evidence). Two (Prochaska et al., 2008; Wye et al., 2017) of the three (Bartlem et al., 2016; Prochaska et al., 2008; Wye et al., 2017) non-randomised studies reported a positive intervention effect, with educational meetings being the only intervention strategy tested in both studies. The third study did not find a positive effect of multiple implementation and governance strategies (Bartlem et al., 2016). Two (Correa-Fernández et al., 2018; Etter et al., 2008) of three (Correa-Fernández et al., 2018; Etter et al., 2008; Huddleston et al., 2018) pre-post studies reported a positive intervention effect on all measures of smoking 'advice', with educational meetings and authority and accountability for quality of practice tested in both. The third did not conduct statistical testing, reporting a 35% absolute increase in receipt of 'advice' following an intervention involving authority and accountability of practice and care pathways (Huddleston et al., 2018).

3.5.1.4. Assist. Three RCTs examined smoking 'assistance' (Osborn et al., 2010; McFall et al., 2005; Rubin et al., 2005). Meta-analysis of two similar interventions (both involving task shifting and communication between providers) found no overall positive effect (OR 5.46, 95% CI: 0.07–415.93; p = 0.44; GRADE: very low quality of evidence) compared to usual care (Rubin et al., 2005) or usual care plus minimal intervention (Osborn et al., 2010). The third RCT reported a positive effect of an educational meeting and reminder intervention, as compared to usual care (McFall et al., 2005). Both non-randomised studies reported a positive intervention effect, one testing educational meetings alone (Prochaska et al., 2008), and the other educational meetings plus additional implementation strategies (Wye et al., 2017). Three (Chen et al., 2018; Correa-Fernández et al., 2018; Etter et al., 2008) of six (Chen et al., 2018; Correa-Fernández et al., 2018; Muladore et al., 2018; Etter et al., 2008) pre-post studies examining 'assist' reported a positive effect, with use of educational meetings being in common across effective interventions. One did not find a positive effect of educational meetings and materials (Muladore et al., 2018). The remaining two did not conduct statistical testing, reporting absolute differences from pre to post intervention of 0% (Greenwood and Shiers, 2016) and 29% (Huddleston et al., 2018) in receipt of 'assist'.

3.5.1.5. Arrange. Two RCTs examined 'arrange' for smoking, however these were unable to be pooled in a meta-analysis due to non-comparable interventions. The first found no positive effect of task shifting (supported by additional implementation strategies, Table 2), as compared to educational materials (Osborn et al., 2010). The second trial reported a positive effect of educational materials and reminders

on 'arrange' (McFall et al., 2005). Three (Dixon et al., 2009; Prochaska et al., 2008; Wye et al., 2017) of the four (Bartlem et al., 2016; Dixon et al., 2009; Prochaska et al., 2008; Wye et al., 2017) non-randomised studies reported a positive effect, with educational meetings being the only common intervention strategy across the three studies. The fourth study did not find a positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016). Three of the four pre-post studies reported a positive effect; common strategies were authority and accountability for quality of practice and educational meetings (Carrillo et al., 2017; Correa-Fernández et al., 2018; Scharf et al., 2011). The fourth pre-post study did not conduct statistical testing on outcome measures (receipt of 'arrange' being 7% prior vs 17% post intervention) (Huddleston et al., 2018).

3.5.2. Nutrition

3.5.2.1. *Ask*. One non-randomised study examined an intervention to increase 'ask' for nutrition, finding no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.2.2. *Assess*. No studies examined 'assess'.

3.5.2.3. *Advice*. Two RCTs assessed 'advice' and were combined in meta-analysis (Osborn et al., 2010; Druss et al., 2001). Both tested interventions involving task shifting (supported by additional strategies), finding no overall positive effect (OR 1.88, 95% CI: 0.33–10.76; $p = 0.48$; GRADE: low quality of evidence); as compared to usual care (Druss et al., 2001) or usual care plus minimal intervention (Osborn et al., 2010). One non-randomised study examined 'advice', reporting no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.2.4. *Assist*. No studies examined 'assist'.

3.5.2.5. *Arrange*. One non-randomised study examined 'arrange', reporting no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.3. Alcohol

3.5.3.1. *Ask*. Two studies, being non-randomised studies, assessed 'ask' for alcohol (Bartlem et al., 2016; O'Callaghan et al., 2011). One reported a positive effect of an intervention involving health information systems and local consensus processes (absolute increase: 24%; $p < 0.001$) (O'Callaghan et al., 2011), the other found no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.3.2. *Assess*. No studies examined 'assess'.

3.5.3.3. *Advice*. One non-randomised study found no positive effect on 'advice' of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.3.4. *Assist*. One RCT examined the impact of an intervention on 'assist', finding no positive effect of an intervention involving task shifting and communication between providers (Rubin et al., 2005).

3.5.3.5. *Arrange*. One study, a non-randomised study, examined 'arrange', finding no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.4. Physical activity

3.5.4.1. *Ask*. Two non-randomised studies assessed 'ask' for physical activity (Bartlem et al., 2016; Maki and Bjorklund, 2013). The first reported no positive effect of multiple implementation, delivery, and

governance strategies (Bartlem et al., 2016). The other did not conduct statistical testing, reporting receipt of 'ask' as 43% in a service that received a task shifting intervention vs 2% in a service that did not (Maki and Bjorklund, 2013).

3.5.4.2. *Assess*. No studies examined 'assess'.

3.5.4.3. *Advice*. Meta-analysis of the two RCTs examining 'advice' (both testing 'task shifting', supported by additional strategies) found an overall positive intervention effect (OR 3.49, 95% CI: 1.60–7.60; $p = 0.002$; GRADE: low quality of evidence); compared to usual care (Druss et al., 2001) and usual care plus minimal intervention (Osborn et al., 2010). One non-randomised study examined 'advice', reporting no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.4.4. *Assist*. No studies examined 'assist'.

3.5.4.5. *Arrange*. One non-randomised study examined 'arrange', reporting no positive effect of multiple implementation, delivery, and governance strategies (Bartlem et al., 2016).

3.5.5. Secondary outcomes

3.5.5.1. *Client risk behaviours*. Four studies examined client risk behaviours (Carrillo et al., 2017; Dixon et al., 2009; Druss et al., 2001; McFall et al., 2005). Two conducted examined smoking (one RCT McFall et al., 2005) and one non-randomised study (Dixon et al., 2009), reporting a positive effect on all relevant measures. One additional study did not conduct statistical testing, reporting that at baseline, 39% of clients were currently smoking and smoked an average of 20.6 (SD 16.80) cigarettes daily, compared to 44%, and 15.2 (SD 12.5) post intervention (Carrillo et al., 2017). One study (an RCT) examined alcohol consumption, finding no positive intervention effect (Druss et al., 2001). No studies reported outcomes pertaining to physical activity or nutrition.

3.5.5.2. *Cost of interventions*. Three studies reported intervention cost outcomes; all expressed as a cost per participant (in USD). One study reported the implementation costs for the intervention (educational meetings) was \$139 per clinician trained in providing preventive care (Prochaska et al., 2008). The other two studies compared the average cost per participant between an intervention and usual care; finding no significant differences in terms of total hospital costs (Rubin et al., 2005), preventive care services received (Druss et al., 2001), and primary care costs (Druss et al., 2001).

4. Discussion

This is the first systematic review to examine the effectiveness of interventions in increasing the provision of preventive care in mental health services by preventive care element and risk behaviour, and for all clients irrespective of mental health diagnosis. Intervention strategies with demonstrated effectiveness across studies were: task shifting, educational meetings, health information systems, local consensus processes, authority and accountability, and reminders. These strategies should be considered for inclusion in future interventions to support mental health services in providing preventive care. A small number of studies examined client behaviour change, finding positive effects regarding smoking cessation, though not alcohol consumption. Cost outcomes were examined by few studies, highlighting a need for future research in this area.

When considering results by risk behaviour, findings regarding smoking were the most consistent across studies, with 14 of the 15 studies which conducted significance testing finding a positive intervention effect on at least one smoking care outcome. Further, meta-analysis indicated there was low quality evidence that interventions

testing task shifting were effective in increasing smoking ‘advice’, though not ‘assist’. Narrative synthesis provided further support for the effectiveness of other intervention strategies (including educational meetings, authority and accountability for quality of practice, health information systems, and local consensus processes); with 59 of 74 (80%) smoking care analyses demonstrating a positive intervention effect. This finding represents a greater proportion of analyses with a positive effect compared to a previous systematic review of interventions to increase preventive care in general health settings (20 of 82; 24%; McElwaine et al., 2016). This potential greater degree of effectiveness of interventions in mental health compared to general health settings may be due to the significant role that smoking has played in the culture of mental health setting (Lawn and Campion, 2013; Ragg and Ahmed, 2008). The increasing acknowledgement of the importance of addressing smoking among people with a mental illness has led to a progressive shift in the number of guidelines, smoke-free policies, and resources available to support a culture change in mental health settings to support smoking cessation (Firth et al., 2019; Royal Australian College of General Practitioners, 2014; Ragg and Ahmed, 2008). This is similarly reflected in an exponential growth in the number of studies examining tobacco smoking among people with a mental illness (Metse et al., 2017).

Fewer interventions examined preventive care for nutrition ($n = 3$), alcohol ($n = 3$), or physical inactivity ($n = 4$); and these studies demonstrated either conflicting results or limited evidence of positive intervention effects. The inconsistent findings and small number of studies examining these risk behaviours as compared to tobacco smoking may be due to these risk behaviours historically not being a focus in mental healthcare (Firth et al., 2019). However, evidence supports the considerable contribution of these risks to the disproportionate chronic disease mortality and morbidity among people with mental illness (Lim et al., 2012; O’Brien, 2005). Further research is needed to investigate intervention effectiveness for these other key risk behaviours and should evaluate whether the strategies with demonstrated effectiveness in increasing care for smoking (educational meetings, authority and accountability for quality of practice, health information systems, and local consensus processes) are also effective for the other risks. These strategies should address the challenge of including these risks as a new and additional focus of care delivery (Dunbar et al., 2010; Happell et al., 2012). For example, educational meetings could be trialled to provide education to mental health clinicians specifically regarding the importance of addressing these risks to improve both physical and mental health (Taylor et al., 2014; Mechling and Arms, 2019; Stanton et al., 2015; Ashdown-Franks et al., 2019).

A paucity of research examined interventions to increase multiple elements of preventive care. Notably, half of the included studies examined only one element of care. Recent research has suggested that provision of all elements of preventive care is significantly more effective in producing positive behaviour change for the four risk behaviours, as compared to provision of some or only individual care elements (Bartlem et al., 2019). This suggests a need to identify effective intervention strategies to support the implementation of best practice preventive care, rather than select care elements.

4.1. Strengths and limitations

This review employed broad inclusion criteria, enabling a comprehensive synthesis of previous research. Findings of the review may be limited due to the inconsistency in the terminology used to describe both care elements and intervention strategies within included studies, which may be contributed to by the large number of search terms used to capture all relevant studies. This inconsistency required reviewers to infer classifications using published definitions. Such an approach may limit conclusions regarding the effectiveness of specific intervention strategies. However, this variability reflects the complexity of implementation research (Waltz et al., 2019). The use of consistent

terminology (Effective Practice and Organisation of Care EPOC, 2015) and utilising systematic and theory-based approaches (e.g. the ‘Theoretical Domains Framework’) to select appropriate intervention strategies that align with the specific barriers and facilitators relevant to particular settings (Atkins et al., 2017) is recommended for future practice change interventions.

Meta-analysis was only possible for four preventive care outcomes, and then only with a small number of included studies. Including a small number of studies in random effect meta-analysis contributes to reduced power (Guolo and Varin, 2017); reflected in the wide confidence intervals for one of the meta-analysed outcomes (smoking assist) (Valentine et al., 2010). Despite these limitations, the meta-analysis provides meaningful information, particularly given the limitations of other methods of synthesis, though should be interpreted with caution (Valentine et al., 2010). Review findings should be considered in the context of the low or very low assessments of quality of the cumulative evidence (assessed for the meta-analysed outcomes), largely due to risk of bias and imprecision. Findings are further qualified by the high risk of bias across all study designs.

Finally, exploration of intervention effects by type of mental health service was constrained, as included studies were conducted in a limited range of settings (primarily specialised community mental health services). No studies were conducted in community managed organisations, which is in contrast with their growing role in providing mental health care and support (Ridoutt et al., 2014). Given the previously acknowledged diversity between the different types of community managed organisations (National Mental Health Strategy, 2010; Ridoutt et al., 2014), different intervention approaches may need to be developed to match the needs of individual services. Future research should also explore if interventions differentially affect the care delivered to clients across mental health conditions, given that chronic disease morbidity and mortality differs by diagnosis (being the highest for severe conditions such as schizophrenia and psychosis) (Walker et al., 2015).

5. Conclusion

The effective intervention strategies identified in this review (task shifting, educational meetings, health information systems, local consensus processes, authority and accountability, and reminders) should be considered in the development of future interventions and service delivery initiatives to enhance the provision of preventive care by mental health services. Given the variable findings across risk behaviours, further rigorous research is required to examine the effectiveness and cost-effectiveness of interventions to increase the provision of comprehensive preventive care for all four key risk behaviours. Despite such limitations, the findings provide evidence for policymakers and service providers regarding effective intervention strategies to address the physical health inequity experienced by this underserved population.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author contribution

CF led the review and manuscript preparation. CF, KB, JW, JBo, and RH contributed to the conception and design of the study. CF conducted the study search. CF, RH, JD, JBa, MW, ES, TCM, and TR contributed to data acquisition. CF and RH conducted study synthesis and analyses. All authors contributed to critical revision of the manuscript and approved the version to be published.

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This work used published data therefore ethical approval was not required.

Consent statement

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Data availability

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Appendix A. Supplementary data

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