

SUICIDE PREVENTION

An evidence review 2015



Lucy Dillon
Ciara Guiney
Louise Farragher
Anne McCarthy
Jean Long

Published by:

Health Research Board, Dublin
© Health Research Board 2015

Copies of this report can be obtained from:

Health Research Board
Grattan House
67-72 Lower Mount Street
Dublin 2
Ireland

t 353 1 234 5000
f 353 1 661 2335
e hrb@hrb.ie
w www.hrb.ie

Contents

List of tables	3
List of figures	3
Foreword	5
Acknowledgements	6
Acronyms and abbreviations	7
List of statistical terms	8
Executive Summary	9
1 Introduction	16
1.1 Background	16
1.2 Research questions	16
2 Methods	18
2.1 Search strategy	18
2.2 Search results	20
2.3 Quality assessment and data extraction	20
2.4 Review limitations	21
2.5 Structure of the report	22
3 Suicide Prevention Interventions: Review evidence	26
3.1 Means restriction	26
3.2 Media guidelines	32
3.3 Gatekeeper training	34
3.4 Screening	35
3.5 Psychosocial	39
3.6 Telemental health	58

3.7	Web-based suicide prevention	61
3.8	Emergency Department	63
3.9	School-based interventions	65
3.10	Veterans and military personnel	76
4	Conclusions	80
4.1	Interventions	80
4.2	Challenges in researching suicide prevention interventions	84
4.3	RCTs and meta-analysis	85
4.4	Concluding statement	85
Appendix 1	NICE Guideline References	88
Appendix 2	Literature search	89
Appendix 3	Quality assessment tool	90
Appendix 4	Quality ratings	99
References		104

List of tables

Table 1: Interventions covered, and the associated reviews discussed in this umbrella review	26
Table 2: Reviews on means restriction	27
Table 3: Reviews on screening	36
Table 4: Psychosocial reviews, review analysis type, interventions covered, and quality rating	40
Table 5: Telemental health reviews	59
Table 6: Reviews on school-based interventions	65
Table 7: Comparison reviews	80
Table 8: Literature search to address the research question	89
Table 9: Papers by intervention type with quality rating	99
Table 10: Summary of quality ratings	101

List of figures

Figure 1: Flow chart of searches and screening process	19
--	----

Foreword

In Ireland almost 10 people died by suicide every week in 2012; a total of 507 people according to the National Suicide Research Foundation. Given these figures, the need to focus on measures to reduce suicide seems obvious. But suicide is a complex phenomenon and there is no simple cause–effect relationship that explains why people take their own life.

However, many suicides are preventable. The World Health Organization suggests that a systematic way of developing a national response to suicide is to create a national suicide prevention strategy, which indicates a government’s clear commitment to dealing with the issue of suicide. Typically, national suicide prevention strategies combine a range of prevention strategies, and it is important that these are based on the best current evidence and that the evidence base is built upon over time.

But to have success and focus resources in areas that will have impact, it is essential to review what actually works. That is why the HSE National Office for Suicide Prevention asked the Health Research Board to review the evidence that is available in relation to suicide prevention interventions. It wants this evidence to underpin their new Strategic Framework for Suicide Prevention, 2015–18.

In this report, the HRB identifies suicide prevention interventions that have weak, moderate- or good-quality evidence that they actually reduce suicidal behaviours such as suicidal ideation, self-harm, suicide attempts or deaths by suicide. The HRB also presents suggestions for adding to and strengthening the evidence base on suicide prevention.

I hope that this report will strengthen the evidence base for suicide prevention and in conjunction with the strategic framework, help reduce the number of people dying by suicide in the future.



Graham Love
Chief Executive

Acknowledgements

The authors would like to thank Mr Gerry Raleigh at the National Office of Suicide Prevention in the Health Service Executive for commissioning the review. We greatly appreciate the valuable input provided by Professor Siobhan O'Neill, Ms Susan Kenny and Professor Ella Arensman. We are very grateful to our peer reviewers: Professor Siobhan O'Neill and Professor Stephen Platt for their valuable insights and comments. Finally, we would like to thank the Health Service Executive for funding this important review.

Acronyms and abbreviations

Acronym	Full text
CAMS	Collaborative Assessment and Management of Suicidality
CARE	Care, Assess, Respond, Empower
CAST	Coping and Support Training
CBT	Cognitive Behavioural Therapy
C-CARE	Counselors CARE
CDS	Community-based Depression Screening
CG	Control Group
DBT	Dialectic Behavioural Therapy
ED	Emergency Department
GBG	The Good Behaviour Game
GP	General Practitioner
HRB	Health Research Board
HSE	Health Service Executive
iCBT	Internet Cognitive Behavioural Therapy
IG	Intervention Group
IMPACT	Prevention of Suicide in Primary Care Elderly: Collaborative Trial
MACT	Manual assisted Cognitive Behavioural Therapy
NOSP	National Office for Suicide Prevention
NNT	Number Needed to Treat
PGC	Personal Growth Class
PROSPECT	Improving Mood – Promoting Access to Collaborative Treatment
PSI	Index of Potential Suicide
QAT	Quality Assessment Tool
QPR	Question, Persuade, Refer
RCT	Randomised Control Trial
RY	Reconnecting Youth
SNAP	Successful Negotiation Acting Positively
SOS	Signs of Suicide
STEPPS	Systems Training for Emotional Predictability and Problem Solving
TAU	Treatment as Usual
TBI	Traumatic Brain Injury
TG	Treatment Group
TMH	Telemental Health
UK	United Kingdom
USA	United States of America
WHO	World Health Organization
YST	Youth-nominated Support Team

List of statistical terms

Abbreviation	Full text
CG	Control Group
CI	Confidence Interval
d	Cohen's measure of effect size
df	Degrees of freedom
F	F-test or Fisher's F-ratio
HR	Hazard ratio
I2	I2 Index
IRR	Incident Risk Ratio
M	Mean
MD	Mean deviation
MIRR	Media Incident Rate Ratio
n	Sample size
OR	Odds Ratio
p	Probability of significance
RR	Risk Ratio or Relative Risk
SD	Standard deviation
SMD	Standardised mean difference
t	T-test
χ^2	Chi-Squared

Executive summary

The National Office for Suicide Prevention (NOSP) of the Mental Health Division of the Health Service Executive (HSE) is developing a new strategic framework for suicide prevention (2015–18). This new strategic framework will where possible be based on best national and international evidence. We at the Evidence Centre of the Health Research Board (HRB) were commissioned by the NOSP to carry out a review of the evidence base for suicide prevention. In this report, we present our findings from a review of reviews, seeking to answer two research questions:

1. Which suicide prevention interventions have been evaluated in the published literature?
2. For which prevention interventions is there good-quality evidence that they reduce suicidal behaviours (measured by a decrease in completed suicides, suicide attempts, (deliberate) self-harm or suicidal ideation)?

Methods

Given the short timeframe available (June to September 2014) and the significant body of literature that exists in the field of suicide prevention, in consultation with the NOSP, we decided to focus resources on doing a review of existing peer-reviewed papers that used systematic review methods. Therefore this report is a review of reviews. The methodology reflects many of the steps associated with a systematic review: an explicit search strategy, inclusion and exclusion criteria, a quality assessment process, and a structured data extraction tool. However, our review was not a systematic review and there were a number of limitations including our strict inclusion/exclusion

criteria, our single-researcher quality assessment process, and analysing summarised reviews rather than detailed primary papers.

Based on a systematic search using key terms and following full screening by two researchers, 47 reviews were found that met our inclusion criteria. The 47 papers were assessed for quality – 33 were assessed to be of ‘strong’ or ‘moderate’ quality and 14 to be of ‘weak’ quality. We extracted data from all the ‘moderate’ and ‘strong’ reviews (n=33). We also extracted data from one review assessed as ‘weak quality’ as it was the only review assessing the specific intervention. Therefore, 34 studies are included in our review of reviews, some of which covered more than one intervention. Five other international reviews are used in our conclusion chapter to compare and contrast our findings with those of other international reviews on the topic; these are referred to as ‘comparison reviews’ (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014; WHO, 2014).

Interventions

Means restriction (four reviews)

Means restriction is a population-based approach to preventing suicide. The premise upon which it is based is that restricting access to various means, for example firearms, bridges, railways, cliffs, rural roads, drugs and pesticides, can prevent completed suicide. Six reviews on means restriction were assessed for quality – four were included in this review. We found that means restriction, in particular, barriers, reduces the incidence of suicide (Cox et al., 2013; Hahn et al., 2005; Kryszynska and De Leo, 2008; Pirkis et al., 2013).

Other means restriction interventions may be effective but the evidence for these is limited and in some cases weak and would need more stringent investigation to determine their exact impact. Our findings are for the most part consistent with the conclusions of four of the comparison reviews (du Roscoät and Beck, 2013; Mann et al., 2005; Teuton et al., 2014; WHO, 2014). However, our finding that restricting access to firearms may be effective is in contrast to the conclusions put forward by Scott and Guo (2012) who argued that this evidence is inconclusive.

Media guidelines (one review)

In some countries guidelines have been developed for media professionals to follow in the reporting of suicide. The premise upon which this prevention intervention is based is that media reporting of suicides can contribute to the phenomenon of imitative suicides. One review of media guidelines as a suicide prevention strategy was assessed for quality and was included in our review (Bohanna et al., 2012). These reviewers acknowledged that there was only limited evidence that the implementation of media guidelines impacts on suicide rates. This evidence came from experience in one country (Austria), where a cohesive intervention was put in place and there was a good level of compliance by media. While there was a suggested link between the introduction of media guidelines and changes in national suicide rates in primary studies in other countries, this was not backed by stringent research. Such changes are suggestive, but not necessarily a result, of the implementation of media guidelines only. The changes could be explained by any of a number of other factors, such as the

introduction of other interventions to prevent suicide. Our findings concur with those of the comparison reviews, which also found the evidence for the impact of media guidelines on suicidal behaviour to be largely inconclusive (Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014). Our and other comparison reviews also identified a gap in the evidence on how to deal with the issue of how suicide is addressed on the internet (Mann et al., 2005; Teuton et al., 2014; WHO, 2014).

Gatekeeper training (one review)

Gatekeeper training teaches people how to identify those at risk of suicide and how to refer them for treatment. One review of gatekeeper training as a suicide prevention strategy was assessed for quality and included in this review (Isaac et al., 2009). There is limited evidence to suggest that gatekeeper training on its own may impact on suicidal behaviour. However, where evidence exists, it is based on the gatekeepers' impact as part of a multi-faceted strategy to prevent suicide. Therefore, it is difficult to ascertain what role gatekeeper training specifically may play in reducing suicidal behaviour outcomes. Reductions may be as a result of other suicide prevention interventions, the particular combination of interventions, or a change in the circumstances that led to high rates of suicide. This finding is supported by the comparison reviews (Mann et al., 2005; Teuton et al., 2014; WHO, 2014). The training of primary care physicians in gatekeeping was identified as a promising intervention in both our and some of the comparison reviews (du Roscoät and Beck, 2013; Mann et al., 2005).

Screening (four reviews)

A screening programme involves the use of a psychometrically validated screening instrument that is able to identify those at risk of suicide, and referral to treatment (Pena et al, 2006). Where screening programmes are of a 'general' population, people previously unidentified as being at risk of suicide are the target of screening. Elsewhere, programmes are targeted at a population known to be at higher risk of suicide, for example older people or socially excluded young people. Four reviews evaluated the effect of screening on suicidal behaviour outcomes. Reports on the impact of screening on suicidal behaviours showed mixed results and were based on relatively weak methods. The evidence suggests that screening might have an impact on suicidal behaviour outcomes where screening of a high-risk population and good access to follow-up care occur in tandem. As with gatekeeper training, this raises the question of attribution. It is not possible to isolate the impact of the screening process from the follow-up intervention. Where the evidence is available, it suggests that screening does not bring about any harmful effects, but this needs more research with specific populations. The two comparison reviews that examined the evidence for screening (Mann et al., 2005; Teuton et al., 2014) came to similar conclusions.

Psychosocial interventions (13 reviews)

Psychosocial interventions cover a wide range of activities. Broadly speaking they fall into two categories:

- Psychotherapeutic interventions: These include, among many others, cognitive behavioural therapy (CBT), dialectic behavioural therapy (DBT), problem-solving therapy,

interpersonal psychotherapy, family behaviour therapy, in-patient behaviour therapy and supportive counselling.

- Enhanced care/outreach/follow-up: These are interventions designed primarily to support those at risk of suicide in accessing and maintaining contact with services. Strategies include follow-up postcards, 24-hour emergency access to psychiatric services, and home visits.

Thirteen reviews were found that were assessed to be of strong or moderate quality. Overall, the evidence for psychosocial interventions is mixed. Within the two broad categories of interventions there is a wide variety of interventions. Even where reviews drew on roughly the same set of primary studies, they varied in how they categorised interventions and, in some cases, populations. Interventions that were categorised together often varied greatly in the content of the interventions, the length of intervention, the mode of delivery and the target population. It was beyond the scope of our review to address these definitional issues in detail and it presented challenges when interpreting this body of evidence as a whole. Therefore, at best we can only make statements about which interventions look promising.

Psychotherapy

CBT and DBT are the psychotherapies for which there is the best, albeit limited, evidence for impacting on reducing suicidal behaviour. While the findings suggested that CBT (in its widest sense) might have a significant effect on reducing suicidal behaviour, it was unclear which forms of CBT were most

effective for which populations. The evidence for DBT was limited to people, mainly women, with borderline personality disorder. There was no evidence that this finding was generalisable beyond this population. Other suicide prevention interventions where the available evidence indicated they were potentially promising were problem-solving therapy and family therapy. Broadly speaking, our conclusions are the same as those of the comparison reviews (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012). However, Mann and colleagues and Teuton and colleagues (2014) stated that ‘intensive care plus outreach’ show promise as a suicide prevention intervention.

Enhanced care/outreach/ follow-up

The evidence across the different types of enhanced care interventions is inconclusive. We found mixed evidence for the impact of both ‘emergency cards’ giving people 24 hour access to care, and follow-up or enhanced care interventions that involved contact in person, either by telephone or by postcards. The comparison reviews found similarly mixed evidence (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014). Overall, while the evidence is inconclusive, this may be due to poor quality research rather than the ineffectiveness of the intervention; further research is warranted.

Telemental health (two reviews)

Telemental health (TMH) has been used in numerous countries as a way of providing mental health care predominantly in psychiatric facilities. It is defined as the use of ‘communications

networks for delivery of healthcare services and medical education from one geographical location to another’ (Soot et al., 2006). Two reviews of this type of intervention were assessed to be of strong/moderate quality – one focused on telemental health interventions specifically (Hailey et al., 2008), the other on telephone counselling as part of a broader review of interventions for older people (Lapierre et al., 2011). There was encouraging albeit limited evidence indicating that TMH is a prevention strategy that results in positive clinical mental health outcomes. However, only two primary studies examined suicidal outcomes, and only one demonstrated a reduction in suicide rates, among females. Although this outcome is promising, it would be difficult to draw strong conclusions regarding the impact of TMH on suicidal outcomes; further investigation is necessary to determine the exact nature of the impact. Other comparison reviews similarly found the evidence inconclusive (du Roscoät and Beck, 2013; Teuton et al., 2014).

Web-based interventions (one review)

The premise upon which this prevention intervention is based is that individuals who are vulnerable to suicide frequently access web-based resources as a source of support. One review was found that examined the impact of web-based interventions in preventing suicide (Lai et al., 2014). The reviewers found preliminary evidence suggesting that web-based interventions may be beneficial in helping to reduce suicidal behaviours. The interventions examined were Internet Cognitive Behavioural Therapy (iCBT) and internet-based, as opposed to face-to-face-based, ‘suicide

survivor' groups. The primary studies were three randomised control trials (RCTs) and one pre- and post-treatment case series. Web-based strategies for suicide prevention have only emerged recently, and therefore many of the comparison reviews did not evaluate the method. The WHO (2014) review authors suggested that the internet and social media might be used more in suicide prevention; further high-quality RCTs are necessary to determine the exact impact of web-based suicide prevention strategies.

Emergency Department (one review)

Hospital emergency departments have been identified as important settings for evaluating and alleviating suicidal emergencies and instigating follow-up care to reduce suicidal symptoms (Larkin et al., 2008). The premise upon which this prevention intervention is based is that providing care and support in emergency departments via, for example, assessment by psychiatric clinician, review of treatments and expectations, and adherence to treatment, can influence whether completed suicide occurs. Only one review on suicide prevention in emergency departments was found; it focused on interventions for young people.

We found that research on the effectiveness of emergency department suicide prevention programmes is promising. Newton et al. (2010) suggested that care that is initiated in the emergency department or continued post emergency department discharge results in reduced suicidal behaviours and improved adherence by young people to treatment. They emphasised the importance of including assessment, disposition planning, adherence, and

problem-solving outcomes. We would agree with Newton and colleagues' suggestion that further investigation is necessary across multiple settings to determine the exact impact of emergency department-based suicide intervention programmes.

School-based/youth strategies (eight reviews)

The school environment is considered an obvious and appropriate setting for the delivery of suicide prevention programmes (Hawton et al., 2002; Robinson et al., 2011). The premise upon which this prevention intervention is based is that providing programmes in schools, for example knowledge and awareness, gatekeeper training, curriculum-based programmes, screening, skills training and/or peer leadership, can influence whether completed suicide occurs. Some programmes took a multi-faceted approach, delivering a number of interventions within the one programme. Eight reviews examined school-based programmes, none of which carried out a meta-analysis.

All eight reviews concluded that there is a lack of evidence for the effectiveness or ineffectiveness of school/curricula-based suicide prevention and post-vention programmes in impacting on suicidal behaviour. The review authors highlighted the necessity for further research to determine the exact impact of school-based intervention and post-vention programmes and we support this suggestion. Our findings are consistent with the findings of the comparison reviews (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014). Generally, it is considered difficult to draw conclusions in

this setting as programmes are not evidenced-based nor do they evaluate effectiveness of the programmes in reducing rates of suicide or other suicidal behaviours (Mann et al., 2005). Despite this, there is some evidence suggesting that a multi-component approach in schools may be beneficial in developing protective factors and reducing suicidal attempts and tendencies (Wasserman et al., 2014, in press, cited in Scott and Guo, 2012 and WHO, 2014). Importantly, many of the reviews that assessed the effectiveness of suicide prevention programmes in young people had been carried out in different countries and hence, their suitability in an Irish context remains to be seen.

Military personnel and veterans (one review)

Prevention programmes have been specifically designed for and delivered to veterans and military personnel. One review was found that addressed interventions delivered to this 'at-risk' population (Bagley et al., 2010). We found the evidence for interventions with military personnel and veterans to be inconclusive. There were numerous methodological limitations to the primary studies in the review. Despite this, the limited evidence suggests that a multi-faceted programme involving a range of different interventions may be required for this population. The only comparison review to discuss this intervention was based on the same study and came to the same conclusion, although they appeared less concerned about the quality of the primary studies (Scott and Guo, 2012).

Conclusions

Overall our umbrella review found the body of evidence on suicide prevention

interventions limited. However, a small evidence base does not mean that interventions in this field are necessarily ineffective, rather that there is little review-level evidence that they work.

A number of challenges in carrying out research on the impact of suicide prevention interventions on suicidal behaviour were identified in the reviews considered in this umbrella review:

- the attribution of reductions in suicide behaviours to one particular intervention, in a context where there may be other factors at play;
- death by suicide is a relatively rare event and studies to determine if an intervention significantly reduces the numbers of completed suicides requires very large sample sizes;
- the ability to generalise the findings of an intervention implemented in a particular context and with a specific population to other populations in different contexts appears limited;
- a lack of consistency across studies as to what constitutes 'treatment as usual'; and
- inconsistency in definitions of interventions and outcomes.

There is a need for high-quality, rigorous research to be carried out using adequately powered RCTs if we are to identify the true impact of suicide prevention interventions on suicidal behaviour. Where meta-analysis is to be carried out, it needs to be methodologically sound and based on comparable interventions.

The lack of review-level evidence in the Irish context highlights the need for national research, and careful consideration on the generalisability of the existing evidence to the Irish context.

Introduction

1 Introduction

This report presents the findings of a review of reviews on suicide prevention interventions, carried out by a team at the Evidence Centre of the Health Research Board (HRB).

1.1 Background

The National Office for Suicide Prevention (NOSP) of the Mental Health Division of the Health Service Executive (HSE) is developing a new strategic framework for suicide prevention (2015–18), leading on from *Reach Out*, the current National Strategy for Action on Suicide Prevention 2005–2014. The objective is to identify a set of priority actions which will contribute to reducing suicidal behaviour in Ireland. Key to the new strategic framework is that it be based on the best national and international evidence on suicide prevention interventions. The Evidence Centre of the HRB was commissioned by the NOSP to carry out a review of this evidence. This report presents the findings of the review.

1.2 Research questions

The aim of this review is to provide the NOSP with the best available evidence on the effectiveness of suicide prevention interventions. To meet this aim there are two main research questions:

Question 1: Which suicide prevention interventions have been evaluated in the published literature?

The review focuses on prevention interventions explored in systematic

reviews of meta-analysis papers. It does not consider primary studies or evidence from pharmaceutical clinical trials or other papers on pharmacological interventions. However, we provide references to NICE guidelines on the treatment and management of psychiatric conditions, including guidelines on pharmaceutical interventions – see Appendix 1.

Question 2: For which prevention interventions is there good-quality evidence that they reduce suicidal behaviour?

Central to answering this question is assessing the quality of the available evidence. While research on suicide prevention focuses on a range of outcomes, the review focuses on those outcomes related to the NOSP's definition of suicidal behaviour as 'the spectrum of activities related to suicide including suicidal thinking, self-harming behaviours not aimed at causing death, and suicide attempts' (NOSP, 2012). The outcomes of interest for the review were:

- completed suicide,
- suicide attempts,
- (deliberate) self-harm, and
- suicidal ideation.

The following chapters report on the approach taken to carrying out the review, the findings, and some concluding comments comparing our findings with those of some other key reviews on the same topic and discussing some methodological limitations to research in the area.

Methods

2 Methods

In order to answer the research questions comprehensively, the preferred approach for this work would have been a systematic review of other reviews and primary studies. However, given the timeframe available (June to September 2014) and the significant body of literature that exists in the field of suicide prevention, in consultation with the NOSP it was decided to concentrate resources on carrying out a review of existing systematic reviews and meta-analyses. While not a systematic review, the methodology reflects many of the steps associated with doing such a review, for example an explicit search strategy, inclusion and exclusion criteria, quality assessment, and a formal data extraction form. This chapter outlines the approach taken to carrying out this 'review of reviews'.

In this chapter and throughout the report we refer to different categories of authors of studies and/or reviews as follows:

- the 'reviewers' or 'review authors' refers to those who wrote the reviews included in our report;
- the 'researchers' or 'research authors' refers to those who wrote the primary research studies reviewed by the review authors;
- 'comparison reviews' refers to the five international reviews of suicide prevention strategies which we used to help validate our findings; and
- 'we' refers to the HRB research team who prepared this report, and 'umbrella review' to this HRB 'review of reviews'.

2.1 Search strategy

Given the tight deadline (four months) for undertaking the review, the literature search focused on finding high-quality meta-analyses, systematic reviews and reviews covering all aspects of suicide prevention. An English-language restriction was applied to the searches, but no date restriction. We searched the following electronic databases:

- Cinahl
- Cochrane Library
- Embase
- Medline
- PsycINFO

We used controlled vocabulary terms including 'suicide' and/or 'suicide prevention' and /or keywords including 'suicide prevention' or 'suicide' and 'prevention'. Search terms were modified to meet the requirements of individual databases in terms of differences in fields and syntax. The aim of the search strategy was high precision and recall (see Figure 1). In addition we examined the reference lists of recent systematic reviews and hand-searched reference lists of selected reviews located by the electronic searches. The results were checked against the WHO *Preventing suicide: A global imperative* report (WHO, 2014) and the reference lists on the WHO website *Self harm and suicide* to ensure relevant reviews were not overlooked. Key informants were also invited to submit articles they considered relevant. A more detailed explanation of the search strategy and terms is outlined in Appendix 2.

To determine if papers were eligible for inclusion and to ensure decisions were consistent, the retrieved abstracts were screened by two reviewers (Lucy Dillon and Louise Farragher), and every retrieved full-text article was reviewed by two reviewers (Lucy Dillon and Ciara Guiney). See Figure 1 for an overview of the screening process.



Figure 1: Flow chart of searches and screening process

We included:

- systematic reviews, reviews or meta-analyses of suicide prevention interventions;
- reviews of studies whose outcome measures included completed suicides and/or suicidal behaviour (suicidal ideation, deliberate self-harm);
- international English-language reviews; and
- all relevant articles, irrespective of publication date.

We excluded:

- single studies on suicide prevention;
- reviews of pharmacotherapy interventions;
- reviews of risk/protective factors, at-risk populations, and suicide methods that did not assess which interventions worked but used their findings to make recommendations for what could/should work;
- reviews of mental health/substance misuse interventions that had suicide/suicidal behaviours as one of their secondary outcomes; and
- reviews that did not include primary studies (i.e. reviews of reviews).

2.2 Search results

In total, 47 review papers on suicide prevention interventions that met our inclusion criteria were identified. Broadly speaking, three types of reviews were included:

- reviews of specific types of interventions, e.g. means reduction, psychotherapies;
- reviews of ‘what works’ with particular (at-risk) populations, e.g. young/older people; and

- reviews of ‘what works’ in particular settings, e.g. workplace or community, although this category was very limited.

In addition, five general reviews of ‘what works’ in suicide prevention that cut across different populations and interventions (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014; WHO, 2014) were identified as providing a valuable overview of the evidence base. In our concluding chapter we compare our findings with the findings of these reviews.

2.3 Quality assessment and data extraction

There is no consensus on the best quality assessment tool to use for carrying out a review of reviews (Lewin et al., 2009; Robinson et al., 2014). A number of tools were considered and the ‘Health Evidence Quality Appraisal Tool’ (QAT) developed by McMaster University was selected.¹ The tool was selected because it covers a range of appropriate assessment criteria, has been used to assess reviews, and is accompanied by detailed guidance which helps to standardise its use by different team members. The tool assessed internal validity, which is measuring the extent to which the findings answered the research question. Assessment was made across ten broad questions – see Appendix 3. We amended the rating thresholds to maximise inclusion – reviews that scored 0–3 were assessed as being of ‘weak’ quality, those that scored 4–6 were of ‘moderate’ quality, and those that scored

¹ For more information visit www.healthevidence.org/our-appraisal-tools.aspx

7–10 were of ‘strong’ quality. It should be noted that the assessments were made of the reviews overall, not the primary papers included in the reviews.

A data extraction tool template was developed by the research team. It consisted of two worksheets:

- Sheet 1 included the adapted version of the QAT. Additional information collected included the review’s limitations cited by the review authors and identified by HRB reviewers.
- Sheet 2 included questions examining the content of each review that was pertinent to the aim of the umbrella review. Data were extracted that described the interventions, target population and outcomes measured and overall conclusions of the review.

The parameters included in the QAT are set out in Appendix 3.

All studies that met our inclusion criteria (n = 47) were critically appraised using the QAT questions on Sheet 1. The second stage of data extraction was only carried out for the ‘moderate’ and ‘strong’ reviews (n = 33). Data were only extracted for one study that was assessed as ‘weak’ as there was no other evidence for the intervention it addresses. Therefore, 34 studies were included in the full review.

Owing to time constraints, it was not possible for the quality of studies to be assessed by two independent reviewers. Each review was assessed by either Ciara Guiney or Anne McCarthy, but the two researchers worked closely together and sought each other’s input where required for clarification. Appendix 4 presents a summary of the results of the quality assessment.

Not all primary studies in the reviews we examined reported on suicidal behaviour outcomes pertinent to this review. For example, some reviews on school-based programmes reported on interventions where only knowledge and attitude-related outcomes were assessed. Data were only extracted from the sections of these reviews where suicidal behaviour-related outcomes were reported.

2.4 Review limitations

The limitations of this umbrella review relate to three broad issues – our inclusion/exclusion criteria, our review of reviews approach and our approach to quality assessment.

Inclusion and exclusion criteria

- By focusing on suicidal behaviours as the outcomes of interest, prevention interventions that have changes in knowledge or attitudes to suicide as their outcomes of interest, were not included in the review. Examples of such interventions are many school-based education programmes and public awareness campaigns.
- Given the review’s focus on suicide prevention interventions and suicidal behaviours as the outcomes of interest, studies that may contain findings of relevance but that do not have these as their primary focus will not have been included. For example, reviews that may have looked at a particular mental health intervention looked at reductions in suicidal behaviour as a secondary outcome.

Review of reviews approach

- By taking a review of reviews approach, the findings of relevant national and international single studies are not included in this review.
- The range of interventions covered in the current review is limited to those for which a review has been carried out. This may mean that newly developed and innovative interventions are not included.
- Given the time lag between the publication of primary studies and their inclusion in published systematic reviews, some more recently published and relevant primary studies will not have been included in this report.
- Some reviews carried out a quality assessment of the primary studies they included, while others did not. As a result, findings from the same primary studies may be interpreted differently in different reviews.
- Reviews varied in how they defined and categorised interventions and the behaviours related to the outcomes of interest. It is beyond the scope of this review to discuss this issue in any detail but it presents challenges when interpreting the body of evidence on a particular intervention as a whole.

Quality assessment

- While the methodological approach and tools used for quality assessment and data extraction were developed and piloted by three members of the research team, for pragmatic reasons each review was only assessed and data extracted by one researcher. There was on-going discussion within the team while undertaking this process to try to minimise any bias.

- Our quality assessment was at the review level, not at the level of the primary studies included. Therefore, a 'strong' review may be based on weak primary studies and vice versa.
- Some meta-analysis papers included in this report were assessed as 'strong' under the quality assessment criteria, but limitations in some critical criteria were identified which means their findings need to be interpreted with caution. This will be discussed further in the evidence statement sections where relevant, and in the conclusion to this report.

2.5 Structure of the report

In the next chapter, Chapter Three, the review of evidence is organised according to the different types of suicide prevention intervention. For each intervention the relevant findings of the reviews are described, including:

- definition of the intervention,
- findings of reviews focused on the intervention,
- findings of reviews that focused on an at-risk group but relevant to the intervention, and
- an evidence statement, giving the HRB's assessment of the evidence for the intervention.

Nine broad types of interventions are covered:

- means restriction
- media guidelines
- gatekeeper training
- screening
- psychosocial interventions
 - psychotherapy
 - enhanced care/outreach services
- telemental health

- web-based interventions
- Emergency Department
- school-based programmes
- military-based programmes

Chapter Four of the report presents the HRB's conclusions. It compares the overall findings of the umbrella review with those of some other key reviews and recent reports on suicide prevention. It also highlights some methodological limitations to research in this area.

**Suicide Prevention
Interventions:
Review evidence**

3 Suicide Prevention Interventions: Review evidence

There is an extensive body of literature on suicide prevention interventions. Owing to time constraints, it was beyond the scope of this review to consider primary studies in the field. Table 1 lists the interventions covered in the reviews examined in the course of this umbrella review. There was considerable variation both within and between reviews as to how interventions were defined and categorised. Some reviews covered more than one intervention. Table 1 also lists for each intervention the reviews (in alphabetical order) that we reviewed and our assessment of the quality of these reviews. Appendix 4 provides a summary of each review's quality rating against the ten assessment criteria. The findings of each review are presented in this chapter.

Table 1: Interventions covered, and the associated reviews discussed in this umbrella review

Type of intervention	Review author (date)	Quality assessment
Means restriction	Cox et al. (2013)	Moderate
	Hahn et al. (2005)	Strong
	Pirkis et al. (2013)	Moderate
	Krysinska and De Leo (2008)	Weak
Media guidelines	Bohanna and Wang (2012)	Moderate
Gatekeeper training	Isaac et al. (2009)	Strong
Screening	Gaynes et al. (2004)	Strong
	O'Connor et al. (2013)	Strong
	Oyama et al. (2008)	Strong
	Pena and Caine (2006)	Moderate
Psychosocial	Bahraini et al. (2013)	Strong
	Crawford et al. (2007)	Strong
	Gaynes et al. (2004)	Strong
	Hawton et al. (1999)	Strong
	Hawton et al. (1998)	Strong
	Lapierre et al. (2011)	Moderate
	O'Connor et al. (2013)	Strong
	O'Neil et al. (2012)	Strong
	Robinson et al. (2011)	Strong
	Shekelle et al. (2009)	Moderate
	Tarrier et al. (2008)	Strong
	van der Sande et al. (1997)	Strong
Telemental health	Winter et al. (2013)	Moderate
	Hailey et al. (2008)	Moderate
	Lapierre et al. (2011)	Moderate
Web-based suicide prevention	Lai et al. (2014)	Moderate
Emergency Department	Newton et al. (2010)	Strong
School-based interventions	Cusimano and Sameem (2011)	Strong

Type of intervention	Review author (date)	Quality assessment
	Guo and Harstall (2002)	Moderate
	Katz et al. (2013)	Moderate
	Miller et al. (2009)	Moderate
	Ploeg et al. (1999)	Strong
	Ploeg et al. (1996)	Moderate
	Robinson et al. (2013)	Moderate
	Zsumilas et al. (2011)	Moderate
Veterans and military personnel	Bagley et al. (2010)	Moderate

3.1 Means restriction

Means restriction is a population-based approach to suicide prevention that is viewed as an essential and effective intervention (Mann et al., 2005). It is based on the premise that restricting access to various means, for example firearms, bridges, railways, cliffs, rural roads, drugs and pesticides, can influence whether a completed suicide occurs. Six reviews on means restriction as a suicide prevention strategy were assessed for quality. Two reviews were rated as strong (Hahn et al., 2005; Pirkis et al., 2013), one as moderate (Cox et al., 2013) and three as weak (Krysinska and De Leo, 2008; Sarchiapone et al., 2011; Yip et al., 2012) (see Appendix 4). The three moderate to strong reviews, which examined firearm legislation and suicide hotspots, are described here, and one 'weak' review on suicide on railway networks.

Table 2: Reviews on means restriction

Review author & date	Review title	Quality rating
Hahn et al. (2005)	Firearms laws and the reduction of violence: a systematic review	Strong
Pirkis et al. (2013)	The effectiveness of structural interventions at suicide hotspots: a meta-analysis	Strong
Cox et al. (2013)	Interventions to reduce suicide at suicide hotspots: a systematic review	Moderate
Krysinska and De Leo (2008)	Suicide on railway networks: epidemiology, risk factors and prevention	Weak

Hahn RA, Bilukha O et al. (2005) Firearms laws and the reduction of violence: a systematic review *American Journal of Preventive Medicine* 28(2 Suppl 1): 40–71

The reviewers found that the effectiveness or ineffectiveness of a range of firearm laws in the US in reducing suicidal behaviour could not be determined owing to lack of evidence. They assessed the effectiveness of seven firearm laws independently and in

combinations to determine how they influenced violence:

- bans on specified firearms or ammunition,
- legal restrictions on firearm acquisition,
- waiting periods between application to purchase and acquisition of firearm,
- firearm registration and owner licensing,
- 'shall issue' carry laws,

- child access prevention laws,
- zero tolerance of firearms in schools, and
- combinations of laws.

Although a broad range of outcomes were examined, for example homicide, unintentional firearm-related injury or death, robbery, aggravated assault and rape, only the outcomes for suicidal behaviours are reported here. Only nine of the 15 studies in Hahn and colleagues' review reported suicidal outcomes. Effectiveness was measured in terms of percentage change in completed suicides. In the primary studies where suicide outcomes were reported on, the findings were mixed.

- The associations between bans on gun acquisition or possession laws and completed suicide were diverse. Significant reductions in completed suicide were demonstrated by Loftin and colleagues ($p < 0.05$) but not by McDowall and colleagues ($p > 0.05$) (Loftin et al., 1991; McDowall et al., 1996). Another study also demonstrated non-significant reductions in completed suicide (Kleck and Patterson, 1993), but these authors also found non-significant increases in completed suicide, indicating no consistent pattern of effect.
- Acquisition restriction and waiting periods for firearm acquisition were only associated with reductions in firearm-related suicide in a sub-sample of adults aged over 55 years (Ludwig and Cook, 2000).
- The impact of waiting periods for purchasing a long firearm was associated with a small increase in suicide rates in one study (0.5%) (Kleck and Patterson, 1993) and a

small decrease in suicide rates in another study (2.9%) (Cantor and Slater, 1995). Reductions in firearm-related suicide rates were also demonstrated among children and adolescents (Lott and Whitley, 2001).

- Firearms registration and licensing, and purchase waiting periods, were not associated with a significant change in firearm-related suicide (DeZee, 1983; Murray, 1975).
- One study showed that lower rates of firearm-related suicide occurred following the introduction of controls on firearms alongside higher rates of other forms of suicide, known as a 'substitution effect' (Sloan et al., 1990).
- Substitution effects were demonstrated in four studies (Cantor and Slater, 1995; Kleck and Patterson, 1993; Ludwig and Cook, 2000; Sloan et al., 1990).
- Laws preventing child access to firearms were linked with lower firearm-related suicide rates in juveniles (< 15 years) (Cummings et al., 1997).

In their discussion the review authors noted that there was not enough evidence to demonstrate that firearm law had definitely reduced violent behaviour outcomes such as suicide, or to quantify the exact reduction that could be expected.

Pirkis J, Spittal MJ et al. (2013) The effectiveness of structural interventions at suicide hotspots: a meta-analysis *International Journal of Epidemiology* 42(2): 541–548

Taking a meta-analytic approach, these reviewers found strong evidence indicating that restricting access to jumping sites leads to a decrease in suicides. The primary studies (n = 11) were carried out in a number of countries (Canada, New Zealand, Switzerland, the UK and the USA).

The reviewers used meta-analysis to assess the effectiveness of structural interventions at suicide hotspots. Primary studies were only included if they reported jumping outcomes pre- and post-intervention. Effectiveness measured in terms of reductions in suicide was assessed using risk ratios (RRs). The analyses indicated the following:

- at jump sites: intervention introduction resulted in an 86% reduction in suicides by jumping per annum (RR = 0.14, 95% CI 0.09 to 0.21, p = 0.001);
- at other jump sites in the same cities: interventions were linked with a 44% increase in suicides by jumping at nearby sites per annum (RR = 1.44, 95% CI 1.15 to 1.81, p = 0.002); and
- overall net effect of all jump-site interventions: a 28% reduction in suicide deaths by jumping per annum (RR = 0.72, 95% CI 0.60 to 0.87, p = 0.001).

The review authors acknowledged that it was possible that there might be publication bias with respect to documenting the effect of structural interventions and suggested that the positive findings about restricting access

to jumping sites might be biased towards publishing studies that had positive outcomes. The reviewers also found evidence of heterogeneity with respect to study design, population size and/or type of jump site and this heterogeneity was measured by the reviewers for the three analyses (i.e. at sites, at other sites, and all sites), using the media incident rate ratio (MIRR), which indicated that the studies' methods were different (MIRR at sites = 2.76; MIRR at other sites = 3.50; MIRR at all sites = 2.95), and the studies were not all measuring the same thing. However, the review authors argued that regardless of disparities, an effect was found which suggested that these findings might be generalisable to other settings. Additionally, Pirkis et al. (2013) cautioned that studies did not report the number of people that were stopped from jumping or who used other methods; nor was the impact of activities that might have been carried out alongside interventions examined. Nonetheless, these review authors concluded that strong evidence was available to support the effectiveness of the installation of structures, such as barriers or fences, at known jump sites in preventing suicide. Although there was evidence to suggest that jumping at nearby (unprotected) sites increased, suicides by jumping decreased overall by 28% (13%–40%).

Cox GR, Owens C et al. (2013) Interventions to reduce suicides at suicide hotspots: a systematic review *BMC Public Health* 13: 214

Extending the work of Pirkis et al. (2013), Cox et al. (2013) also examined interventions to reduce hotspots. Unlike Pirkis et al. (2013) these review authors did not carry out a meta-analysis, but they had a broader search string that captured

a wider range of means restriction interventions. As a consequence they included studies that are not found in the review by Pirkis and colleagues. Cox and colleagues found strong evidence to indicate that restricting means at hotspots was effective in deterring suicides and did not result in substitution effects. The primary studies (n = 19) were carried out in a number of countries (Austria, Canada, Hong Kong, New Zealand, Switzerland, the UK and the USA).

The reviewers aimed to critically evaluate the availability and effectiveness of interventions to reduce suicides at hotspots. Effectiveness was measured in terms of reduction in completed suicide rate. Overall, the review authors found that restricting access to means resulted in positive outcomes:

- Nine studies evaluated the effectiveness of installing barriers at jumping sites, for example at bridges or cliffs. Interventions included physical barriers, such as metal screens fixed above concrete parapets, or high wire fencing/barriers. In all nine studies, suicide rates decreased when barriers were in place and increased when they were taken away.
- Three studies examined strategies that encouraged help-seeking behaviour, for example placing signs and emergency telephones at hotspots. Reductions in suicide rates were shown in all three studies.
- Three studies assessed whether the involvement of a third party successfully reduced suicide rates. Interventions, which included telephone hotlines, gatekeeper

training and suicide patrols, were associated with reduced suicide rates.

- One study indicated that responsible reporting of suicide acts by reporters contributed to a decrease in the frequency of suicidal behaviour over time.

Like Pirkis et al. (2013), these review authors concluded that the strongest evidence available to them suggested that installing barriers at hotspots to prevent suicide was a reliable and effective method of reducing suicidal outcomes. However, in contrast to Pirkis and colleagues, they inferred that suicide rates were not influenced by substitution effects, that is, an increase in suicide completions at other sites. This deduction was based on the outcomes of 11 primary studies (two of which were not in the Pirkis study), which indicated that suicide rates at other sites were either reduced or remained unchanged. A possible explanation for the disparities in review conclusions is that the review authors used different methodologies: Pirkis et al. (2013) carried out a meta-analysis while Cox et al. (2013) presented their findings narratively with no numerical p values or confidence intervals to support their conclusions. With regard to the three other interventions examined – encouraging help-seeking, increasing the likelihood of a third party intervening, and the provision of responsible media reporting guidelines for suicide – Cox et al. (2013) stated that they had the potential to reduce suicide, but the evidence was weaker. A review looking specifically at media guidelines is examined in section 3.2 below.

Krysinaka K and De Leo D (2008) Suicide on railway networks: Epidemiology, risk factors and prevention *Australian and New Zealand Journal of Psychiatry* 42 (9): 763–771

One study examined means restriction at railway networks (Krysinaka and De Leo, 2008). Although the quality assessment of this study was weak it was deemed prudent to extract data from it as the stronger reviews had not addressed this type of intervention. The review authors found that the effectiveness of railway network prevention strategies was limited. The primary studies (n = 27) were carried out in a number of countries (Australia, Austria, Canada, Denmark, Germany, the Netherlands, South Africa, Spain, Sweden, Turkey, the UK, the USA and Wales).

The reviewers aimed to identify epidemiological and clinical factors that gave rise to higher engagement in this kind of suicide behaviour, and to evaluate the effectiveness of prevention strategies used on railway networks. Prevention interventions mentioned in the review as being effective in preventing suicides, included the following:

- Deep channels between rails (four studies): no detailed data were provided in the review as to their effectiveness.
- Sliding doors at platform limiting access to the track (one study): no detailed data were provided in the review regarding their effectiveness.
- Two studies comparing stations with and without suicide pits: results provided for one study indicated a significant reduction in suicide events or attempts in stations with pits (45%), compared to stations without pits (66%) ($\chi^2 = 72.1$, $df = 1$, $p < 0.001$)

(O'Donnell et al., 1994; O'Donnell and Farmer, 1992).

- Responsible media reporting on suicide: resulted in an 80% drop in suicide completions and attempts in a subway system in Vienna (two studies). This is explored in more detail in section 3.2 below.
- Community media campaigns that advertise crisis intervention centres and hotlines at railway stations: indirect evidence suggested these were beneficial in reducing suicide rates and attempts (one study).
- Booklet ('Reducing suicides at railway stations'): one study; outcomes not published.

Among the limitations acknowledged by the review authors was the fact that it was not possible to carry out a systematic analysis owing to lack of comparability between studies. The review authors further highlighted the fact that where data were provided on suicide fatalities, there was no consensus among rail and metropolitan subway networks regarding operational definitions of suicidal behaviours, and in some instances the fatality was logged as an accident rather than a possible suicide.

These review authors concluded that despite a number of rail suicide prevention strategies being suggested and implemented, evidence indicating their effectiveness was limited. They further advocated inter-agency action to implement railway prevention strategies, owing to the multi-faceted interaction among factors such as socio-demographic, psycho-pathological and environmental variables. A number of strategies were put forward by these review authors for further investigation,

for example an airbag, which inflates after the emergency brake is activated, and a rigid skirt to stop a body falling under a train.

Evidence statement

The consensus among all four reviews was that means restriction (in particular, barriers) is a useful and important method that is successful in reducing suicide (Cox et al., 2013; Hahn et al., 2005; Krysiniska and De Leo, 2008; Pirkis et al., 2013). Despite having the strongest evidence base among suicide prevention

strategies, means restriction strategies are often opposed by communities as being costly to implement, and their appearance is considered to detract from the beauty of an area (Cox et al., 2013). The strongest evidence supports the implementation of barriers; other interventions look promising but the evidence is limited and in some cases weak, and further investigation is needed to determine their exact impact.

3.2 Media guidelines

In some countries guidelines have been developed for media professionals to follow when reporting a suicide. The premise upon which this prevention intervention is based is that media reporting of suicides can influence the phenomenon of imitative suicides (Bohanna and Wang, 2012). One review of media guidelines as a suicide prevention strategy was assessed for quality and relevant data extracted. It was assessed to be of moderate quality (see Appendix 4).

Bohanna I and Wang X (2012) Media guidelines for the responsible reporting of suicide: a review of effectiveness *Crisis: Journal of Crisis Intervention & Suicide* 33(4): 190–198

The reviewers found that there was only limited research available on the effectiveness of media guidelines so their review included a broad range of studies focusing on a range of outcomes. The primary studies came from seven countries (Austria, Australia, China, New Zealand, Switzerland, the UK and the

USA). The guidelines under review included those produced by governments, suicide organisations or media organisations, with varying levels of partnership evident between these stakeholders in their development.

The reviewers aimed to critically evaluate the evidence concerning the use and effectiveness of media guidelines for reporting on suicide. Effectiveness could be measured in terms of improvements in the quality of news reports of suicide, or more directly in terms of reductions in the suicide rate or suicidal behaviours. Most of the primary studies reviewed evaluated the effect of guidelines on the quantity and quality of media reports. Some reported qualitative data based on interviews with media professionals regarding the use and awareness of, and attitudes towards, guidelines. While an undefined number of studies were reported to ‘suggest an association between the introduction of media guidelines and reduced suicide rates’ (p.191), this was not discussed in any detail in the review and no causal link was evidenced. However, two of the eleven

studies examined suicide rates as their primary outcome measures (Niederkröthaler and Sonneck, 2007; Sonneck et al., 1994); the findings of these two studies are described below as they address behavioural outcome measures which are the focus of this review.

Both of the primary studies that considered suicide rates were carried out in Austria where media guidelines were introduced in response to a dramatic increase in the number of subway suicides in Vienna. A 75% decrease in subway suicides was observed over a six-month period following the introduction of the guidelines in mid-1987 (Sonneck et al., 1994). Subsequent analysis of Viennese and Austrian suicide data up to 2004/05 showed a national decrease of 81 suicides annually since the guidelines had been introduced, in addition to the sharp decrease in Viennese subway suicides mentioned above (Niederkröthaler and Sonneck, 2007). The reduction in suicides was limited to areas in which newspapers that were compliant with the guidelines reached a readership of more than 67% of the population; there was no significant impact in two other areas where these compliant newspapers had a readership of 48.2% and 38.6%.

In their discussion the review authors noted that there was not enough evidence to know whether changes in reporting of suicide were long-lasting. They identified a number of critical success factors that might have influenced the positive impact of guidelines on suicide prevention. These included:

- media participation in the development of guidelines,
- an active dissemination strategy for the guidelines,
- on-going training for the media in the use of and need for the guidelines, and
- on-going monitoring of the application of media guidelines.

The review authors also commented that the phenomenon of imitative suicides might vary between cultures, and suggested that the 'unique local sociocultural context' (p.196) should be considered when assessing the need for, and potential impact of, media guidelines.

Evidence statement

As acknowledged by Bohanna and Wang (2012), there is only limited evidence that the implementation of media guidelines impacts on suicide rates. This evidence comes from experience in just one country where there was a relatively good level of compliance by media. While there was a suggested link between the introduction of media guidelines and changes in national suicide rates in primary studies in other countries, this was not backed by quantitative evidence. Such changes are suggestive, but are not necessarily as a result of the implementation of guidelines only; for example, there may have been other interventions to prevent suicide introduced, or the factors leading to increased rates of suicide may have been alleviated over time.

3.3 Gatekeeper training

Gatekeeper training teaches specific groups of people how to identify those at risk of suicide and how to refer them for treatment. One review of gatekeeper training as a suicide prevention strategy was assessed for quality and relevant data extracted. It was judged to be of strong quality (see Appendix 4).

Isaac M, Elias B et al. (2009) Gatekeeper training as a preventative intervention for suicide: A systematic review *Canadian Journal of Psychiatry* 54(4): 260–268

The reviewers found that gatekeeper training programmes varied in their length, content and trainee profile. They lasted anything from a few hours to five days, with most programmes lasting two days. The content covered a varied selection of topics, for example myths and facts about suicide, intervention needs for those at risk, gatekeepers' attitudes to suicide, warning signs, and referral strategies. The reviewers identified two groups of trainees in the literature: first, the 'designated group' who were trained and designated as helping professionals, for example medical professionals or social workers; and second, the 'emergent group' who might not have been formally trained to intervene with people at risk of suicide but who were potential gatekeepers for those with whom they worked who might have suicidal intent, for example school staff, police or youth workers.

While gatekeeper training is broadly implemented and recommended as a suicide prevention strategy, the reviewers reported that 'there has not been strong consensus as to its effectiveness' (p.262). They identified two main groups of

outcomes reported as a result of gatekeeper training: first, changes in the knowledge, attitudes, and skills of the trainee, and second, changes in suicidal behaviours. Their findings in relation to this second group of outcomes are pertinent to this review and are reported here.

Studies included in the review that evaluated behavioural outcomes were limited to military populations, aboriginal communities, and primary-care physicians.

- The military-based study (Knox et al., 2003) was of a population-based multi-level suicide prevention programme initiated in the US Air Force in 1997. Gatekeeper training was one of 11 different suicide prevention interventions delivered as part of the programme. The gatekeeper training included identification of basic suicide risk factors, intervention skills and referral procedures. The research authors found a 33% relative risk reduction (RR = 0.67, $p < 0.001$, 95% CI 0.57 to 0.80) in suicide when comparing the pre- and post-intervention cohorts.
- The study of aboriginal youth in New Mexico between 1988 and 1997 was based on a programme that included 'gatekeeper-like natural helpers' (May et al., 2005). The research study found a drop in the mean number of 'self-destructive acts per year by 73% (suicide attempts and gestures, $p < 0.001$), but no change in the mean number of suicide completions' (p.265). The research authors noted that the decrease in self-destructive acts in this study could have been accounted for by a cyclical trend in suicide acts that had been documented previously in that community.

- Finally, there was a group of studies that examined the role of primary-care physicians as gatekeepers. The reviewers found that some studies had reported an effect as a result of GPs' education on suicidal ideation, and attempts or deaths by suicide. A Swedish study found a significant decrease in the suicide rate for females only ($p < 0.01$) when analysing the rate of suicide in the general population before and after two days' training for GPs on depression and suicidality (Rutz et al., 1992). The rate returned to pre-training levels three years after the intervention. A more recent Swedish study found a non-statistically significant reduction in the suicide rate after another programme of GP education (Henriksson and Isacson, 2006). Finally, a German study of a multi-faceted approach to suicide prevention, which included primary-care physician training and gatekeeper training for people in the general population, found a decrease in suicide attempts and deaths of 24% ($p < 0.004$) in the target region when compared to a control region (Hegerl et al., 2006).

While the review provided some support for gatekeeper training as a suicide prevention strategy, the review authors emphasised the limitations of the evidence; for example, the best evidence for the effectiveness of gatekeeper training as a prevention strategy was found in suicide prevention programmes that had a number of different elements, making it difficult to isolate the effect of the gatekeeper training on its own. The review authors concluded that 'gatekeeper training holds promise as part

of a multifaceted strategy to combat suicide. It has been proven to positively affect the skills, attitudes, and knowledge of people who undertake the training in many settings. Though research is limited in demonstrating an effect on suicide rates and ideation, it is seen in many circles as an extremely promising initiative to prevent suicide. An RCT [randomised control trial] is needed to delineate its potential for reducing the suicide base rate in a given community' (p.266).

Evidence statement

There is limited evidence to suggest that gatekeeper training may impact on suicidal behaviour. As noted by Isaac et al. (2009), while some of the studies carried out report changes in suicidal behaviour outcomes, given their study design it is unclear whether these changes are as a direct result of the gatekeeper training, or of gatekeeper training combined with other interventions. For example, changes may have been due to other suicide prevention interventions having been introduced, to a combination of interventions, or to a change in the circumstances that had led to high rates of suicide. The findings suggest that training primary-care physicians may be promising.

3.4 Screening

A screening programme involves the use of a psychometrically validated screening instrument to identify those at risk for suicide (while minimising the number of false positives and false negatives) and treatment referral when required (Pena and Caine, 2006). Where screening programmes are applied to a 'general' population, people with previously unidentified suicide risk are the target of

screening. Elsewhere, programmes are targeted at a population known to be at higher risk of suicide, for example older people or socially excluded young people. In these programmes, identifying those at risk of suicide is also the target of

screening. Four reviews evaluated the effect of screening on suicidal behaviour outcomes; three reviews were found to be of strong quality and one of moderate quality (see Table 3 and Appendix 4).

Table 3: Reviews on screening

Review author & date	Review title	Quality rating
Oyama et al. (2008)	Effect of community-based intervention using depression screening on elderly suicide risk: A meta-analysis of the evidence from Japan	Strong
O'Connor et al. (2013)	Screening for and treatment of suicide risk relevant to primary care: A systematic review for the U.S. Preventive Services Task Force	Strong
Gaynes et al. (2004)	Screening for suicide risk in adults: A summary of the evidence for the U.S. Preventive Services Task Force	Strong
Pena et al. (2006)	Screening as an approach for adolescent suicide prevention	Moderate

Oyama H, Sakashita T et al. (2008) Effect of community-based intervention using depression screening on elderly suicide risk: A meta-analysis of the evidence from Japan *Community Mental Health Journal* 44(5): 311–320

The reviewers undertook a meta-analysis of five studies examining the effect of a community-based depression screening (CDS) programme with follow-up on the completed suicide incidence for people aged 65 and over (Oyama et al., 2008). All five studies described universal prevention programmes that provided voluntary two-step screening, using a self-report questionnaire in the first step and an assessment by a public health nurse and a psychiatrist in the second step. Where participants screened positive for 'probably at risk for suicide' (p.315) in either of these steps, a follow-up was performed by a medical practitioner. In two studies the follow-up was conducted by a psychiatrist and in the other three it was conducted by a GP.

Based on their meta-analysis the reviewers found that:

- The implementation of universal prevention programmes comprising CDS and health education was associated with a reduced risk of completed suicide among older residents (aged 65 and over).
- The benefit of the CDS with the follow-up conducted by psychiatrists in a region with a high suicide rate was estimated to be a 20% reduction or less (95% CI) for older men and a 40% or less (95% CI) reduction for older women.
- In contrast, the benefit of the CDS with the follow-up conducted by GPs in a region with a high suicide rate was estimated to be no change in risk for older men, but up to a 34% reduction for older women.

The reviewers concluded that the CDS would achieve a positive effect among older women regardless of whether the follow-up was conducted by GPs or psychiatrists, but there was only a positive effect for older men when the follow-up was conducted by a psychiatrist rather than a GP.

Among the limitations acknowledged by the reviewers was the fact that all the studies included in the meta-analysis had been carried out in Japan, and it was possible that differences in health care systems and the characteristics of the older populations might have limited the generalisability of the findings to other countries. We would emphasise that these findings were not associated with a screening programme in isolation but included at minimum a follow-up with a specialist medical practitioner.

O'Connor E, Gaynes B et al. (2013) Screening for and treatment of suicide risk relevant to primary care: A systematic review for the U.S. Preventive Services Task Force *Annals of Internal Medicine* 158(10): 741–756

Gaynes B, West S et al. (2004) Screening for suicide risk in adults: A summary of the evidence for the U.S. Preventive Services Task Force *Annals of Internal Medicine* 140(10): 822–835

O'Connor et al. (2013) provided an update on an earlier study (Gaynes et al., 2004) that focused on the efficacy and safety of screening for and treatment of suicide risk in primary care. The findings of the more recent report are described here.

As part of a broader review of suicide prevention interventions relevant to primary care, O'Connor and colleagues systematically reviewed the evidence for the benefits and harms of screening in adult and adolescent populations. One of their key research questions was whether screening programmes in primary care settings resulted in improved suicide behavioural outcomes. They included one study on the benefits of screening (Crawford et al., 2011), which found no clear short-term (within two weeks) benefit. None of the three trials on the

potential adverse effects of screening that the reviewers found (Crawford et al., 2011; Robinson et al., 2011b; Gould et al., 2005) identified 'serious adverse effects of screening' (p.743). No further details on these four studies were given by the reviewers. Overall, they concluded that from the limited evidence available, no serious harms could be identified from screening in primary-care settings.

Pena JB and Caine ED (2006) Screening as an approach for adolescent suicide prevention *Suicide & Life-Threatening Behavior* 36(6): 614–637

These reviewers highlighted questions about the desirability and feasibility of introducing a suicide screening programme for young people. They set out to address the research question 'what do we know about the demonstrated effectiveness of screening as a tool or programme to prevent suicide?' Much of their paper focused on assessing the quality of screening tools and explored issues relating to the delivery of these programmes, the findings of which are beyond the scope of our review. They measured intermediate indicators (such as suicidal ideation), and final outcomes (rates of suicide or attempted suicide).

The reviewers presented a narrative review of three studies that looked at suicidal behaviour outcomes pertinent to our research question. The first examined the impact of a screening tool on suicidal ideation, and the other two the impact of a screening-type protocol or screening instrument on the number of suicide attempts by young people.

- The first study looked at whether screening instruments that contained suicide-related questions

inadvertently increased suicidal ideation among those who had been screened (Gould et al., 2005). A randomised control trial (RCT) was carried out in six high schools where the experimental group received a survey with suicide-related questions while the control group did not. Two days later both groups were assessed for suicidal ideation and distress. The research authors found that the screening instrument did not increase rates of either suicidal ideation or distress. The same result was found among 'high-risk youth who had a history of previous suicide attempt or depression' (Pena et al, 2006: p.629).

- The second study found a reduction in suicide attempts among young people after taking part in the Signs of Suicide (SOS) prevention programme (Aseltine and DeMartino, 2004). The programme included a self-screening tool, which was described as a 'self-education tool'. Young people who got above a certain score when using the tool were advised to seek help. The research authors found a significant reduction in self-reported suicide attempt three months after the programme, although young people did not report an increase in their help-seeking. The reviewers concluded that while this was the first study to show a reduction in suicide attempts in a school setting using a randomised research design, the role of the screening tool in reducing suicide attempts was 'altogether unclear' (p.630). First, there was no increase in help-seeking among the group; second, the screening tool did not involve a further assessment of screen positives; and third, there were

other elements in the programme that may have impacted on the outcome.

- The third study found that there was a reduction in suicide attempts in a population of 'runaway' young people (n = 741) after the introduction of a screening programme that included referral and immediate access to follow-up care for those found to be at risk (Rotheram-Borus and Bradley, 1991). There were nine suicide attempts in the three months prior to the programme's introduction, and two over the 18 months after implementation. However, a major limitation of this study was that it did not have a comparison group. Two elements of the programme highlighted as being critical to the programme's apparent success were that staff were provided with sufficient training to screen, and there were clear follow-up responses, i.e. with established protocols, which meant referrals were dealt with quickly.

Pena and colleagues concluded that there was 'an inadequate evidence base regarding the use or utility of screening programmes' for reducing suicidal behaviours among young people and that screening programmes should be regarded as 'investigational in nature' (p.634). Given the limitations, the review authors further concluded that 'neither study (Rotheram-Borus and Bradley, 1991 or Aseltine and DeMartino, 2004) offers any conclusive evidence of the effectiveness of screening (alone) in reducing suicides, suicide attempts or intermediate indicators related to these two outcomes' (p.629).

Evidence statement

The evidence for the impact of screening on suicidal behaviours is mixed and relatively weak. The evidence suggesting that it might have an impact is associated with screening of a high-risk population where there is good access to follow-up care; as a result, it is not possible to isolate the impact of the screening process from the follow-up intervention. The available evidence also suggests that screening does not have any harmful effects but this needs more research with specific populations.

The focus of much of the research is on assessing the accuracy of the screening tools and issues that arise when implementing a programme, rather than suicidal behaviour outcomes. Our umbrella review would also suggest that there is inconsistency in the literature as to what 'screening' is, varying from a self-administered survey recommending self-referral for follow-up care, to an administered two-part screening process with immediate access to follow-up care when necessary. Pena et al. (2006) argued that 'as a standard of comparison, we can say with confidence that no new medication to treat depression would be approved for general use based on such sparse data' (p.634).

3.5 Psychosocial

A variety of interventions are covered in the reviews on 'psychosocial interventions'. Broadly speaking they fall into two categories:

- Psychotherapeutic interventions: These include cognitive behavioural therapy (CBT), dialectic behavioural therapy (DBT), problem-solving therapy, interpersonal psychotherapy,

family behaviour therapy, in-patient behaviour therapy, and supportive counselling, among many others.

- Enhanced care/follow-up: These interventions are designed primarily to support those at risk of suicide in accessing and maintaining contact with services. For example, follow-up postcards, 24-hour emergency access to psychiatric services, and home visits to encourage attendance at a treatment service, among others.

Ten reviews were rated as strong (Bahraini et al., 2013; Crawford et al., 2007; Gaynes et al., 2004; Hawton et al., 1998; Hawton et al., 1999; O'Connor et al., 2013; O'Neil et al., 2012; Robinson et al., 2011; Tarrier et al., 2008; van der Sande et al., 1997), three as moderate (Lapierre et al., 2011; Shekelle et al., 2009; Winter et al., 2013), and three as weak (Fountoulakis et al., 2009; Gray and Otto, 2001; Luxton et al., 2013) (see Appendix 4). What follows is a description of the moderate to strong reviews. Thirteen reviews were included: ten covered both psychotherapeutic and at least one of the enhanced/follow-up care interventions; three examined just psychotherapeutic interventions (see Table 4). Where possible, for each review we have divided up the findings under the two categories (psychotherapeutic interventions, enhanced care/follow-up) outlined above. While some reviews drew on a core set of primary studies, there is a lot of variation across the reviews in how psychosocial interventions, study populations, and outcomes were defined and categorised. It is beyond the scope of this umbrella review to address these variations in detail and it presents challenges when interpreting this body of evidence as a whole.

Table 4: Psychosocial reviews, review analysis type, interventions covered, and quality rating

Review author & date	Review title	Narrative analysis	Meta-analysis	Psychotherapy	Other psychosocial	Quality rating
O'Connor, E. et al. (2013)	Screening for and treatment of suicide risk relevant to primary care: A systematic review for the U.S. Preventive Services Task Force		✓	✓	✓	Strong
*Gaynes, B. et al. (2004)	Screening for suicide risk in adults: A summary of the evidence for the U.S. Preventive Services Task Force		✓	✓	✓	Strong
O'Neil, M. E., et al. (2012).	Suicide prevention interventions and referral/follow-up services: A systematic review	✓		✓	✓	Strong
*Shekelle et al. (2009)	Strategies for suicide prevention in veterans	✓		✓	✓	Moderate
Hawton, K. et al. (1999)	Psychosocial and pharmacological treatments for deliberate self-harm: Review		✓	✓	✓	Strong
*Hawton, K. et al. (1998)	Deliberate self-harm: Systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition		✓	✓	✓	Strong
van der Sande, R., et al. (1997)	Psychosocial intervention following suicide attempt: A systematic review of treatment interventions		✓	✓	✓	Strong
Crawford, M. J. et al. (2007)	Psychosocial interventions following self-harm. Systematic review of their efficacy in preventing suicide		✓	✓	✓	Strong
Winter, D., et al. (2013).	A systematic review of the literature on counselling and psychotherapy for the prevention of suicide: 1. Quantitative outcome and process studies		✓	✓		Moderate
Tarrier, N. et al. (2008)	Cognitive-behavioral interventions to reduce suicide behavior: A systematic review and meta-analysis	✓	✓	✓		Strong
Robinson, J. et al. (2011)	Preventing suicide in young people: Systematic review	✓	✓	✓	✓	Strong
Lapierre, S., et al. (2011)	A systematic review of elderly suicide prevention programs	✓		✓	✓	Moderate
Bahraini, N. H. et al. (2013).	Suicidal ideation and behaviours after traumatic brain injury: A systematic review	✓		✓		Strong

*These reviews are not reported on in this section as other reviews provided an update to them.

O'Connor E, Gaynes B et al. (2013) Screening for and treatment of suicide risk relevant to primary care: A systematic review for the U.S. Preventive Services Task Force *Annals of Internal Medicine* 158(10): 741–756

Gaynes B, West S et al. (2004) Screening for suicide risk in adults: A summary of the evidence for the U.S. Preventive Services Task Force *Annals of Internal Medicine* 140(10): 822–835

O'Connor et al. (2013) provided an update to an earlier study (Gaynes et al., 2004) that focused on the efficacy and safety of screening for and treatment of suicide risk in primary care. The findings of the more recent report on two of their three broad intervention groups (psychotherapy and 'enhanced usual care' but not pharmacotherapy) are reported here. The reviewers carried out a meta-analysis, examining adult and adolescent populations separately. Overall, they concluded that psychotherapy could reduce the risk of suicide attempts and deliberate self-harm in high-risk adult populations.

Psychotherapy

Thirty-one studies were found on psychotherapeutic interventions including CBT, DBT, problem-solving therapy and psychodynamic or interpersonal therapy. Among adults the review authors found that:

- Psychotherapy reduced the likelihood of a suicide attempt or deliberate self-harm compared with usual care by an average of 32% (RR = 0.68 [95% CI 0.56 to 0.83]; 11 trials; n = 1583; I₂ = 16.1%). However, they noted that a single estimate of benefit was 'misleading' (p.743) as there was a highly variable rate of repeated self-harm or attempted suicide among the 11 studies: it ranged from 15% to 71%

of those in the control groups at follow-up. When the review authors removed the studies with the most extreme rates, they found the absolute differences ranged from (a) a low of 46% in the control group and 39% in the intervention group in a study of 'brief CBT versus treatment as usual' among 16–65-year-olds presenting to accident and emergency departments after an episode of deliberate self-harm (Tyrer et al., 2003), to (b) a high of 47% in the control group and 23% in the intervention group in a study of DBT among female patients aged 18 to 45 with bipolar disorder (Linehan et al., 2006).

- There was insufficient evidence to assess the effect on suicide deaths as only six of the 19 trials reported on them.
- While a reduction in suicidal ideation was reported in both the intervention and control groups, there was no greater improvement among those who had engaged in psychotherapy than among those who had not (SMD = -0.10 [CI, -0.27 to 0.06]; 8 trials; n = 964; I₂ = 26.3%).

Among the studies exploring the impact of psychotherapeutic interventions on adolescents the review authors found the following:

- Unlike adults, psychotherapy did not reduce suicide attempts in adolescents (RR = 0.99 [CI 0.75 to 1.31]; 9 trials; n = 1331; I₂ = 49.1%). Given the wide variation in the results of the various trials, the review authors noted that they 'cannot rule out the possibility of harm (or benefit) on the basis of existing evidence' (p.744).
- Four of the 12 trials they found

reported statistically non-significant increases in suicide attempts of 22% to 113%. The interventions under study were CBT (Donaldson et al., 2005; Greenfield et al., 2002), developmental group therapy (Hazell et al., 2009) and improving treatment adherence with postcards (Robinson et al., 2012). We note that the last study is also referred to as an 'enhanced usual care' intervention below.

- As with the adult populations, there was insufficient evidence to assess the effect on suicide deaths.
- O'Connor et al. (2013) did not find greater improvement than usual care for suicidal ideation (SMD = -0.22 [CI - 0.46 to 0.02]; 6 trials; n = 629; I2 = 41.2%), while at follow-up a reduction in suicidal ideation was reported in both intervention and control groups.
- While the data were limited there was some suggestion from the trials reviewed that targeting parents and young people, either together or separately, seemed to be more beneficial than targeting only young people. We note, however, that it was unclear which specific interventions or outcomes these findings related to and they may not have been behavioural.

Enhanced usual care

Seventeen studies were found on 'enhanced usual care'. These interventions were defined as those that 'attempted to improve the quality or format of recommended treatment (in primary or specialty care) or patient adherence to usual care while providing little to no direct therapeutic counselling or specific prescription for psychotherapy' (O'Connor et al., 2013, p.744). This

included studies on telephone, mail and home visit contacts to encourage adherence to treatment, and other case management interventions.

There was not enough evidence to assess the impact of these interventions on suicide deaths for either adults or adolescents.

- Thirteen of the 17 adult trials of enhanced usual care reported on suicide attempts. All but one found no difference in rates of suicide attempts (RR = 0.91 [CI, 0.80 to 1.02]; 13 trials; n = 6592; I2 = 0.0%).
- The only adolescent trial in this category was of a postcard-based intervention, which was one of the trials already referred to above in the discussion on psychotherapeutic interventions that reported statistically non-significant increases in suicide attempts (Robinson et al., 2012).

In their discussion the reviewers noted that the enhanced usual care interventions might be useful components of a larger system-wide approach to suicide prevention that included psychotherapy.

The reviewers identified a number of limitations to their review, some of which were grounded in the gaps in the evidence available on suicide prevention:

- They did not consider suicide attempts and self-harm to be 'good surrogates' for suicide deaths; therefore the lack of power and reports on suicide deaths was a major limitation. It cannot be assumed that because psychotherapy reduced suicide attempts that it would have reduced the number of suicide deaths

if the studies had had adequate power.

- They found very little evidence about the effectiveness of treatment among older adults and among racial or ethnic minorities. They argued that these groups had different needs from suicide prevention services.
- In their call for further research in this area, the review authors highlighted the need for research focusing on young people, as their needs are different to those of adults.
- They emphasised the importance of replication in trials as the evidence from one study is not always replicated in subsequent studies.

The review authors concluded that more research on how to treat adolescents in particular is 'urgently needed' (p.751).

O'Neil ME, Peterson K et al. (2012) *Suicide prevention interventions and referral/follow-up services: A systematic review* Washington (DC): Department of Veterans Affairs

Shekelle P, Bagley SC et al. (2009) *Strategies for suicide prevention in veterans*. Washington (DC): Department of Veterans Affairs

The review by O'Neil et al. (2012) is a more up-to-date, synthesised and methodologically refined study than that by Shekelle et al. (2009), which addressed similar research questions for the same population. The O'Neil review was assessed by us to be of high quality, whereas we assessed the review by Shekelle and colleagues to be of moderate quality. Therefore, only the review by O'Neil and colleagues is reported on in this section.

O'Neil et al. (2012) carried out a systematic review of RCTs examining

pharmacotherapy and psychotherapy interventions, and referral and follow-up services. They provided a narrative analysis of primary studies published between 2005 and 2011, to update the evidence base since the publication of three earlier systematic reviews (Gaynes et al., 2004; Mann et al., 2005; NICE, 2011). While O'Neil and colleagues were interested in both military/veteran and civilian populations, they only found studies of interest that were conducted outside the military setting. Their outcome of interest was 'suicidal self-directed violence' including suicide attempt and completed suicide; they did not include 'self-directed violence ideation' or 'undetermined or non-suicidal self-directed violence'. Central to their review was a rigorous quality assessment of the RCTs. Overall, they concluded that there was a lack of 'strong evidence' for any interventions in preventing suicide and suicide attempts.

Psychotherapy

O'Neil et al. (2012) reported their findings on psychotherapeutic interventions by target population.

People with borderline personality disorder

- The review authors found insufficient evidence across the studies to draw conclusions about the role of psychotherapeutic interventions in preventing suicide deaths in this population. They noted that this was largely due to there being no or very few suicide deaths occurring in the course of the studies under review.
- They found a significant reduction in suicide attempts for two interventions:

- First was ‘mentalisation-based treatment’ compared with ‘structured clinical management’. After 18 months, Bateman et al. (2009) found a statistically significant reduction in the proportion of patients making a suicide attempt (2.8% compared with 25.4%; effect size of $d = .65$) and severe self-harm incidents (23.9% compared with 42.9%; effect size of $d = .62$).
 - Second was DBT compared to community treatment by experts. Among a sample of women, Linehan et al. (2006) found a statistically significant reduction in suicide attempts for DBT (23.1% compared with 46%; HR 2.66, $p = .005$).
 - The review authors found no significant reduction in suicide attempts or self-harm in three other RCTs:
 - Systems Training for Emotional Predictability and Problem Solving (STEPPS) compared to treatment as usual (Blum et al., 2008),
 - CBT for Cluster B personality disorders versus treatment as usual at six years (Davidson et al., 2006; Davidson et al., 2010), and
 - DBT compared to general psychiatric management at 12 months (McMain et al., 2009).
- People with recent suicide attempts, recent self-harm incidents or imminent risk*
- As above, the review authors found insufficient evidence to draw conclusions about the effectiveness of psychotherapeutic interventions in preventing suicide deaths within this population. Again, this was attributed to insufficient power in studies to detect an effect of the intervention on this outcome.
 - There was a significant reduction in repeated self-harm among those who had received problem-solving therapy and usual care, compared to just usual care, for those hospitalised following an episode of self-harm. Hatcher et al. (2011) found no significant difference at 12 months in the proportion of those presenting again with self-harm for the whole study sample compared to those for whom the hospitalisation was as a result of the patient’s first episode of self-harm. However, where they had been hospitalised for repeated self-harm, those who received problem-solving therapy were less likely to present again with self-harm.
 - Methodological limitations (an unacceptably high risk of bias) led the review authors to conclude that there was insufficient evidence to draw conclusions about the preventative effect of psychotherapeutic interventions in the following RCTs:
 - personal construct psychotherapy (Winter et al., 2007),
 - CBT (Stewart et al., 2009),
 - Collaborative Assessment and Management of Suicidality (CAMS) (Comtois et al., 2011),
 - intensive case management with a therapy component (De Leo and Heller, 2007), and
 - skills-based intervention (Donaldson et al., 2005).
 - A study of attachment-based family therapy (Diamond et al., 2010) found fewer low-lethality suicide attempts in the treatment group (11% compared to 22% in the control group). While the reviewers assessed this study to

be of better quality than those listed above, they still concluded that it was not methodologically strong enough to allow 'firm conclusions' (p.26) to be drawn from the results.

- There was some evidence of one intervention having an iatrogenic effect. A study of group therapy among adolescents (aged 12–16) found an 88% incidence of repeated self-harm after 12 months compared to a 71% incidence of self-harm ($p = 0.7$) among those receiving routine care (Hazell et al., 2009). Given the quality of the study, the review authors described the research authors' conclusions about the possibility of iatrogenic effects of the intervention as 'tentative' (p.26). Another study of group therapy with adolescents (Green et al., 2011) did not report similar findings, although this evidence was deemed to be of low quality.

People with a psychotic spectrum disorder

- The study by Tarrier et al. (2006), comparing CBT with supportive counselling, was found to have an 'unacceptably high risk of bias' and insufficient evidence upon which to draw conclusions.

People with depression or dysthymia

- An RCT of the IMPACT intervention, which gives people aged 60 or over access to depression care managers, was deemed by the review authors to have an unclear risk of bias and therefore insufficient evidence upon which to draw conclusions (Unützer et al., 2006).

Referral and follow-up services

The review authors found seven RCTs on referral and follow-up services published since 2005. They related to four separate interventions.

Postcard interventions

Mixed results were found in the two RCTs of postcard interventions that aimed to reduce self-harm.

- A study by Carter et al. (2005; 2007) of adults who were discharged from hospital following deliberate self-poisoning, who received eight postcards over 12 months, found the following:
 - There was a reduction in the cumulative number of repeat episodes of self-poisoning at 12 months (IRR 0.55; 95% CI, 0.35 to 0.87) and 24 months (IRR 0.49; 95% CI, 0.33 to 0.73).
 - No reduction was shown for patients presenting with repeat deliberate self-poisoning.
 - The reduction in the cumulative number of repeat episodes of deliberate self-poisoning was only found in women.
- A study by Beautrais et al. (2010) of patients aged 16 and over who were discharged from hospital following deliberate self-harm or attempted suicide and who received six postcards over 12 months, found:
 - no significant reduction in the total number of self-harm presentations; and
 - no significant reduction in the total proportion of patients who re-presented as a result of self-harm.

Youth-Nominated Support Team (YST) interventions

- This intervention involves supplementing usual care with youth-nominated support persons who maintain regular contact with patients following hospitalisation. Two studies did not find that the intervention significantly reduced the risk of suicide attempts or deaths in suicidal adolescents (King et al., 2009; King et al., 2006).

Assertive community treatment

- There was no reduction in suicide deaths or deliberate self-harm incidents among adults who had received 'assertive community treatment' compared to those who received community mental health care (Killaspy et al., 2006).

Case management/Care co-ordination

- No significant changes were found in the suicide mortality rate of older adults who had accessed a depression care management programme when compared to those receiving 'usual care' (Gallo et al., 2007).

Based on their review of RCTs that examined the effectiveness of a range of suicide prevention interventions, the review authors concluded that the evidence was 'plagued by design flaws and insufficient power' (p.34). They identified two possible explanations for this: first, the complexity of conducting high-quality RCTs of psychotherapeutic interventions, and second, the low base rate of completed suicides and suicide attempts even in the highest risk groups. They found these two issues to be

'paramount' (p.34) in explaining the lack of strong evidence in this field.

Hawton K, Townsend E et al. (1999)
Psychosocial and pharmacological treatments for deliberate self-harm *Cochrane Database Syst Rev* (4): 1-42

Hawton K, Arensman E et al. (1998)
Deliberate self-harm: systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition *British Medical Journal* 317(7156): 441-447

Two papers presented the findings of the same review of treatments for patients who had self-harmed (Hawton et al., 1998; Hawton et al., 1999). The 1999 paper included four studies on psychosocial treatment that were not included in the 1998 paper. Both publications came to the same overall conclusions for psychosocial treatments. Therefore, the 1999 publication is used for this umbrella review.

The objective of the review was 'to identify and synthesise the findings from all RCTs that have examined the effectiveness of treatments of patients who have deliberately self-harmed themselves' (p.1). While the review authors examined all RCTs of psychosocial and/or psychopharmacological treatment compared to standard or less intensive types of patient aftercare, only the findings relating to the psychosocial treatments are reported on here. It should also be noted that the reviewers were only interested in deliberate self-harm as an outcome. DBT was the only intervention for which they found a statistically significant reduction in repeated self-harm.

A wide range of psychosocial treatments were covered in the primary studies

reviewed. For analysis the reviewers grouped together studies with similar treatment strategies. We note that there was not a specific CBT grouping, and studies that included a CBT element were in the 'problem solving therapy' and 'DBT' groupings. Where possible, odds ratio analysis was carried out for each intervention (at a 95% confidence interval), the findings of which are reported on below.

- DBT compared to standard care (one study): A significantly lower rate of repetition of self-harm was found for patients in this study who had received DBT (OR = 0.24; 0.06 to 0.93). However, this finding was limited to one sub-group of patients – female patients with borderline personality disorder who had a history of self-harm (Linehan et al., 1991).
- Problem-solving therapy compared to standard aftercare (five studies): While all the individual studies in this grouping reported reduced repetition of deliberate self-harm in patients in the experimental groups, the review authors' analysis did not find this to be statistically significant (OR = 0.70, 0.45 to 1.11).
- Emergency card compared to standard aftercare (two studies): Experimental groups in these studies were given 24-hour access to emergency advice from a psychiatrist or could admit themselves to hospital. The review authors found that 'while there was a trend towards less repetition of self-harm in the experimental groups', this was not statistically significant (OR = 0.45; 0.19 to 1.07).
- Intensive intervention plus outreach compared to standard aftercare (six studies): The experimental groups in these studies had greater access to therapists and greater efforts were made on the part of service providers to keep in contact with patients through some form of outreach. Studies were inconsistent in the directions of effect they found for intervention groups compared to control groups. The review authors' analysis did not find it to be statistically significant (OR = 0.84, 0.62 to 1.15)
- Inpatient behaviour therapy compared to inpatient in-sight oriented therapy (one study): Because of methodological limitations of the study under review, the review authors could not come to any conclusions from their analysis (OR = 0.60; 0.08 to 4.45).
- Same therapist compared to different therapist (one study): Where patients saw the same therapist for aftercare who had originally assessed them in the hospital, it was found that their repetition rate of self-harm was significantly higher than that among patients who had a change of therapist (OR = 3.70, 1.13 to 12.09). However, it was noted that the experimental group had more risk factors for repeated self-harm than the control group. The reviewers noted that where patients had the same therapist they were more likely to attend at least one outpatient treatment session when compared to the control group (OR = 2.75; 1.37 to 5.52).
- General hospital admission compared to discharge (one study): General hospital admission following self-harm was not found to have a beneficial effect (OR = 0.75; 0.16 to 3.60), although this study was limited to

patients considered to be 'low risk' and with no immediate medical or psychiatric needs (Waterhouse and Platt, 1990).

- Long-term therapy compared to short-term therapy (one study): Long-term therapy (one therapy session per month over a 12-month period) was not found to be more effective than short-term therapy (12 weekly therapy sessions delivered over three months) in preventing repetition of self-harm (OR = 1.0; 0.35 to 2.86). This finding was based on a study of patients (n = 80) who had deliberately self-poisoned (Torhorst et al., 1988).
- Home-based family therapy compared to standard aftercare (one study): Analysis did not find a beneficial effect of family therapy carried out in the patient's home on repetition of self-harm (OR = 1.02; 0.41, 2.51). However, the reviewers also reported on a sub-group analysis of adolescent patients who were not depressed at entry, which was carried out as part of the primary study (Harrington et al., 1998). It found that fewer of those who received home-based family therapy reported suicidal ideation at both two-month and six-month follow-ups, compared to those who received standard aftercare.

The review authors identified a number of limitations to the body of evidence under review.

- Nearly all the RCTs in the review included far too few subjects to be able to have the statistical power to identify clinically meaningful differences in the rates of repeated self-harm.
- Studies varied in the self-harm profile of participants and therefore the

population to which the findings would be generalisable. They varied in the method of self-harm used, whether or not they had a history of self-harm, and whether they were being treated in the community or in a hospital setting.

- The comparison intervention for most of the studies was 'standard care' but this was not clearly defined. It is likely that this varied from site to site which would have impacted on the relative effectiveness of treatments across settings.
- The measurement of the outcome of interest – 'repetition of self-harm' – varied across studies. Sometimes it was based on a hospital referral, sometimes on interviews with patients. The reviewers noted that where different treatments might have been associated with differences in the extent to which a person who repeatedly self-harmed might have presented to hospital, this could be an important source of bias in trials that only looked at routine service data and did not use interviews to ascertain repetition of self-harm.
- The groups of patients in studies were often heterogeneous in terms of gender, age and presenting problems. The reviewers suggested the efficacy of interventions should be looked at according to such factors.

The reviewers concluded that the findings suggested 'promising results' (p.7) for problem-solving therapy and DBT, while for enhanced care there were 'trends favouring provision' (p.7) of an emergency access card in addition to standard care. However, they also argued that there was a lack of evidence to indicate which forms of treatment were

the most effective for patients who self-harm: 'There is a need for larger trials of treatments associated with trends towards reduced rates of repetition of deliberate self-harm. The results of small single trials which have been associated with statistically significant reductions in repetition must be interpreted with caution and it is desirable that such trials are also replicated' (p.2).

Crawford MJ, Thomas O et al. (2007)
Psychosocial interventions following self-harm. Systematic review of their efficacy in preventing suicide *British Journal of Psychiatry* 190(1): 11–17

The reviewers carried out a meta-analysis of RCTs of psychosocial interventions following self-harm, to estimate their impact on the rate of subsequent suicide. They also carried out the analysis on all-cause mortality, the findings of which are beyond the scope of this umbrella review. In their analysis, they combined data from studies on a wide range of psychosocial treatments, which were being delivered to populations of varying ages and gender and with diverse histories of self-harm. They analysed a range of psychotherapeutic and enhanced care/follow-up interventions under the one label 'psychosocial interventions'.

The meta-analysis of the effect of psychosocial interventions on completed suicide found no significant effect (pooled root difference in suicide rate 0.0, 95%CI - 0.03 to 0.03) (p.11). Among the limitations identified by the authors of this analysis were:

- There was a relative lack of statistical power in the meta-analysis owing to the small sample sizes in many of the trials.

- By combining all the interventions, the impact of specific forms of intervention may have been minimised.

van der Sande R, Buskens E et al. (1997)
Psychosocial intervention following suicide attempt: A systematic review of treatment interventions *Acta Psychiatrica Scandinavica* 96(1): 43–50

The reviewers carried out a review of RCTs of psychosocial interventions for suicide attempters. Interventions included psychotherapeutic treatment and interventions aimed at improving compliance with aftercare. 'Attempted suicide' included deliberate self-poisoning and self-harm, irrespective of the 'apparent purpose of the act' (p.44). All the studies included had reductions in repeated suicide attempts as their main outcome. The only intervention for which the reviewers found some evidence of a positive effect was CBT.

The reviewers developed four categories of interventions in an attempt to address the issue of heterogeneity among the interventions in terms of therapeutic backgrounds and protocols. Their findings, based on estimates of an overall relative risk calculation, are presented for each of the four categories.

- Cognitive behavioural approaches (four studies): These were all studies of interventions based on a cognitive-behavioural rationale. This is the only intervention for which a significant reduction in repeated suicide attempts was found (RR = 0.5; 95% CI = 0.3 to 0.8). However, the review authors identified some limitations. They suggested that first, publication bias might have influenced the result; second, the baseline rates of previous

suicide attempts had been relatively high within the studies and therefore, the reduction in relative risk found might not have applied to all suicide attempters but only to those at high risk; third, given the study design issue of duration of follow-up, CBT might not have been so effective in the long term; and finally, as only one of the four trials had been analysed on an intention-to-treat basis, this might have resulted in an 'over-optimistic estimate of effect' (p.49).

- Psychosocial crisis intervention (two studies): These interventions were delivered by psychiatric nurses and social workers. They included out-patient appointments in which the focus was on the reduction of well-defined problems by discussing effective methods of problem resolution. The reviewers found no significant reduction in the risk of repeated suicide attempts (RR = 0.9; 95% CI = 0.5 to 1.3).
- Psychiatric management of poor compliance (six studies): This category was made up of strategies to improve the continued participation of suicide attempters in aftercare and to increase their motivation to attend for aftercare. No specific psychiatric or psychotherapeutic treatment was offered. The reviewers found no evidence of reduced rates of repeated suicide attempts as a result of these interventions (RR = 0.9; 95% CI = 0.6 to 1.4).
- Guaranteed in-patient shelter (two studies): These interventions provided patients with a card allowing readmission to hospital in the event of an emergency. The reviewers found no significant reduction in the risk of

repeated suicide attempts (RR = 0.5; 95% CI = 0.2 to 1.1).

Despite the limitations outlined above in relation to CBT approaches, the review authors concluded that while 'by no means conclusive' (p.49), the findings indicated that CBT might be effective in reducing repeated suicide attempts. Given their findings, they identified a need for additional research on CBT interventions in well-defined groups of suicide attempters.

Winter D, Bradshaw S et al. (2013) A systematic review of the literature on counselling and psychotherapy for the prevention of suicide: 1. Quantitative outcome and process studies *Counselling and Psychotherapy Research* 13 (3): 164–183

The review by Winter et al. (2013) aimed to assess the impact of counselling and psychotherapy on people considered to be at risk of suicide, on a range of outcomes to do with mental well-being. While they reported that most of the primary studies they included in their analysis were on DBT, CBT and problem-solving therapy, it was unclear which other interventions were included. They studied a broader range of outcomes than just suicidal behaviour, including also suicide attempts, self-harm, suicidal ideation, measures of hopelessness and depression and other miscellaneous measures. Overall, they reported a statistically significant effect of the interventions under study on their outcomes of interest.

The reviewers carried out a number of statistical tests, using meta-analysis and meta-regression techniques, to look at the relationship between the interventions and the outcomes. They carried out this analysis on

two groups of primary studies reflecting their study design. For each group the reviewers found a statistically significant effect, representing a positive effect of the interventions on the outcomes of interest:

- randomised controlled trials (RCTs) and non-RCTs (-0.45 (95% CI: -0.57 to -0.32, $p < .001$), and
- observational studies and controlled studies, with and without randomisation (-0.72 [95% CI: -0.853 to -0.579], $p < .001$).

The reviewers identified a number of limitations to their study, including the following.

- The considerable heterogeneity of methods, interventions and outcomes among the studies included in the analysis were 'a cause for caution in the interpretation of results'.
- The reviewers did not look at whether the self-harm history of patients or psychiatric morbidity impacted on treatment outcomes.
- While the reviewers used measures that were closest to suicidal behaviour, they did not ascertain whether clients saw themselves as suicidal.

The review authors concluded that 'the studies reviewed provide evidence of the effectiveness of psychological interventions for clients at risk of suicide' and that while most of the studies they included were of some form of CBT, there were promising findings for other forms of psychotherapeutic or counselling therapies. However, we would highlight and strongly agree with their view that 'the heterogeneity of the studies requires some caution in interpreting their results'.

Tarrier N, Taylor K et al. (2008) Cognitive-behavioral interventions to reduce suicide behavior: A systematic review and meta-analysis *Behavior Modification* 32(1): 77–108

These reviewers carried out a systematic review and meta-analysis to explore whether CBTs or treatments that contained cognitive-behavioural methods as a substantial part of the treatment, reduced suicide behaviours. They defined suicide behaviour as completed suicides, suicide attempts, suicide intent and/or plans, and suicidal ideation. While they found CBT reduced suicidal behaviour among adults, given the methodological limitations they suggested the findings be treated with caution.

The reviewers' narrative analysis found a lot of variation in the 28 studies reviewed, particularly in relation to what was included as CBT and how it was being delivered.

- **Nature of treatment:** The types of treatments studied included DBT, manual assisted cognitive behavioural therapy (MACT), problem solving training, cognitive therapy/restructuring and family behaviour therapy, among others.
- **Treatment delivery staff:** Programmes were delivered by staff with varying levels of professional training and experience, including clinical psychologists, psychiatrists, nurses, school counsellors and 'relatively junior' therapists still in training.
- **Length of treatment:** The mean duration of treatment was 19.52 weeks (SD = 24.77). However, the estimated hours of therapy ranged from 3.15 for a MACT programme to 190.6 hours of therapy for a DBT programme. The majority (n=20) of

interventions lasted six months or less, while some ($n = 6$) lasted 12 months or longer.

- Number of treatment sessions: The mean number of treatment sessions was 25.01 (SD = 30.72). The estimated number of sessions ranged from 2.7 to 104.
- Target population: The gender and age profile of the study populations in different studies varied, as did the mental health issues they were facing.

The overall results of the reviewers' meta-analysis based on follow-up at up to 3 months included the following.

- CBT had an 'overall positive effect' ($p.90$) on reducing suicidal behaviour (combined Hedge's $g = -0.59$, $z = -5.26$, $p < .0001$, 95% CI = -0.811 to -0.371).
- CBT had a 'highly significant' effect on adults (combined Hedge's $g = -0.775$, $z = -5.497$, $p < .0001$, 95% CI = -1.051 to -0.498) but the effect on adolescents was 'not significant' (combined Hedge's $g = -0.260$, $z = -1.355$, $p < .175$, 95% CI = -0.635 to 0.116) ($p.90$).
- CBT had a significant effect when compared to no treatment (combined Hedge's $g = -0.808$, $z = -3.389$, $p < .001$, 95% CI = -1.276 to -0.341) or treatment as usual (combined Hedge's $g = -0.594$, $z = -3.754$, $p < .0001$, 95% CI = -0.92 to -0.269) but not when compared to another form of therapy (combined Hedge's $g = -0.412$, $z = -1.619$, $p < 0.105$, 95% CI = -0.910 to 0.087).
- A comparison of CBT with DBT found similar effect sizes that were 'robust and comparable' ($p.95$): CBT (combined Hedge's $g = -0.562$, $z = -4.244$, $p < .0001$, 95% CI = -0.825 to -0.302), and DBT (combined Hedge's g

= -0.697, $z = -3.057$, $p < .0001$, 95% CI = -1.143 to -0.250).

- CBT had a significant effect when it was delivered on a one-to-one basis, even where the series of sessions included some group work, but it was not found to have a significant effect when it involved just group work (combined Hedge's $g = -0.576$, $z = -3.74$, $p < .0001$, 95% CI = -0.881 to -0.271 for individual treatment; combined Hedge's $g = -0.790$, $z = -3.466$, $p < .001$, 95% CI = -1.237 to -0.343 for individual treatment together with group treatment).

However, a number of limitations to this review were identified by the authors. They included:

- a publication bias that 'appeared to be operating' ($p.102$) across the included studies,
- variation in the populations being treated, the nature of treatment and the outcome measures used, across the included studies,
- a lack of consistency in the age groups defined as 'adult' and 'adolescent' across the studies,
- a low number of studies in some of the sub-group analyses carried out, and
- a lack of consistent information, making it impossible to evaluate the impact of duration, frequency and intensity of treatment on outcomes.

The review authors concluded that 'even though the systematic development of cognitive-behavioural suicide prevention programmes is in the early stages, there are reasonable grounds for cautious optimism that progress is in the right direction' ($p.103$). They also suggested that, as well as there being a

need for larger clinical trials on the effectiveness of CBT in preventing suicide, research should identify the elements within CBT programmes that can be delivered to at-risk individuals. Overall, given the range of limitations to this study we would agree with the authors' suggestion that the findings should be interpreted with caution.

**Robinson J, Hetrick SE et al. (2012)
Preventing suicide in young people:
Systematic review *Australian and New
Zealand Journal of Psychiatry* 45(1): 3–26**

(Robinson et al. 2011a) carried out a systematic review and meta-analysis of all RCTs of interventions for adolescents and young adults (aged 12–25) who had presented to a clinical setting for suicidal behaviours. The outcomes of interest were suicide attempt, suicidal ideation, and deliberate self-harm. The reviewers found 21 studies covering a range of interventions. However, not all provided adequate outcome data for the meta-analysis, the findings of which are presented here. Overall, they found limited evidence for a positive effect of CBT and DBT on young people's suicidal behaviour.

Statistically significant differences were found between intervention groups and their comparison groups for two of the seven interventions of interest to our review. These two studies are described below.

CBT compared to TAU (one study)

- Slee et al. (2008) found that while the number of people who engaged in self-harm did not change, the number of incidents of self-harm was reduced in the CBT group at the nine-month follow-up.

- Number of self-harm incidents: The research authors found no statistically significant differences between the two groups either post intervention or at six months. However, at nine months there were fewer self-harm incidents reported in the group receiving CBT (MD -3.4, 95% CI -6.54 to -0.26).
- Suicidal ideation: There was a significant reduction in suicidal ideation among those receiving CBT post intervention (MD -13.07, 95% CI -22.48 to -3.66), at six months (MD -13.78, 95% CI -23.49 to -4.07), and at nine months (MD -18.28, 95% CI -26.66 to -9.9).
- Number of people with self-harm incidents: There was no statistically significant difference found between the groups.

This study (n = 90) was predominantly of female patients: there was a male to female ratio of 1:14.

DBT compared to control intervention (one study)

- Turner (2000) compared a 12-month DBT intervention with client-centred therapy for people aged 18–27 with a borderline personality disorder. The reviewers noted that caution was required when interpreting the findings as the study population was small (n = 24) and there was a high drop-out rate.
- Mean number of suicide attempts: There was a statistically significant difference between the groups, with fewer suicide attempts reported in the DBT group at both six-month (MD -4.58, 95% CI -8.13 to -1.03) and 12-month follow-up (MD -4.83, 95% CI -7.9 to -1.76).

- Suicidal ideation: There was a statistically significant difference between the groups, with lower levels of suicidal ideation being exhibited in the DBT group at both six-month (MD -10.5, 95% CI -16.38 to -4.62) and 12-month follow-up (MD -7.75, 95% CI -14.66 to -0.84).

The reviewers found no statistically significant differences between adolescents in the treatment and control groups for the following interventions:

- Individual psychological therapy compared to control intervention: They found no difference between the groups in the number of people with suicide attempt and suicidal ideation.
- Group psychological therapy compared to TAU: There was no difference found between the groups in the mean number of self-harm incidents, the number of people who engaged in multiple self-harm incidents, the number of people with self-harm, and those with suicidal ideation.
- Family therapies compared to TAU: There was no difference found between the groups in the number of people with one or more incidents of self-harm and with suicidal ideation.
- Youth nominated support team compared to TAU: There was no difference between the groups in the number of people making a suicide attempt.
- Emergency access card and TAU compared to TAU alone: There was no difference between the groups in the number of people making suicide attempts.

No outcome data were available for the 'compliance enhancement intervention versus TAU' trial.

The reviewers identified a number of limitations to their study, which were grounded in the limitations of the primary studies under review.

- There was relatively little evidence on the topic.
- Studies were not adequately powered to measure suicide as an outcome.
- The proxy indicators of suicidal behaviour were defined differently in different studies, making it difficult to compare findings and carry out meta-analysis.
- Often studies did not report adequately on their methodology, making it difficult for reviewers to assess the risk of bias.

In their conclusion, the review authors noted that the Tarrier et al. (2008) review discussed above had concluded that CBT-based interventions reported a positive effect among adults but not among adolescents. They argued that their review updated this by including more recently published RCTs and that their findings suggested this effect might also be true for adolescents and young people. Furthermore, while their meta-analysis did not find any statistically significant difference, they specifically mentioned the family therapies and interpersonal therapy as worthy of further research. More broadly, they identified the need to carry out more high-quality RCTs across the interventions for young people, and to carry them out rigorously with minimised risk of bias and standardised definitions of outcomes.

Lapierre S, Erlangsen A et al. (2011) A systematic review of elderly suicide prevention programs *Crisis: The Journal of Crisis Intervention and Suicide Prevention* 32(2): 88–98

The review by Lapierre et al. (2011) of prevention interventions for older people (aged 60 and over) provided a narrative analysis of a programme of psychosocial interventions for older people. In addition to the interventions outlined below, they reviewed a study of a community-based screening programme with follow-up (Oyama et al., 2005), the findings of which are reported in Section 3.4 above.

Psychotherapy

The reviewers found two studies exploring the impact of programmes that included a psychotherapeutic element: CBT in one (Lapierre et al., 2007), and interpersonal psychotherapy in the other (Heisel et al., 2009). The reviewers did not assess the quality of these studies and their limitations were not reported. The first was a case control study and the other a case series.

- Lapierre et al. (2007) used a case control approach to evaluate a programme that included an 11-week workshop based on CBT, which was offered to small groups of early retirees who had problems adapting to retirement. It found that 80% of the experimental group (n = 11), but only 36% of the control group (n = 10), reported absence of suicidal ideation at the 6-month follow-up.
- Heisel et al. (2009) carried out a case series to evaluate a programme that included a 16-week interpersonal psychotherapy intervention for adults aged 60 or more who were at elevated risk for suicide. Within their sample (n = 11), they found a

reduction between pre- and post-treatment on a score for suicidal ideation ($t = 2.75, p = .02$).

Depression care managers

The reviewers examined two RCTs on primary care collaborative treatment strategies (IMPACT and PROSPECT) that both focused on the provision of depression care managers. These managers could be nurses, psychologists, or social workers. They offered education about treatment options, brief psychotherapy (interpersonal or behavioural), monitoring of the older person's depressive symptoms and medication side-effects, and follow-up of patients. The reviewers found:

- After a 12-month intervention, IMPACT programme participants had a statistically significant lower rate of suicidal ideation at six, 12, 18 and 24 months compared to patients assigned to usual care (OR [CI - 95%]: after six months, 0.54 [0.37 – 0.78]; after 12 months, 0.54 [0.40 – 0.73]; after 18 months, 0.52 [0.36 – 0.75]; and after 24 months, 0.65 [0.46 – 0.91]) (Unützer et al., 2006).
- No statistically significant difference was found between the intervention and usual care groups for the PROSPECT programme for suicidal ideation, the only study to look at the outcome related to suicidal behaviour studied (Alexopoulos et al., 2009).

Elements of the IMPACT programme that were identified as contributing to its success were development of a therapeutic alliance between the older person and the care manager, a personalised treatment plan and proactive follow-up by the manager (Unützer et al., 2006).

**Bahraini NH, Simpson GK et al. (2013)
Suicidal ideation and behaviours after
traumatic brain injury: A systematic review
Brain Impairment 14 (1): 92–112**

The review by Bahraini et al. (2013) focused on traumatic brain injury (TBI) survivors and suicide. While they found evidence of increased risk of suicide among TBI survivors, there was little evidence of what worked in preventing their suicide. They found two studies of psychosocial interventions for this population that looked at suicidal ideation as an outcome (Rees and Bellon, 2007; Simpson et al., 2011). Both used an element of CBT, one as part of a group programme, the other in individual counselling. Neither study found significant evidence of a reduction in suicidal ideation, the latter being described as having a high risk of bias.

Evidence statement

The evidence for psychosocial interventions is very mixed. Within the two broad categories of interventions – psychotherapy and enhanced care/follow-up – there is a wide variety of interventions. Even where reviews drew on roughly the same set of primary studies, they varied in how they categorised interventions and, in some cases, populations. Interventions that were categorised together often varied greatly in the content of the intervention, the length of intervention, the mode of delivery, and the target population. Therefore, at best, we can only make statements about which interventions look promising. This statement focuses on the seven reviews that took a meta-analytical approach.

The only review that did a meta-analysis and specifically examined suicide rates as

an outcome (Crawford et al., 2007) found no significant impact of psychosocial interventions on the outcome. It should be noted that, when carrying out their analysis, these reviewers included all kinds of interventions, from giving a ‘green card’ for access to services to 50 sessions of psychotherapy, under the one term. None of the other reviewers who used meta-analysis found that psychosocial interventions significantly reduced the rate of suicide deaths.

Psychotherapy

Where all interventions were categorised for analysis under a single label – ‘psychotherapy’ – the findings were mixed with regard to the impact of psychotherapeutic interventions on suicide outcomes. It was found that they reduced suicidal behaviour/suicide attempts for adults (O'Connor et al., 2013; Winter et al., 2013) but not for adolescents (O'Connor et al., 2013).

Cognitive behavioural therapy (CBT)

The findings suggest that CBT (in its widest sense) may have a significant effect on reducing suicidal behaviour (Robinson et al., 2013; Tarrier et al., 2008; van der Sande et al., 1997). However, it is unclear from the reviews which forms of CBT are most effective for which populations. Where a distinction between adults and adolescents is made, the findings are mixed. Tarrier et al. (2008) found the effect only to be significant among adults, whereas Robinson et al. (2011a) found it to be significant for a reduction in self-harm and suicidal ideation among adolescents. Robinson and colleagues’ conclusion was based on one primary study (Slee et al., 2008), which was not included in the review by Tarrier and colleagues. In the

O'Connor et al. (2013) review discussed above, the Slee study was categorised as an adult study; it was of patients aged 15–35.

Dialectical behavioural therapy (DBT)

While reviews varied in their categorisation of the various forms of psychotherapy, there was general consensus that DBT is a specific form of CBT. As with CBT, there is some evidence that DBT may have a significant impact on suicide attempts/self-harm in both adults (Hawton et al., 1999) and adolescents (Robinson et al., 2011a) who have a borderline personality disorder. However, there is no evidence that this finding is generalisable beyond these populations. The reviews based their findings on two separate research studies – the Hawton et al. (1999) and O'Neil et al. (2012) reviews on Linehan et al. (1991), and the Robinson et al. (2011a) review on Turner (2000). Both these research studies looked only at patients with borderline personality disorder, and Linehan and colleagues included only women while Turner and colleagues had a 3:1 female to male ratio.

Other psychotherapies

Other psychotherapeutic interventions for which the reviewers found no statistically significant findings included:

- problem-solving therapy for self-harm (Hawton et al., 1999; van der Sande et al., 1997),
- family therapy for self-harm and suicidal behaviour (Hawton et al., 1999; Robinson et al., 2011a),
- group therapy with adolescents for suicidal behaviour (Robinson et al., 2011a),
- intensive intervention plus follow-up (Hawton et al., 1999),

- inpatient behaviour therapy (Hawton et al., 1999), and
- long-term therapy compared to short-term therapy (Hawton et al., 1999).

While there were no statistically significant findings for these interventions, based on the findings of primary studies reviewers did note that the following showed potential:

- problem-solving therapy (Hawton et al., 1999),
- family therapies (Hawton et al., 1999; O'Connor et al., 2013; O'Neil et al., 2012; Robinson et al., 2011a), and
- DBT for older people (Lapierre et al., 2011).

Similarly, group therapy for adolescents was identified by one primary study (Hazell et al., 1993) as having a potentially negative effect on suicidal behaviour (O'Neil et al., 2012), but the same primary study was used by Robinson et al. (2011a) in their analysis and this iatrogenic effect was not found.

Across the reviews there was a call for further research on psychotherapeutic interventions, particularly for adolescents.

Enhanced care/follow-up

No meta-analytic paper found a statistically significant impact of any enhanced care/follow-up interventions on suicidal behaviour outcomes. However, narrative synthesis provided a more mixed picture.

Emergency cards

All of the reviews that explored the impact of 'emergency cards' that would allow patients readmission to hospital in the case of an emergency (Hawton et al.

1999; van der Sande et al., 1997; Robinson et al., 2011a) drew on the same two primary studies: all three reviews reviewed (Cotgrove et al., 1995), (Morgan et al., 1993) and two reviews (van der Sande et al., (1997) and Hawton et al., (1999)) reviewed Morgan et al., (1993). Hawton and colleagues noted that, while these studies showed a trend towards less repetition of self-harm in the experimental groups, this was not statistically significant.

Postcards/telephone follow-up

While meta-analysis did not find that postcard or telephone follow-up had impacted on suicidal behaviour, the findings from narrative reviews and primary studies referred to in reviews were mixed and therefore inconclusive (O'Connor et al., 2013; O'Neil et al., 2012). This was also the conclusion of a review that focused specifically on these interventions but which we assessed to be of 'weak' quality and so did not report on it (Luxton et al., 2013). These review authors found both significant and non-significant impact on suicidal behaviour within the studies they reviewed and suggested that further investigation was needed to determine the impact of follow-up.

Methodological issues

We and the authors of the 13 reviews are in agreement in identifying a series of limitations to the primary studies on psychosocial interventions, in particular when trying to carry out a review and compare findings between studies. To address some of the main limitations we and other authors have a series of suggestions for investigators to consider in undertaking future research projects.

- The interventions and their expected outcomes need to be clearly defined.
- The skills and level of training of staff should be defined and have the same purpose as in the 'new' intervention.
- What constitutes TAU or 'usual care' needs to be clearly defined.
- The study population should be identified and it should be recognised that the findings will only be applicable to them. Age, gender, and mental health status are key influencers on how treatments work.
- An adequate calculated sample size should be used that will allow the investigator to detect a difference (if a difference exists) in the outcomes of interest (suicidal ideation, self-harm, suicide attempts and completed suicide) between the intervention group and the control group.
- The follow-up period based on clinical expectations and objectives needs to be clear.
- People should be allocated to the intervention using a randomisation process so as to deal with confounding factors.
- Blinding procedures for data collectors need to be used so as to deal with investigator bias.
- Loss to follow-up needs to be monitored.
- Intention to treat analysis should be used and it should be ensured that 95% CIs are applied to the results so that the difference can be applied to the population that the study represents.

3.6 Telemental health

Telemental health (TMH) has been used in numerous countries as a way of

providing mental health care, predominantly in psychiatric facilities. It is defined as the use of ‘communications networks for delivery of healthcare services and medical education from one geographical location to another’ (Sood et al., 2007). The premise upon which this prevention intervention is based is that providing care and support via, for example, telephone hotlines, video conferencing, internet or virtual reality, can influence whether suicides are completed.

Three reviews met the inclusion criteria for this umbrella review: two were judged to be of moderate quality (Hailey et al., 2008; Lapierre et al., 2011) and the other was of weak quality (Lester, 1997) (see Appendix 4). While Hailey and colleagues focused on telemental health interventions specifically, Lapierre and colleagues reviewed the evidence for telephone counselling as part of a broader review of interventions for older people.

Table 5: Telemental health reviews

Review author & date	Review title	Quality rating
Hailey et al. (2008)	The effectiveness of telemental health applications: A review	Moderate
Lapierre et al. (2011)	A systematic review of elderly suicide prevention programs	Moderate

Hailey D, Roine R et al. (2008) The effectiveness of telemental health applications: A review *The Canadian Journal of Psychiatry* 53(11): 769–778

The reviewers found encouraging evidence indicating that telemental health services are beneficial in the treatment of clinical mental health outcomes. They aimed to evaluate the effectiveness of the delivery of telemental health services. The review covered numerous studies (n = 72), but no indication was provided regarding the geographic location of the studies.

Although a broad range of outcomes were examined, for example general psychiatry and (or) mental health, depression, panic disorder, smoking, dementia, child psychiatry, obsessive compulsive disorder, schizophrenia, alcohol and (or) other drug abuse, eating disorders and post-traumatic stress, only the outcomes for suicidal behaviours are reported here.

Only two of the 72 primary studies reported suicide outcomes. Effectiveness was measured in terms of repeat suicide attempts, treatment attendance by individuals who had previously attempted suicide, and suicide completion.

The prevention strategy investigated by both the primary studies was telephone-based. The first study was an RCT which demonstrated that changes in the number of repeat suicide attempts or in treatment contact among patients who had attempted suicide was not significant (Cedereke et al., 2002). The second study was a 10-year longitudinal design, which demonstrated that a telephone hotline and emergency service were associated with a lower rate of suicide, and more so in elderly females (De Leo et al., 2002). No data were presented by the review authors to support these findings nor were any review limitations identified by the review authors.

The review authors noted that the studies investigated a wide variety of telemedicine technologies across numerous mental health sub-specialties, conclusions regarding individual clinical outcomes such as suicide were not reported.

Nonetheless, Hailey et al. (2008) emphasised that good-quality research is necessary to examine the use of TMH in routine care and put forward criteria considered essential in the administration of tele-interventions:

- equipment must be reliable and robust,
- TMH must be well accepted by clients and health care specialists, and
- TMH interventions must be able to provide a similar standard of service quality as face-to-face meetings, without interrupting practice patterns.

Lapierre S, Erlangsen A et al. (2011) A systematic review of elderly suicide prevention programs *Crisis: The Journal of Crisis Intervention and Suicide Prevention* 32(2): 88–98

In their broader review of interventions for older people (aged 60 and over), Lapierre et al. (2011) found one study of a telephone counselling outreach programme that reported on an outcome of interest to our review – suicide rates (De Leo et al., 2002). While this was also reported on by Hailey et al. (2008), Lapierre and colleagues provided more detail on the study and its findings. It was a cohort study, the quality of which was not assessed by the reviewers. The intervention evaluated had two elements – a 24-hour emergency service which older people could telephone for help,

making it difficult to compare like with like. The review authors' conclusion was based on the review as a whole and

and tele-check, a twice-weekly telephone support service. The researchers assessed the long-term impact of the service on suicide rates in the intervention area.

They found the following:

- After 11 years the number of observed suicides among service users living in the intervention area ($n = 6$) was statistically significantly lower ($\chi^2(1) = 10.6, p < .001$) than the expected number ($n = 20.86$), which was calculated from the prevailing suicide rate in the region. A standardised mortality ratio indicated that only 28.8% of the expected suicide mortality had occurred.
- The programme appeared to have a significant benefit only for female service users. The difference between observed and expected number of suicides for women was significant ($\chi^2(1) = 8.4, p < .01$). It was noted that 84% of service users in the study were women.

Evidence statement

As acknowledged by the review authors, there is encouraging albeit limited evidence indicating that TMH as a prevention strategy is effective in relation to clinical mental health outcomes. However, only two primary studies examined suicide outcomes, with one demonstrating a reduction in suicide rates only among females. Although this outcome is promising, it is difficult to draw strong conclusions regarding the impact of TMH on suicide outcomes; further investigation would be necessary to determine the exact impact.

3.7 Web-based suicide prevention

The internet is an important resource that may be useful in suicide prevention (Lai et al., 2014). The premise upon which this prevention intervention is based is that individuals vulnerable to suicide frequently access web-based resources looking for support. One review examining the impact of web-based interventions as a suicide prevention strategy was assessed for quality and was assigned a moderate rating by the umbrella review authors; relevant data were extracted (Lai et al., 2014).

Lai MH, Maniam T et al. (2014) Caught in the web: A review of web-based suicide prevention *Journal of Medical Internet Research* 16(1): e30

The reviewers found preliminary evidence indicating that web-based interventions may be beneficial as a suicide prevention strategy. They aimed to assess the effectiveness of web-based suicide prevention strategies by centring on evidence that demonstrated efficacy, benefits and challenges. Thirteen studies that met their inclusion criteria were rated variously as high (n = 5), medium (n = 5) and low (n = 3). The design of the studies varied: RCT (n = 3), pre- and post-treatment (n = 1), cohort (n = 2), cross-sectional (n = 2), descriptive (n = 3), qualitative (n = 1) and narrative reviews (n = 2). No indication was provided regarding the geographic location of the studies. A broad range of interventions were identified, for example:

- iCBT,
- information provision, counselling, email, and chat rooms,

- college screening project via interactive web-based method,
- web-based anonymous confidential screening assessment/referral programme,
- internet suicide survivor support group,
- website, personal communication (e.g. chat/email), group communication (e.g. online forum/chat), and
- online training.

The reviewers placed greater emphasis on reporting and discussing papers that were of higher quality than those that were of lower quality. Effectiveness was measured in terms of change in suicidal ideation. Three studies examined the impact of an iCBT intervention on suicidal ideation:

- The first study, which used an RCT design, was reported in two papers (van Spijker, 2012; van Spijker et al., 2012). The iCBT intervention group was associated with a reduction in suicidal ideation (d = 0.28) six weeks post-intervention in comparison to the control group. This outcome was maintained three months later.
- The second study, which also used an RCT design, examined iCBT for depression (Christensen et al., 2013). This study demonstrated that all three iCBT intervention groups for depression (iCBT alone, iCBT and telephone call-back, telephone call-back alone) and the control group (TAU) were significantly associated with lower suicidal ideation: iCBT delivered independently or with a telephone call-back did not provide better outcomes than receiving a telephone call-back only or TAU. The

review authors presented no data to support this finding. Follow-up at 12 months indicated a small effect size for iCBT (0.04-0.45)

- Another iCBT intervention in depressed patients demonstrated that suicidal thought pre-intervention (54%) declined post-intervention (30%) as assessed by Item 9 on the Patient Health Questionnaire (Watts et al., 2012). However, the review authors stated that no control group was used for comparison.

Additionally, a cross-sectional survey compared demographic and loss-related characteristics of two suicide survivor groups (an internet group and a group that held face-to-face meetings) (Feigelman et al., 2008). The results indicated that in the previous year:

- a higher proportion of the internet group (35%) reported suicidal ideation sometimes or more often, compared to the face-to-face group (23%);
- a higher proportion of the internet group (17%) compared to the face-to-face group (7%) reported having a plan for suicide; and
- 64% of participants in the internet group indicated that advance goals of suicide prevention resources were vital in preventing suicidal ideation.

The remaining primary studies, which were presented using a descriptive evaluative narrative, suggested anecdotally that users experienced some form of positive benefit from using the web as a resource. However, the review authors presented no supporting data to back these findings.

As observed by Lai et al. (2014), their review had its limitations. Only 15 studies

met the inclusion criteria, of which only three were RCTs and one was a pre-and post-intervention study. The review authors pointed out that it was not possible to determine an overall effect owing to lack of homogeneity with respect to population, study design, and how constructs were measured. Additionally, they suggested that two types of bias might have been present: first, publication bias with respect to omissions in the search criteria, for example grey literature and no contact with experts in the area to locate unpublished studies; and second, some studies did not use a control group or blinding when allocating participants to interventions. The lack of a control group and of blinding could have resulted in participants completing self-reports more favourably as they were aware they were receiving the intervention.

The review authors concluded that web-based suicide prevention strategies might be beneficial. Nevertheless, they stressed the need to carry out larger research projects to identify their impact. The benefits and potential challenges of ensuring accessibility, anonymity and text-based communication as key components for web-based prevention strategies were emphasised in the review.

Evidence statement

We conclude that there is preliminary evidence indicating that web-based suicide prevention strategies may be beneficial in helping to reduce suicidal behaviours. It was not possible for the review authors to carry out a meta-analysis owing to the variability between the primary studies. However, their findings are promising. It is important to note that there was only one review

available for this intervention and although it received a moderate quality assessment, data were only presented for three RCTs and one pre- and post-treatment case series. The review authors suggested further investigation would be necessary to determine the exact impact of web-based suicide prevention strategies and we support this suggestion.

3.8 Emergency Department

Hospital emergency departments have been identified as vital settings for evaluating and alleviating suicide emergencies and instigating follow-up care to reduce suicide symptoms (Larkin et al., 2008). The premise upon which this prevention intervention is based is that providing care and support originally in emergency departments via, for example, assessment by a psychiatric clinician, review of treatments and expectations, and adherence, can influence whether a suicide is completed.

Only one review on emergency departments met the inclusion criteria for this umbrella review; it was judged to be of strong quality (Newton et al., 2010) (see Appendix 4).

Newton AS, Hamm MP et al. (2010) Pediatric suicide-related presentations: A systematic review of mental health care in the emergency department *Annals of Emergency Medicine* 56(6): 649–659e2

The reviewers found preliminary evidence suggesting that suicide prevention transition interventions delivered by emergency departments may reduce suicidal behaviour outcomes such as repeated self-harm, suicide re-attempt or suicidal ideation. The primary studies (n = 10) were carried out in a number of

geographic locations (Belgium, Brazil, Canada, China, India, Iran, Ireland, Sri Lanka, the UK and the USA). The review authors assessed the efficacy of interventions that aimed to improve mental health care and health outcomes for suicidal behaviours recorded among young people presenting in emergency departments.

Although a range of primary outcomes were examined, for example parent-related (reporting of means restriction) and care-related (service delivery, consultation, documentation), only the outcomes for suicidal behaviours, for instance rates of self-injurious behaviour, death by suicide or suicidal ideation, are reported in this umbrella review. Effectiveness measured in terms of changes in suicidal behaviours was assessed mainly using risk ratios (RRs). The analyses indicated only two programmes reduced suicide outcomes. Studies presenting suicide outcomes were classified into two types of intervention programmes:

- post-emergency department, that is, direct emergency department enrolment, and
- emergency department plus post-emergency department intervention programmes.

Post-emergency department (ED) (direct ED enrolment)

- Skills-based treatment was not associated with a reduction in rates of suicide re-attempts (RR = 2.13, 95% CI:0.53 to 9.08), or suicidal ideation (MD = -7.27, 95% CI:-35.13 to 20.59) (Donaldson et al., 2005).

- MACT was not associated with reductions in repeated self-harm across the life course (RR = 0.86, 95% CI:0.69 to 1.08) (Tyrer et al., 2004).
- Interpersonal problem-solving skills training was not associated with a reduction in self-poisoning at one-year follow-up (RR = 0.50, 95% CI:0.12 to 2.05) (McLeavey et al., 1994).
- Following presentation with suicidal behaviours, admission to hospital and recommendations to contact own GP if further help required was not associated with reductions in representation after discharge (RR = 0.77, 95% CI:0.20 to 2.89) (Waterhouse and Platt, 1990).
- Specialised services, for example community-based outreach, liaising with the hospital or advocacy with relevant agencies, were not associated with reductions in emergency department representation for suicide attempt (RR = 1.71, 95% CI: 0.73 to 4.03) (Deykin et al., 1986).

Emergency department plus post-emergency department interventions

- Standard care plus brief intervention and contact can reduce suicide mortality rates (RR = 0.10, 95% CI: 0.03 to 0.41, Number Needed to Treat [NNT] = 52 [range 23 – 98]) (Fleischmann et al., 2008).
- Standard emergency department care plus Successful Negotiation Acting Positively (SNAP) therapy was associated with higher treatment completion (OR = 2.78, 95% CI: 1.20 to 6.67, NNT = 5 [range 3 – 20]) but did not reduce suicide reattempts (RR = 0.63, 95% CI: 0.25 to 1.54) (Rotheram-Borus et al., 2000).

- Rapid response outpatient team was associated with a reduction in later suicide-related hospitalisations in youth (RR = 0.41, 95% CI: 0.28 to 0.60, NNT = 4 [range 3 – 7]) (Greenfield et al., 2002).

Among the limitations acknowledged by the reviewers was the fact that it was not possible to carry out a meta-analysis owing to lack of comparability between studies; in particular, variations were evident for interventions, clinical populations, suicide-related terminology and outcomes. The reviewers suggested that bias was evident as a result of lack of blinding and control groups. Additionally, no information was provided for confounding variables, for example comorbid mental illness, use of substances, family functioning, or previous suicidal behaviours. Furthermore, the reviewers recommended that attention be applied to inclusion criteria for participants: the age of participants in the studies ranged from 10 to 85 years, which made it difficult to draw strong conclusions from the evidence.

The reviewers concluded that evidence for the influence of paediatric suicide-related emergency department programmes on suicide outcomes was promising albeit limited. The strongest evidence in their review came from care that was initiated in an emergency department, or care that was provided post-discharge from the emergency department. The reviewers highlighted the need for research to overcome existing methodological limitations. They also emphasised the importance of including assessment, disposition planning, adherence and problem-solving outcomes.

Evidence statement

We note the reviewers' conclusion that the available evidence indicates that emergency department suicide prevention programmes may be promising, albeit limited, and that care initiated in the emergency department or continued post emergency department discharge results in reduced suicidal behaviours and improved adherence to treatment. However, these conclusions are based on one review. The reviewers suggested further investigation was necessary across multiple settings to determine the exact impact of emergency department-based suicide intervention programmes and we support this suggestion.

3.9 School-based interventions

The school environment is considered an obvious and appropriate setting for the delivery of suicide prevention programmes (Hawton et al., 2002; Robinson et al., 2011b). This viewpoint stems from the fact that a large amount of time is spent by children and youth in school (Miller et al., 2009). The premise upon which this prevention intervention is based is that providing programmes in

schools, for example knowledge and awareness, gatekeeper training, curriculum-based prevention, screening, skills training, and/or peer leadership, can influence whether suicides are completed. Notably, some programmes take a multi-faceted approach, where a number of interventions are combined within the same programme, for example screening and counselling (Eggert et al., 2002; Randell et al., 2001; Thompson et al., 2001).

Eleven reviews examined school-based programmes, of which seven were rated as strong or moderate (Cusimano and Sameem, 2011; Guo and Harstall, 2002; Katz et al., 2013; Miller et al., 2009; Ploeg et al., 1999; Ploeg et al., 1996; Robinson et al., 2013), and three were weak (Gould et al., 2003; Mujoomdar et al., 2009; Pompili et al., 2010). Another review examined school-based post-ventions and was rated as moderate (Szumilas and Kutcher, 2011) (see Appendix 4). The seven strong and moderate reviews and the one post-vention review are reported on below. There is a lot of overlap between the reviews in the primary studies reported on. None of the reviews carried out a meta-analysis.

Table 6: Reviews on school-based interventions

Review author & date	Review title	Quality rating
Cusimano MD and Sameem M (2011)	The effectiveness of middle and high school-based suicide prevention programmes for adolescents: A systematic review	Strong
Ploeg J et al. (1999)	The effectiveness of school-based curriculum suicide prevention programs for adolescents	Strong
Ploeg J et al. (1996)	A systematic overview of adolescent suicide prevention programs	Moderate
Miller DN et al. (2009)	Suicide prevention programs in the schools: A review and public health perspective	Moderate
Katz C et al. (2013)	A systematic review of school-based suicide prevention programs	Moderate
Robinson J et al. (2013)	A systematic review of school-based interventions aimed at preventing, treating, and responding to suicide-related behavior in young people.	Moderate
Guo B and Harstall C (2002)	Efficacy of suicide prevention programs for children and youth	Moderate
Szumilas, M and Kutcher S (2011)	Post-suicide intervention programs: A systematic review	Moderate

Cusimano MD and Sameem M (2011) The effectiveness of middle and high school-based suicide prevention programmes for adolescents: A systematic review *Injury Prevention* 17: 43–49

The reviewers found no evidence to indicate that school-based intervention programmes reduced suicide rates in adolescents. Six of the eight studies were carried out in the USA, one in Belgium (Portzky and van Heeringen, 2006) and one in Israel (Klingman and Hochdorf, 1993). The reviewers aimed to assess the efficacy, methodological rigour, and limitations of suicide prevention programmes in adolescents attending middle and high school using a narrative approach.

A broad range of outcomes were examined in the eight studies – for example, knowledge, attitudes, awareness, help-seeking and coping. Two studies reported on suicidal behaviour outcomes and are reported on here. Both studies were carried out by the same research group on the SOS prevention programme (Aseltine and DeMartino, 2004; Aseltine et al., 2007). Effectiveness was measured in terms of percentage change in suicide attempts. The findings were similar in both studies.

- In the first study, self-reported repeated suicide attempts were lower in the treatment group (3.6%) compared to the control group (5.4%) (Aseltine and DeMartino, 2004).
- In the second study, although suicidal ideation was lower in the treatment group (10.1%) compared to the control group (12.2%), the difference was not significant (Aseltine et al., 2007).

- As with the first study, the second study found self-reported repeated suicide attempts were significantly lower in the treatment group (3.0%) compared to the control group (4.5%) (Aseltine et al., 2007).
- Females reported higher suicidal ideation and suicide attempts than males (Aseltine et al., 2007). No data were presented by the review authors to support this finding.

Among the limitations acknowledged by the reviewers was the fact that it was not possible to carry out a meta-analysis owing to lack of comparability between studies, in particular the varied methodological approaches, population sizes, study durations, outcome measures and timeframes. The reviewers also suggested that bias might have been present; there was no evidence of whether blinding was applied among studies. Additionally, confounding and contamination of control groups was evident, for example, in the studies carried out by Aseltine and colleagues, students were allocated to treatment and control groups within the same schools.

The reviewers concluded that although school-based suicide prevention programmes can result in changes in knowledge, attitudes, and some help-seeking behaviour in adolescents, the evidence is limited as to whether these changes translate into reductions in suicide rates or attempts. The majority of studies did not assess suicidal behaviour outcomes. The reviewers highlighted the importance of assessing suicide rates pre- and post-intervention but recognised that this might not always be logistically or financially possible. Hence, the review authors stressed the need for further

research to determine the exact impact of suicide prevention strategies in the school environment. They recommended using RCTs that would:

- measure suicidal ideation outcomes,
- use common instruments across studies,
- evaluate high risk groups, and
- evaluate different cultures and countries.

Ploeg J, Ciliska D et al. (1999) *The effectiveness of school-based curriculum suicide prevention programs for adolescents* Hamilton, Ontario: Effective Public Health Practice Project (EPHPP)

Ploeg J, Ciliska D et al. (1996) *A systematic overview of adolescent suicide prevention programs* Canadian Journal of Public Health/Revue Canadienne de Santé Publique 87(5): 319–324

Two papers presented the findings of the same review of adolescent suicide prevention programmes. The 1999 paper was an update of the 1996 paper and reviewed studies carried out up to the end of 1998. Three studies were added to the seven studies that were deemed relevant from the original review.

Notably, four studies from the 1996 paper were not included in the later review, two of which assessed suicide outcomes. One was a post-vention programme carried out among college students (Hazell and Lewin, 1993), the second was methodologically inconsistent (Nelson, 1987). Both papers by Ploeg and colleagues came to the same overall conclusion: there was inadequate evidence to support school-based intervention programmes. The remainder of this section will describe the findings from the 1999 publication.

Although nine of the primary studies were carried out in the USA, two were carried out in Israel (Klingman and Hochdorf, 1993; Orbach and Bar-Joseph, 1993). The review authors aimed to examine the influence of school-based curriculum suicide prevention programmes on adolescents and to determine whether gender differences were evident in the response to the programmes.

Although a range of outcomes were examined, only the outcomes for suicidal behaviours are reported on here. Effectiveness was measured in terms of a percentage change in suicide attempts and risk behaviours. In the primary studies where suicide outcomes were reported on, the findings were mixed.

- Following a series of ‘personal growth classes’ (PGC), suicide risk behaviours (as measured by the Brief Suicide Risk Behaviour Scale, which includes suicidal thoughts, threats and attempts) reduced between pre- and post-test in two intervention groups and one assessment-only group ($p < 0.001$, Eggert et al., 1995). Overall, the research authors found suicidal behaviours decreased by 25% in 85% of the treatment group and 65% of the control group. At the ten-month follow-up, no differences were demonstrated between the groups.
- Vieland et al. (1991) examined curricula programmes that included a session lasting between 1½ and four hours. They found no differences between intervention and control groups 18 months post-intervention. However, this study was assessed as methodologically weak.

The reviewers found that the methodological quality of primary studies

was poor. They only assessed one study as strong and four as moderate. Concerns were raised about internal validity, such as lack of reliability, invalid measurement instruments and no control over confounding variables, and external validity, such as selection bias.

The reviewers concluded that the evidence to support the effectiveness of school-based curriculum suicide prevention programmes on suicidal behaviour was inadequate. They stressed the need for further research to determine the exact impact of suicide prevention strategies in the school environment. They suggested that in future research:

- strategies need to retain a minimum of 80% of eligible participants;
- the same valid and reliable measurement instruments need to be used across studies;
- data for confounding variables should be collected and controlled for in data analysis;
- the short- and long-term impacts of programmes on suicidal behaviours should be assessed; and
- any differences in impact between genders should be evaluated.

Miller DN, Eckert TL et al. (2009) Suicide prevention programs in the schools: A review and public health perspective *School Psychology Review* 38(2): 168–188

The reviewers found that the evidence regarding the effectiveness of school-based suicide prevention programmes to reduce suicidal behaviours in adolescents was limited. No indication was provided by the review authors regarding where the 13 primary studies were carried out.

The review authors aimed to carry out a comprehensive review of school-based suicide prevention programmes from a public health perspective. Based on a public health approach, interventions included in the 13 primary studies were classified using a three-tiered model (universal, selected, and indicated). Studies covered a number of different interventions:

- suicide awareness curriculum, for example SOS,
- teaching suicide warning signs and peer response/intervention strategies,
- disseminating staff intervention policies,
- encouraging self- and peer-referrals,
- psychological education curriculum including exercise-training on coping skills, and homework assignments,
- seminars delivered to youth, parents and school staff,
- coping, problem-solving, and cognitive strategies to reinforce strengths, and
- self-esteem enhancement and mood management.

While a broad range of outcomes were examined, only the three studies that looked at behavioural outcomes are reported in this umbrella review.

Effectiveness was measured in terms of changes in suicide deaths, suicide attempts, and suicidal ideation. The findings were mixed:

- Participants in at least half of the schools that had done a universal intervention, including student workshops over a seven-week period, reported reduced 'suicidal tendencies' (Orbach and Bar-Joseph, 1993).
- Zenere and Lazarus (1997) applied a five-year system-wide school-based

prevention and intervention programme, which showed a significant reduction in suicides (63%) and in suicide attempts (from 87 per 100,000 to 31 per 100,000).

- In this same study, suicidal ideation varied over a 5-year timeframe, although no significant reductions were demonstrated (Zenere and Lazarus, 1997).
- A selected intervention demonstrated a significant reduction in rates of suicide attempts reported by students. However, in this same study, the effects for suicidal ideation were not significant (Aseltine and DeMartino, 2004). Although support for this outcome has been provided in other reviews, in this instance the review authors presented no data to support this finding.

The review authors tended not to present data to support the primary study findings and they did not identify any limitations to their review. They concluded that the evidence is very limited as to whether school-based prevention programmes translate into reductions in suicide rates, attempts or ideation. They based their conclusions on the considerable methodological limitations that were observed in the majority of universal and selected suicide prevention programmes that they reviewed.

Katz C, Bolton SL et al. (2013) A systematic review of school-based suicide prevention programs *Depression and Anxiety* 30 (10): 1030–1045

The reviewers found that two school-based intervention programmes were successful in reducing suicide attempts: Signs of Suicide (SOS) and the Good

Behaviour Game (GBG). They aimed to evaluate the evidence supporting existing school-based suicide prevention strategies to determine their impact on suicide-related outcomes. The geographic location of the 27 primary studies was not identified by the review authors. A range of interventions and programmes were covered in the studies that they reviewed:

- awareness/education curricula, for example SOS
- screening, for example TeenScreen
- gatekeeper training, for example Question, Persuade, Refer (QPR)
- peer leadership, for example Sources of Strength
- skills training, for example Care, Assess, Respond, Empower (CARE), Coping and Support Training (CAST), Reconnecting Youth (RY) and the Good Behaviour Game (GBG).

Only four programmes examined suicidal behaviour outcomes: three skills-based training programmes (CAST, CARE and GBG) and one awareness/education curriculum (SOS). The strongest evidence was provided by the GBG, a universal programme that aims to develop a positive class setting where children are supported by their peers, which in turn enables them to learn without resorting to hostile or disorderly behaviour. Children were allocated to teams, and each team was rewarded when what was considered 'acceptable' behaviour was displayed. Reducing suicidal behaviours was not the primary goal of this programme but its impact on suicide attempts and ideation was evaluated using an RCT over two years (Wilcox et al., 2008). Participants were subsequently followed up over 15 years. Although the review authors indicated that the young people receiving the

intervention were less likely to present with suicide attempts or ideation compared to the control group, no data were presented by the review authors to support this finding.

Similar to the GBG, the SOS is a universal programme that sees suicide as an associate of mental disorder rather than a response to stress or anxiety. The SOS programme incorporates suicide awareness, education, and screening approaches in order to reduce suicide. As reported in two reviews described above (Cusimano et al. 2011; Miller et al., 2009), two RCTs assessed the effectiveness of this programme and found that:

- short-term effects were demonstrated – reductions in the rate of self-reported suicide attempts were reported at 3-month follow-up (Aseltine and DeMartino, 2004);
- suicidal ideation was similar in intervention and control groups.

Katz et al. (2013) cautioned that the outcomes of this programme might be biased as they were based on self-reports. The reviewers also did not provide any data to support the findings.

The two other programmes that examined suicide behaviour outcomes were selected programmes targeting young people deemed 'high-risk' (Eggert et al., 2002; Randell et al., 2001; Thompson et al., 2001). The programmes were CARE, a computer-assisted suicide assessment and motivational counselling intervention, and CAST, which aims to increase life skills and social support using small groups. These were sometimes combined under one programme.

Where CARE and CAST were combined, the aim of the programme was to identify at-risk young people using CARE who then went on to participate in CAST. The review authors stated that although these programmes were successful in increasing knowledge and awareness, the impact of the programmes on suicide outcomes was not significant. No data were presented by the review authors to support this finding. As will be seen in two reviews described below (Robinson et al., 2013; Guo et al., 2002), the same studies have been reported to have found a significant reduction in suicidal ideation among the treatment group compared to the control groups.

The review authors identified a number of limitations to their study. Although they attempted to compare outcomes, there was evidence of heterogeneity with regard to the intervention programmes, study design, goals and outcomes. For some programmes it was not possible to determine whether they had an effect on suicide attempts, highlighting the need for research that assesses suicidal ideation and attempts. Their recommendations were based on their quality assessment, which could suggest a lack of evidence or that the primary studies were poorly designed. The review authors also stated that their review focused on the evidence for reducing causal factors and did not include studies that focused on promoting mental health, which would be considered a fundamental component of a suicide prevention strategy (Appelhoff, 2013).

In their conclusion, the review authors speculated that one intervention programme may not be adequate to cover the breadth of suicide prevention

approaches needed in schools, and emphasised that a multifaceted approach, where programmes are combined, may be more effective. Based on the limited evidence available, they were unable to recommend one particular programme. However, they suggested that the SOS and GBG intervention programmes might work well together to decrease suicidal ideation but that further research would be necessary to determine how these programmes together would impact suicide outcomes.

Robinson J, Cox G et al. (2013) A systematic review of school-based interventions aimed at preventing, treating, and responding to suicide-related behavior in young people *Crisis: The Journal of Crisis Intervention and Suicide Prevention* 34(3): 164–182

The reviewers found that overall the evidence evaluating the effectiveness of school-based suicide prevention programmes was limited. They aimed to detect all types of school-based programmes that targeted suicidal behaviours. The 43 studies they found had mainly been carried out in the USA, although some were done elsewhere (Australia, Belgium, Canada, Israel, the Netherlands and Taiwan).

The reviewers did not provide a lot of detail on the interventions covered, but they included:

- universal programmes, for example a one-off 4-hour training session and a 6-week curriculum,
- selective programmes, for example gatekeeper training and screening programmes,
- indicated programmes, for example CAST and CARE, already discussed

above in reporting on the review by Katz et al. (2013), and

- post-vention programmes.

None of the selective programmes reported on suicidal behaviour outcomes so only findings for studies of universal and indicated programmes that examined these outcomes are reported on here. The findings were mixed. Six universal programmes reported outcomes for suicide attempts:

- As reported above in describing the findings of other reviews (Cusimano and Sameem, 2011; Katz et al., 2013), after the two-day SOS programme, suicide attempts reported by the treatment group were lower (3.5%) than the control group (3.6%, $p < 0.05$) (Aseltine and DeMartino, 2004).
- Another study on the SOS programme found suicide attempts were significantly lower in the treatment group (3.0%) compared to the control group (4.5%) (Aseltine et al., 2007).
- A pre-test/post-test case series of the programme ‘Surviving the Teens’, comprising four 50-minute sessions, indicated at follow-up a decrease in the number of students considering attempting suicide ($p = .035$), making a suicide plan ($p = .003$) and attempting suicide ($p = .011$) (King et al., 2011).

The three following studies of universal programmes were reported by the reviewers as reducing ‘suicide attempts’, but it is unclear whether behaviours or other non-behavioural outcomes were included in the measures of the primary studies.

- A programme of 12 weekly group sessions: a research study found that the treatment group was

associated with higher reductions in scores on an 'Index of Potential Suicide,' when compared to the control group ($F(1,211) = 28.57, p < .001$) (Klingman and Hochdorf, 1993).

- A programme of seven weekly meetings of two hours: a group by time interaction for 'suicidal tendencies' ($F(1,17) = 7.08, p < .05$) (Orbach and Bar-Joseph, 1993).
- A life skills programme delivered three times a week over 30 weeks: a non-randomised experimental trial compared and found a significant difference between the 'suicide vulnerability' score of the control group ($M = 58.86$) and the treatment group ($M = 54.34$) (LaFromboise and Howard-Pitney, 1995). However, the p-value ($p < 0.07$) stated by the review authors indicates the difference is not statistically significant.

Three indicated interventions were reported on:

- A PGC-based programme: the primary researchers found suicide risk behaviour as measured by a scale decreased over time in all treatment groups (F sublinear $(1,102) = 104.14, p < .001$) (Eggert et al., 1995). (This research study is also discussed above in the description of the review by Ploeg and colleagues [1999]).
- CARE and CAST intervention programmes: A primary research study found the treatment group had significantly reduced their suicidal ideation when compared to the control group (Thompson et al., 2001). (The review by Katz et al.(2013), described above, reported that the impact of these programmes on suicide outcomes was not significant.)

- A programme of interpersonal psychotherapy for adolescents: A primary research study found significantly lower levels of suicidal ideation in the treatment group (8.97) when compared to the control group (16.29) ($p < .01$) (Tang et al., 2009).

Two post-vention studies were reported on, although no data were presented to support these findings.

- Within seven days of a student's suicide, a 90-minute counselling session was delivered to his/her peers by a child psychologist or trainee psychiatrist. A similar level of risk factors was identified in the treatment and comparison group (Hazell and Lewin, 1993).
- A 'First Talk Through' session provided students with an opportunity to 'debrief' after a fellow student's suicide. Changes in suicidal behaviour were not reported on but no other suicides were reported in the four-year follow-up period (Poijula et al., 2001a).

The review authors identified a number of limitations to their review. First, they could not carry out a meta-analysis as they included non-RCTs. Second, they did not carry out a full quality appraisal of included studies. Third, the quality of the primary studies was mixed, resulting in the extraction of limited and vague evidence – this made it difficult to draw strong conclusions.

The review authors concluded that the evidence for the effectiveness of school-based programmes in reducing suicidal behaviour outcomes is limited. While some interventions show potential, they cautioned that rigorous evaluations are

necessary to determine how they impact on suicidal behaviour outcomes.

Guo B and Harstall C (2002) *Efficacy of suicide prevention programs for children and youth* Edmonton: Alberta Heritage Foundation for Medical Research

The reviewers found that, after taking the methodological quality and inconsistent conclusions of primary studies into consideration, the effectiveness or ineffectiveness of curriculum-based suicide prevention programmes could not be determined owing to lack of evidence. Of the 13 primary studies reviewed, ten had been carried out in the USA, two in Israel and one in Australia.

The reviewers examined the effectiveness of suicide prevention programmes among children and adolescents aged five to 19 years. A broad range of outcomes were examined, for example depression, protective factors, knowledge, empathy, awareness, hopelessness, and coping. However, only the outcomes for suicidal behaviour are presented here. All these studies have been discussed in reviews described above. As before, the findings were mixed:

- Curriculum-based suicide education programmes for high-risk adolescents:
 - A study of a PGC-based programme, also reviewed by Ploeg et al. (1999) and Robinson et al. (2013), is reported on here. Following an assessment of suicide potential over a period of 10 months, suicide-risk behaviours in students declined in both treatment and control groups ($F_{\text{Linear}(1,102)} = p < .001$) (Eggert et al., 1995).
 - Counsellors CARE (C-CARE), which provides a brief one-to-one

assessment and crisis intervention, and CAST were shown to have greater effectiveness than 'treatment as usual' (TAU) in reducing suicidal ideation over time (Thompson et al., 2001). No data were presented by the review authors to support this finding.

- Curriculum-based suicide education programmes for general school population:
 - A study of a curriculum-based programme that focused on problem-solving found no evidence at an 18-month follow-up that the programme had impacted on the suicide attempt rates among exposed students (Vieland et al., 1991).
- Post-vention programmes:
 - An Australian study of a post-vention counselling programme found no differences between experimental and control groups at an eight-month follow-up on outcomes measured (Hazell and Lewin, 1993). No data were presented by the review authors to support this finding.

The review authors included two Israeli studies (Klingman and Hochdorf, 1993; Orbach and Bar-Joseph, 1993), which have been cited elsewhere in this umbrella report. However, they concluded that the scale used to measure outcomes in these studies (the Israeli Index of Potential Suicide [PSI]) cannot be extrapolated to behavioural change. Therefore, while they are reported on in the review, they are not reported on here.

Although the review authors did not identify any limitations in their review, they noted a number of limitations to the primary studies based on their quality assessment of them. These included problems with selection procedures, sampling, study design, confounding variables, allocation to groups, blinding, data collection, reliability and validity of tools used to measure outcome variables, and attrition rates. They noted that lack of information on these matters might have been a consequence of restrictions enforced by publishers.

The review authors concluded that the effectiveness or ineffectiveness of curriculum-based suicide prevention programmes could not be determined owing to lack of evidence. Their conclusion stemmed from the considerable variation that was demonstrated amongst studies, for example, objectives, content, frequency, duration, and delivery. Nonetheless, some of the outcomes reviewed were promising, for example in relation to curriculum-based suicide education programmes for high-risk adolescents (Eggert et al., 2002; Thompson et al., 2000 & 2001). The review authors further highlighted that the primary studies included in the review targeted young people in junior high or high schools (aged 15 to 19) and proposed that in order to reduce suicide outcomes in this cohort it might be better to implement prevention strategies at an earlier age.

Szumilas M and Kutcher S (2011) Post-suicide intervention programs: A systematic review *Canadian Journal of Public Health/Revue Canadienne de Santé Publique* 102(1): 18–29

The review authors found no evidence that suicide post-vention programmes

reduced suicide rates, suicide attempts and/or suicide contagion. The geographic location of primary studies was not always reported but they included Austria, Canada and the USA. The review authors aimed to assess the influence of suicide post-vention programmes on suicide attempts and suicides.

Although this review classified programmes by setting, for example, school-based, family-focused and community-centred, only the evidence for suicide outcomes for school-based and one community-focused programme which focused on youth (Hacker et al., 2008) will be discussed here. The family-focused study has not been discussed further as no suicide outcomes were reported.

School-based post-vention

The first two interventions have been reported on above in considering the review by Robinson et al. (2013):

- Following the implementation of ‘First Talk-Through’, a psychological debriefing programme, no new suicides appeared in a four-year follow-up period. However, the review authors stated that the protective effect could not be determined for rate of suicide deaths or suicide attempts as no statistical analysis was presented (Pojjula et al., 2001b).
- A counselling intervention for close friends of someone who had died by suicide was not found to have impacted on young people’s current suicidal behaviour, hospitalisation for suicide attempts, or suicidal ideation at eight-month follow-up (Hazell and Lewin, 1993).

- A ‘negative effect’ for a psychological debriefing-type suicide post-vention programme was found: six hospitalisations and 30 ‘suicide gestures or attempts’ occurred during the six-month period after the post-vention (Callahan, 1996). However, no statistical analysis was presented by the reviewers to support the finding that this represented an increase.

Community-based post-vention

- The effect of a community-wide intervention consisting of support services, youth development, media approaches and education on suicide deaths or lethal overdoses in youth aged 10 to 24 years could not be determined, as no statistical analysis was reported (Hacker et al., 2008). Despite no effect being identified, the review authors recommended this primary study as a source and guide for communities wishing to implement post-vention programmes.

As acknowledged by the review authors, the quality of the post-vention literature was poor, mainly being descriptive or theoretical. Methodologically, primary studies were weak and presented insufficient statistical analyses, making it difficult for the review authors to draw conclusions regarding the effectiveness of the programmes. Research bias may have been present in that positive outcomes were generally found by individuals/groups that developed or were connected with the development of the programme. The review authors stressed that the dearth of independent evaluations is a significant issue in post-vention research.

The review authors concluded that insufficient evidence was presented in the literature to support a sustained positive effect for school-based suicide post-vention programmes in reducing suicide, suicide attempts, and/or suicide contagions. They highlighted the need for good quality research to determine the exact impact of school-based post-vention programmes.

Evidence statement

As acknowledged by the authors of the reviews described in this section on school-based interventions, there is insufficient evidence to assess the effectiveness or ineffectiveness of school/curriculum-based suicide prevention and post-vention programmes. There was a lot of overlap in the primary studies used in the eight reviews, although how they were categorised and the outcomes measured or interpreted varied. Reporting on suicidal behaviour outcomes was relatively rare in the reviews – only about a third of the primary studies included in the reviews did so.

The review authors highlighted the need for further research to determine the exact impact of school-based intervention and post-vention programmes and we support this suggestion. The review authors have recommended that suicide prevention programmes for children and young people also need to:

- use a multifaceted approach where programmes are combined in order to be more effective, for example, SOS with GBG, and
- be provided for a younger age-group, ideally between 10 and 14.

The review authors also suggested that the following should be applied to future research, and we would agree with these suggestions:

- randomised or controlled trials should be used;
- suicidal behaviour outcomes should be assessed pre- and post-intervention, for example ideation, thoughts, attempts, and completions;
- where possible, the same valid and reliable measurement instruments should be used across studies;
- strategies are needed to retain a minimum of 80% of eligible participants;
- the short- and long-term impacts of programmes on suicidal behaviours should be identified;
- data for confounding variables should be collected and controlled for in data analyses;
- analyses should be carried out for the different populations and high-risk groups and different populations; and
- the impact on different cultures and countries should be examined.

3.10 Veterans and military personnel

Prevention programmes have been specifically designed for and delivered to veterans and military personnel. Three reviews were found for this population. Two were assessed to be of moderate quality (Bagley et al., 2010; Shekelle et al., 2009), and one of weak quality (Zamorski, 2011). This section presents the findings from one of the moderate reviews (Bagley et al., 2010), which was taken from the other broader review (Shekelle et al., 2009). It focused on the findings related

to interventions for military personnel and veterans specifically.

Bagley SC, Munjas B et al. (2010) A systematic review of suicide prevention programs for military or veterans *Suicide and Life-Threatening Behavior* 40(3): 257–265

Reviewing the evidence for suicide prevention for military and veteran populations, the review authors found seven studies involving military personnel – five of which were on US military populations, and three on US veteran populations. The heterogeneity of the studies prohibited any meta-analysis and they provided a narrative summary of the findings.

Military personnel

There were a range of elements in each of the seven programmes reported on in the review. Suicidal behaviour outcomes were reported for six of them:

- The researchers reported on a prevention programme for the US Navy. Training officers were educated to recognise risk factors and to ensure treatment compliance for those referred for treatment. They reported a statistically significant negative correlation between the number of instructors trained and the number of suicide attempts (-0.65) where the training had been delivered when compared to another military site (McDaniel et al., 1990).
- A prevention programme with 11 separate components, aimed at reducing suicide in the US Air Force, was evaluated. The researchers found a statistically significant trend for decline in suicide rate over time: the average suicide rate in the pre-intervention period was 13.5 per 100,000 and 9.2 in the post-

intervention period (Knox et al., 2003).

- Jones et al. (2001) report on a programme for the US Navy and Marine Corps that included the development of a training video on suicide prevention that became part of the annual general military training requirement. They used a decrease in the Navy suicide rate to its lowest rate in 10 years (9.2/100,000) as evidence of the programme's success.
- Kennedy et al. (2005) described a gambling treatment programme for the US Navy that assessed suicidal ideation as an outcome. The programme involved a range of interventions including family education and individual and group counselling. Of the 35 individuals in the study none reported a suicide attempt or suicidal ideation during treatment, three had made attempts before treatment and 20% had reported suicidal ideation.
- An assessment of a prevention programme in the Ukrainian army, involving education about suicide for soldiers and officers, found a pre-implementation suicide rate among military personnel of 32.6 per 100,000 and post-implementation it was 16.7 per 100,000 (Rozanov et al., 2002).
- A prevention programme in the army of Serbia and Montenegro was reported to have improved selection processes to remove recruits with serious mental health issues, and to have provided education about suicide risks for soldiers and gatekeepers. At pre-implementation the annual suicide rate for the army was 13 per 100,000, and post-implementation it was 5 per 100,000 (Dedic and Panic, 2007).

The review authors identified limitations across these studies and, overall, assessed the quality of the evidence as 'low'. We would emphasise that there are some serious limitations to the methodologies used, in particular the outcome measures and conclusions drawn about attribution.

Veterans

The review authors identified two studies of interventions for US veterans, relevant to our review:

- An RCT of DBT for female veterans with borderline personality disorder found no statistically significant difference between the treatment and control groups in levels of deliberate self-harm (Koons et al., 2001). The review authors noted that this might have been as a result of the small sample size (n = 20).
- Veterans entering a substance misuse treatment programme were studied for impact of the treatment on suicide rates. The suicide rate for patients in the 12 months prior to treatment, during treatment and in the 12-month follow-up were compared (Ilgen et al., 2007). In predicting suicide attempt rates during treatment, residential treatment was associated with a lower attempt rate than outpatient treatment. In predicting suicide attempts after treatment, a longer rather than shorter treatment episode was also associated with a statistically significant lower attempt rate. Specific figures were not reported by the reviewers.

The review authors assessed the quality of evidence for the veterans as 'very low'.

Overall, they concluded that 'multicomponent interventions in military personnel probably reduce the risk of suicide' (p.262). While acknowledging that the quality of individual studies was too weak to be able to draw such a conclusion from them individually, they said this was 'balanced by the consistency of the effect found' (p.262).

Evidence statement

Based on the review by Bagley et al. (2010), the evidence for interventions with military personnel and veterans is very weak. We would not agree with the reviewers' conclusion that the limitations across the studies are 'balanced out' by the outcome data as there are questions across many of the studies as to how changes in the suicide rates could be attributed to the interventions, among other methodological concerns.

Conclusions

4 Conclusions

Overall this umbrella review (based on a review of reviews) has found limited good-quality evidence for what works in suicide prevention in terms of impacting on suicidal behaviour. We assessed the quality of reviews but not the quality of primary studies considered in these reviews: thus, a strong review did not necessarily mean the primary studies were strong.

This chapter presents the HRB's conclusions on the findings of this review of reviews. We compare our findings with those of five other reviews and recent reports on suicide prevention ('comparison reviews') (see Table 7), focusing on differences in the overall conclusions. We also highlight some methodological challenges to research in this area.

Table 7: Comparison reviews

Review author & date	Review title
du Roscoät and Beck (2013)	Efficient interventions on suicide prevention: A literature review
Mann JJ et al. (2005)	Suicide prevention strategies: a systematic review
Scott A and Guo B (2012)	For which strategies of suicide prevention is there evidence of effectiveness
Teuton J et al. (2014)	Prevention of suicide and self-harm: Research briefing
WHO (2014)	Preventing suicide: a global imperative

4.1 Interventions

Means restriction

Based on four reviews that focused on firearms legislation, jumping hotspots and railways, we found that means restriction (in particular, barriers) is a useful and important method that is successful in reducing suicide. This is consistent with the conclusions of four of the comparison reviews (du Roscoät and Beck, 2013; Mann et al., 2005; Teuton et al., 2014; WHO, 2014). However, our suggestion that restricting access to firearms was an effective intervention is in contrast to the conclusions put forward by Scott and Guo (2012) who argue that this evidence is inconclusive. A possible explanation for the disparity may be the different methodologies used by both reviews. Conclusions in the Scott and Guo (2012) paper were based on three reviews of 51

primary studies (Hahn et al., 2003; Hahn et al., 2005; Shekelle et al., 2009), while our review was based on just one review (Hahn et al., 2005), whose conclusions were based on nine primary studies that cited suicidal behaviour outcomes only.

It is also important to note that this umbrella review only addressed means restriction methods that were identified in the studies that met our inclusion criteria. Other means restriction methods not included in the reviews that we reviewed, but which have been found by the comparison reviews to successfully reduce suicide outcomes (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014; WHO, 2014), include:

- restricting access to pesticides and poisonous gases,

- limiting carbon monoxide levels in domestic gas and vehicle exhaust,
- restricting access to paracetamol and altering package size,
- restrict the sale of barbiturates and prescription drugs, and
- changing packaging of analgesics to blister packets.

Media guidelines

Based on one review we found limited evidence that the implementation of media guidelines impacts on suicide rates. While there were numerous studies carried out on media guidelines, these rarely looked at suicidal behaviour outcomes. Where they did, the evidence came from one country's experience (Austria), in which there was a relatively good level of compliance by media. While there was a suggested link between the introduction of media guidelines and changes in national suicide rates in these primary studies, in other countries this was not backed by quantitative evidence. Therefore, the changes could have been down to one of a number of other factors, such as the introduction of other interventions to prevent suicide. The other comparison reviews also found the evidence of the impact on suicidal behaviour to be largely inconclusive (Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014), although the WHO report (2014) stated that 'responsible reporting of suicide in the media has been shown to decrease suicide rates' (p.35). This is based on an earlier WHO report which draws on the same Austrian studies discussed here.

Three of the comparison reviews also highlight the need for action in dealing with how suicide is addressed on the

internet (Mann et al., 2005; Teuton et al., 2014; WHO, 2014).

Gatekeeper training

Based on one review we found only limited evidence that gatekeeper training may impact on suicidal behaviour. Where it exists, this evidence is based on the impact of multi-faceted strategies to prevent suicide, including gatekeeper training. Therefore, it is difficult to ascertain what role gatekeeper training specifically played in delivering on suicidal behaviour outcomes. Changes may have been as a result of other suicide prevention interventions, the particular combination of interventions, or a change in the circumstances that led to high rates of suicide. This finding is supported by three of the comparison reviews (Mann et al., 2005; Teuton et al., 2014; WHO, 2014).

An element of gatekeeper training isolated in other comparison reviews (du Roscoät and Beck, 2013; Mann et al., 2005) is that of primary care physicians. In our umbrella review we discuss a group of studies that suggest primary care physician education can have a positive impact on suicidal behaviours (Hegerl et al., 2006; Henriksson and Isacsson, 2006; Rutz et al., 1992). In their review, du Roscoät and Beck also concluded that training GPs in the detection and treatment of depression has the potential to impact on suicide rates. They concluded that for this training to have a significant effect on suicide rates the training should be aimed at a specific disorder (e.g. depression), be on-going or at least repeated over the years, and be provided to a large majority of GPs in a given area. Mann and colleagues also

found that primary care physician training that focuses on depression recognition can be effective in lowering suicide rates. Both groups of reviewers agreed that more research is needed on this intervention as it is often not possible to isolate the impact of the training on changes in suicidal behaviour, as there are other factors at play such as other prevention interventions.

Screening

Based on three reviews we found that the evidence for the impact of screening on suicidal behaviours is mixed but relatively weak. There is no evidence that screening brings about harmful effects, but this needs more research. Where evidence suggests that screening might have an impact, it is screening of a high-risk population and there is good access to follow-up care. As with gatekeeper training, this raises the question of attribution. It is not possible to isolate the impact of the screening process from the follow-up intervention. Where other comparison reviews looked at screening (Mann et al., 2005; Teuton et al., 2014), they came to similar conclusions. Teuton and colleagues found some limited evidence that screening young people in primary care could have a positive impact, but they stated that overall this intervention needs more research.

Psychosocial interventions

Thirteen reviews presented a very mixed picture of evidence for how both psychotherapeutic interventions and enhanced care/outreach/follow-up interventions impact on suicidal behaviour. While this is in part due to the wide range of interventions included under this umbrella term, it is also due to the variation in how reviews were carried

out and interventions and populations categorised.

Psychotherapy

Overall, CBT and DBT are the psychotherapies for which there is the best evidence as to their impact on reducing suicidal behaviour. The evidence for DBT was limited to those with borderline personality disorder, and mainly among women. Other interventions identified as having promising evidence were problem-solving therapy and family therapy. Broadly speaking, these conclusions reflect those of other comparison reviews (du Roscoät and Beck, 2013; Scott and Guo, 2012; Mann et al., 2005). Mann and colleagues and Teuton and colleagues also noted that intensive care plus outreach showed promise. As concluded in one review of reviews, 'overall the results showed either no difference between the treatment and control groups or moderate efficacy in favour of the intervention for reducing repetition or suicide attempts or self-harm' (Scott and Guo, 2012, p. 12).

Enhanced care/outreach services

The evidence across the different types of enhanced care interventions is inconclusive. We found mixed evidence for the impact of both 'emergency cards' giving people 24 hour access to care, and follow-up or enhanced care interventions that involved contact in person, by telephone or by postcards. Other comparison reviews found similarly mixed evidence (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014). However, du Roscoät and Beck concluded that follow-up can be considered an 'effective' (p.372) intervention, but that it needs to be characterised by a 'human

caring relation' rather than focusing directly on treatment adherence. While the evidence is inconclusive, it is also promising. Similarly, WHO (2014) described follow-up as having been found to be an effective intervention in reducing suicide deaths, but this was based on the findings of Luxton et al. (2013), which we assessed as a weak review and presenting mixed results.

Telemental health

There is encouraging albeit limited evidence indicating that TMH's impact as a prevention strategy on clinical mental health outcomes is effective. However, only one study on a telephone counselling service for older people found a reduction in suicide rates. We conclude that, given the current evidence base, it is difficult to make strong conclusions regarding the impact of TMH on suicidal outcomes. Further investigation is necessary. Other comparison reviews have come to similar conclusions (du Roscoät and Beck, 2013; Teuton et al., 2014). WHO (2014) identified crisis helplines as helping reduce the risk of suicide risk, but the evidence does not relate to behavioural outcomes.

Web-based suicide interventions

We found preliminary evidence suggesting that web-based interventions may be beneficial in helping to reduce suicidal behaviours. However, this was based on one review which reported on three RCTs and one pre- and post-treatment case series. Web-based strategies for suicide prevention have only emerged recently, hence, in many comparison reviews, the method has not been evaluated. Nonetheless, regardless of the scant evidence illustrating its effectiveness, as acknowledged by WHO

(2014), the internet and social media have the potential to be used as a universal strategy. In light of this, we are in agreement with the review authors discussed in the main body of the report who suggest that further research is necessary to determine the impact of web-based suicide prevention strategies.

Emergency Department

Based on one review, we found that care initiated in emergency departments and/or continued post emergency department discharge was a promising method that may be beneficial in reducing suicide. Notably, this conclusion is based on a limited evidence base: only three of ten primary studies found reductions in suicidal behaviour. Nonetheless, in agreement with this conclusion, du Roscoät and Beck (2013) also found that the strategies achieving the best outcomes were those initiated during treatment. They further suggested that the greatest impact on reducing suicide is achieved by a programme that is delivered by a counsellor, is at least six weeks long, intensive, hands-on, and tailored to suit the individual's needs. Hence, we agree with the review authors who suggested that emergency department suicide prevention strategies are worthy of further investigation to determine their exact impact on suicide outcomes.

School-based interventions

Based on eight reviews, we found that the general consensus among review authors was that the effectiveness or ineffectiveness of school/curricula-based suicide prevention programmes has not yet been determined owing to lack of evidence. This is consistent with the findings of other comparison

reviews (du Roscoät and Beck, 2013; Mann et al., 2005; Scott and Guo, 2012; Teuton et al., 2014). Generally, it is considered difficult to draw conclusions in this setting as programmes are not evidenced-based nor do they evaluate effectiveness of the programmes in reducing rates of suicide (Mann et al., 2005). Despite this, there is some evidence to suggest that a multi-component approach in schools may be beneficial in developing protective factors and reducing suicide attempts and suicidal tendencies (Wasserman et al., 2014, in press, cited in WHO 2014; Scott and Guo, 2012). Importantly, many of the reviews that assess the effectiveness of suicide prevention programmes in young people have been carried out in different countries and hence, evidence of their suitability for an Irish context remains to be seen.

Veterans and military personnel

We found the evidence for interventions with military personnel and veterans to be inconclusive. There were methodological limitations to the primary studies in the one review examined. Despite this, the limited evidence suggests that a multi-faceted programme involving a range of different interventions may be required in this context. The only comparison review to discuss this was based on the same study and came to the same conclusion, although they appeared less concerned about the quality of the primary studies (Scott and Guo, 2012).

4.2 Challenges in researching suicide prevention interventions

Across the reviews a number of recurring issues were raised by review authors on

the challenges faced by researchers, and how best to evidence the impact of suicide prevention interventions on behavioural outcomes. Some of the recurring challenges noted were:

- **Attribution** – suicide prevention interventions are not delivered in a vacuum, which presents challenges in attributing, for example, a reduction in the national suicide rate to a particular intervention. There may be a number of other factors impacting on the rate change, such as the introduction of another prevention intervention or changes in the social or economic context.
- **Suicide base rate** – the suicide base rate is relatively low, which makes it difficult to assess the effectiveness of a particular intervention against changes in the suicide rate.
- **Generalisability** – study populations varied in their age, gender, ethnicity, and suicide profile. People with different profiles are likely to need different interventions, for example adults compared to young people. Therefore the ability to generalise about the impact of the intervention beyond a particular population is limited. This is not always reflected in the conclusions drawn from studies and reviews.
- **Treatment as usual** – when comparing an intervention with ‘standard care’ or TAU, it was not always clear what that involved. TAU will vary between locations and therefore have an impact on the scale of impact of the intervention when compared to the experimental group. By saying that there is no incremental benefit from an intervention under study compared to standard care is not the same as saying nothing works

with the particular group. It may mean that 'standard care' is an effective intervention. Therefore it is important for studies to be clear about what constitutes 'standard care'/TAU.

- **Defining interventions and outcomes** – there was inconsistency within the body of evidence as to the definitions and how interventions and outcomes were defined. These prevent valid comparisons between studies.

4.3 RCTs and meta-analysis

There were four types of studies included in the reviews we assessed – surveys, before and after studies, screening studies, and RCTs. Only the RCT can test if an intervention works and estimate its effect size. It does this by controlling for confounding factors (that is, other factors which may explain the observed outcomes). Many of the studies reviewed had no formal sample size calculation to determine whether they were large enough to detect a difference.

In some of the meta-analysis papers, a number of interventions were pooled for comparative purposes. However, these interventions would appear to be different from each other. This combining of interventions may result in the dilution of the effectiveness of the more successful interventions or an increase in the effectiveness of the less successful interventions. In addition, the intervention and comparison in one study may differ from the intervention and comparison in another study included in the same meta-analysis. This approach of combining different intervention and comparison groups renders the resulting summary measure of findings from all

studies included for analysis meaningless. If completing a meta-analysis, we and other authors suggest that:

- the interventions need to be the same in the selected papers;
- the comparison groups need to be similar in the selected papers;
- the same outcomes need to be measured in the selected studies;
- the primary studies need to be described in the paper with respect to interventions, study design, sample size;
- the findings with respect to the main outcomes should be described;
- the studies need to be tested for homogeneity;
- the studies need to be tested for publication bias; and
- if both homogeneity and publication bias allow, a summary statistic needs to be calculated.

4.4 Concluding statement

Overall our umbrella review has found that the body of evidence demonstrating the effectiveness of suicide prevention interventions in reducing suicidal behaviour is limited. A limited evidence base does not mean that the interventions are necessarily ineffective, rather that there is little review-level evidence that they work.

There are a number of challenges in conducting research on the impact of suicide prevention interventions on suicidal behaviour, which recurred throughout the reviews. They include:

- the attribution of reductions in suicide behaviours to one particular intervention, in a context where there may be other factors at play;

- death by suicide is a relatively rare event and studies to determine if an intervention significantly reduces the numbers of completed suicides requires very large sample sizes;
- the ability to generalise the findings of an intervention based in a particular context and with a specific population to other populations in a different context appears limited;
- a lack of consistency across studies in what constitutes 'treatment as usual'; and
- inconsistency in definitions of interventions and outcomes.

There is a need for high-quality, rigorous research to be carried out using adequately powered RCTs if we are to identify the true impact of suicide prevention interventions on suicidal behaviour. Where meta-analysis is to be carried out, it needs to be methodologically sound and based on comparable interventions.

The lack of review-level evidence in the Irish context highlights the need for national research, and careful consideration on the generalisability of the existing evidence to the Irish context.

Appendices

Appendix 1 NICE Guideline references

Bipolar Disorder: The management of bipolar disorder in adults, children and adolescents, in primary and secondary care. July 2006. NICE clinical guideline 38
www.guidance.nice.org.uk/cg38

Borderline Personality Disorder: Treatment and management. January 2009. NICE clinical guideline 78
www.guidance.nice.org.uk/cg78

Depression in Adults: The treatment and management of depression in adults. October 2009. NICE clinical guideline 90
www.guidance.nice.org.uk/cg90

Psychosis and Schizophrenia in Adults: Treatment and management. March 2014. NICE clinical guideline 178
www.guidance.nice.org.uk/cg178

Self-harm: Longer-term management. November 2011. NICE clinical guideline 133
www.guidance.nice.org.uk/cg133

Appendix 2 Literature search

All abstracts retrieved by the database searches were screened by two reviewers. In the case of disagreements or if it was unclear from the abstract whether it should be included, the full paper was retrieved for a more detailed evaluation by both reviewers. Ultimately 464 abstracts were reviewed by two reviewers, 103 full text papers were screened by two reviewers and 47 reviews were included in the review and assessed for quality.

Table 8: Literature search to address the research question

Database	Search terms	Number of papers or reports retrieved for screening
Medline In-Process & Other Non-Indexed Citations and Medline 1946 to June Week 2 2014 (OVID platform)	<ol style="list-style-type: none"> 1. Exp Suicide Prevention/ 2. Prevent* .ti,ab. 3. 2 and 1 4. Limit 3 to (English language and [meta analysis or systematic reviews]) 	155
Embase 1974 to 2014 Week 24 (OVID platform)	<ol style="list-style-type: none"> 1. Exp Suicide/ 2. Suicide prevent*.mp. 3. 1 and 3 4. Limit 3 to (English language and 'review') 	272
PsycInfo 1967 to June Week 2 2014 (OVID platform)	<ol style="list-style-type: none"> 1. Exp Suicide Prevention/ 2. Limit 1 to (English language and [meta analysis or systematic review]) 	29
Cochrane Library 1992 to June 2014 (Wiley platform)	<ol style="list-style-type: none"> 1. suicid* AND prevent* ti,ab,kw 	24
CINAHL 1981 to June 2014 (EBSCO platform)	<ol style="list-style-type: none"> 1. MH "Suicide+" 2. TI prevent* OR AB prevent* 3. 1 and 2 	24
WHO <i>Preventing suicide</i> A global imperative 2014 report reference list, WHO Website, reference chasing and Key Informant contributions		20
Total		524
Total articles screened following the removal of duplicates		464
Total articles included in the review		47

Appendix 3 Quality assessment tool¹

Health Evidence™ Helping public health use best evidence in practice		Quality Assessment Tool – Review Articles	
Instructions for completion: Please refer to the attached dictionary for definition of terms and instruction for completing each section. For each criteria, score by placing a check mark in the appropriate box		First Author: _____	
		Year: _____	
		Journal: _____	
		Reviewer: _____	
CRITERION		Yes	No
Q1 Did the authors have a clearly focused question [population, intervention (strategy, and outcomes(s))?			
Q2 Were the appropriated inclusion criteria used to select primary studies?			
Q3 Did the authors describe a search strategy that was comprehensive?			
Circle all strategies used:	<ul style="list-style-type: none"> • health databases • psychological databases • social science databases • educational databases • other 	<ul style="list-style-type: none"> • hand searching • key informants • references lists • unpublished 	
Q4 Did search strategy cover an adequate number of years?			
For question 5, 6, and 8, please choose the column relating to the appropriate methodology. Strike a line through the column that does not apply.			
Q5. Quantitative reviews: Did the authors describe the level of evidence in the primary studies included in the review? Level I RCTS only Level II on-randomised, cohort, case-control Level III uncontrolled studies	Q5. Quantitative reviews: Do the authors provide a clear description of the range of methods in each of the primary studies included in the review?		
Q6 Quantitative reviews: Did the review assess the methodological quality of the primary studies, including: (Minimum requirement: 4/7 of the following)	Q6 Quantitative reviews: Did the review assess the methodological quality of the primary studies, including: (Minimum requirement: 4/7 of the following)		
<ul style="list-style-type: none"> • Research design • Study sample • Participation rates • Sources of bias (confounders, respondent bias) • Data collection (measures of independent/dependent variables) • Follow-up/attrition rates • Data analysis 	<ul style="list-style-type: none"> • Suitability of methodology/paradigm to the research question • Sampling (selection of participants/settings/documentation) • Clear description of context, data collection and data analysis • Rigor: Audit trail Some coding by 2 or more coders, if appropriate Deviant case analysis *negative cases) Respondent validation (member checking) • Triangulation Reflexivity (research and research process) Relevance (credibility, consistency, applicability, transferability) 		
Q7 Are the results of the review transparent?			
Q8 Quantitative reviews: Was it appropriate to combine the finding of results across studies?	Q8 Quantitative reviews: Is there a description of how reviewers determined results were similar enough cross studies to compare or combine them?		
Q9 Were appropriate methods used for combining or comparing results across studies?			
Q10. Do the data support the author's interpretation?			
		Total Score	
Quality Assessment Rating: (Circle one)	Strong (total score 8 – 10)	Moderate (total score 5 – 7)	Weak (total score 4 or less)

¹ Health Evidence Canada (2013)

Quality assessment tool dictionary

A systematic review is a research approach to accessing, acquiring, quality assessing, and synthesising a body of research on a particular topic. All phases of systematic review development should be well described such that the process is transparent and replicable by others.

Q1 Clearly focused research question

The review should have a clearly focused research question that contains the following components: Population, Intervention, Comparisons, and Outcomes. NOTE: Remember PICO.

Population: How would you describe the population of interest?

→ Details on the population of interest should be clearly outlined to the level that it would be appropriate to determine whether the results apply directly to one's patient(s) / community / constituents.

Intervention: Which main intervention or exposure is being considered?

→ The intervention refers to a variety of actions that are undertaken with the expectation of promoting and achieving specific outcomes. This may include an intervention, a strategy, or a policy, including activities such as lobbying, coalitions, and legislation. The focus of the review is to evaluate the impact of these activities on specific outcomes for individuals, communities or the population. The activities being assessed should be similar enough that it is reasonable to assess their combined impact.

Comparison: What is the main alternative to compare with the intervention?

→ This might be a control group or another intervention. Often the comparison is not stated explicitly in the research question. Either a control group or another intervention can be used as the comparator. In some instances, due to the nature of public health, a comparison and/or control may not be feasible.

Outcome: What do the researchers hope to accomplish measure, improve, or affect?

→ Outcomes relate to the measured impact of the activities and can be at the individual, community or population level. Outcomes may include health policies, health programs, coalition development, etc.

Any part of **PICO** that is not addressed in a review's main research question should be clearly stated in the inclusion criteria to receive a **Yes** for criterion #1.

Outcomes can be general in the research question (e.g. to allow for a broader search strategy, especially if the topic at-hand has a limited body of literature available), and then be addressed more specifically in the evidence tables and/or highlighted through the process of data extraction. For example, a general question may read: "The aim of this study, therefore, was to systematically review evidence from controlled trials on the efficacy of motor development interventions in young children."

Overall Coding for Q1:

If the answer to each of population, intervention and outcome is yes, then place a check mark in the Yes column. Otherwise, place a check mark in the No column.

Q2 Provision of inclusion criteria

The review should clearly describe the criteria that were used to select primary studies. This includes decisions related to the target population, intervention, outcome(s), as well as the research design (i.e., RCT, cohort, participatory, etc). Using the descriptions “peer-reviewed” and/or “measurement of a quantitative outcome” in the inclusion criteria are NOT sufficient descriptions to count for study design. Mark a No for this criterion.

If authors mention in their exclusion criteria that they rejected reviews, letters, editorials and case reports, but do not specifically address what they chose to include, mark a No for this criterion.

Overall Coding for Q2:

Place a check mark in the Yes column if selection criteria were clearly outlined.

Q3 Comprehensive search strategy

A well-described comprehensive search strategy will include multiple database searches and a variety of other search strategies. Relevant databases, chosen based on the key concepts in the research question, will include those from health databases (Medline, CINAHL, BIOSIS,

EMBASE, etc), psychological databases (PsycINFO), social science databases (sociological abstracts), and/or educational databases (ERIC). ‘Other’ databases may be used and should be described in the space provided. General web searches may be included in ‘other’. For reviews measuring specifically health-related outcomes (e.g. vaccine effectiveness), at least 2 health databases need to be employed to allow for only ONE type of database to be searched. (NOTE: The two do not have to include Medline)

‘Column 2’ search strategies include:

- Handsearching – journals of relevance to the review topic
- Reference lists – reference lists of relevant reviews should be reviewed for potential titles
- Key informants – should demonstrate consultation with experts in the field for relevant titles; this can include pharmaceutical representatives
- Unpublished (grey) literature – efforts to locate unpublished literature should be described. This can include the use of the electronic database SIGLE (which is specific to grey literature), and the searching of conference proceedings or scientific meetings.

NOTE: Should the author(s) describe the manual searching of reference lists, it would be most appropriate to score as ‘Reference Lists’, NOT as both ‘Handsearching’ and ‘Reference Lists’.

Overall Coding for Q3:

To answer Yes, the author(s) should have used at least two strategies from each column (one database type may be appropriate, as described above). In other words, in addition to using at least two types of electronic databases, the author(s) must have utilized a minimum of two of the other strategies (i.e., handsearching; key informants; reference lists; and/or unpublished literature).

Q4 Search strategy covers an adequate number of years

In order to ensure that the entire body of relevant research is included in the review, the search strategy should cover a sufficient time period. The number of years that are adequate to search for primary studies will vary depending on the topic and the amount of literature being developed in that field. Generally, at least 10 years should be used as a minimum length of time, however, this may be increased if there has been little published in that time frame, or may be shortened if there has been an extreme amount of literature published in the recent past. The duration may also be shortened if the review is an update, however the original search must have covered a sufficient number of years.

Overall Coding for Q4:

Answer Yes if the search strategy covered enough years that it is unlikely that important studies were missed. If there is any doubt in the reviewer's mind, some additional consideration of the topic area with the librarian will be conducted to determine the final assessment.

Q5 Rigour of studies included in review is described

The methodological quality of primary studies is powerful in helping to explain variations in results from study to study. Therefore, the methodological rigour of primary studies in the relevant topic area should be identified and clearly described. Should the author(s) describe the studies as 'observational', please consider these studies to be a Level III. For reviews of reviews, select the level of evidence based on the types of primary studies that appeared in the systematic reviews/meta-analyses now under assessment.

Overall Coding for Q5:

Place a check mark in the Yes column if the methodological rigour (ie. RCT, Cohort, qualitative, etc.) of the primary studies is clearly identified in the review and circle the appropriate level of evidence.

Q6 Quality assessment of primary studies

Each primary study should be assessed for methodological quality using a standardized assessment tool/scale. These criteria apply to meta-analyses as well.

Review authors need to do more than just state quality-related data that was extracted. The implication of this data on a review's findings must be addressed. For example, just because review authors list sample sizes of the primary studies does not mean they have assessed study sample.

**Health-Evidence staff should not have to conduct the QA, based on study characteristics provided.*

A **minimum of four** of the following areas should be assessed and the results described (in narrative or table form for each included primary study) for quantitative studies:

- Research design (most rigorous design given the research question)
- Study sample (generalizability, baseline characteristics)
- Participation rate
- Sources of bias (confounders, respondent bias, blinding, allocation concealment)
- Data collection (measurement of independent and dependent variables, assessment tools).
- Follow-up/attrition rates
- Data analysis (e.g., intention-to-treat)

For **Cochrane Reviews** authors are required to conduct a standardized 'Risk of Bias' assessment (see <http://www.cochrane-handbook.org/> Figure 8.6a). Their results are typically included in the Characteristics of Included Studies table. These characteristics translate to the Health Evidence QA tool as follows:

If Cochrane authors assess...	On the health evidence QA tool select...
Sequence generation →	Research design
Allocation concealment →	Research design
Blinding →	Source of bias
Free of selective reporting →	Data collection
Incomplete long-term/short-term outcome data	Data analysis
*Authors describe assessing intention-to-treat analysis & whether incomplete data was dealt with correctly.	

The **JADAD** and **EPOC** tools are well-reputed and typically code **Yes**. Systematic reviews from the Cochrane Library often employ criteria from the Cochrane Reviewers' Handbook, however it is important to clarify the areas of assessment as 4 out of the 7 are not always considered.

When review authors assess whether or not a primary study used a "validated measure(s)", this counts toward a point for Data Collection.

Use of a Funnel plot can be used towards a point for Sources of Bias, as long as it appears in the body of the paper and is part of a larger QA.

In some instances, different quality assessment criteria may be used for different study designs included in the same review. For example the EPOC tool has different criteria for interrupted time series studies, compared to randomized controlled trials. In this case, as long as the majority of reviews are assessed with 4+ criteria then **Yes** is appropriate.

For reviews of **qualitative primary studies** the following should be assessed and described for each included primary study:

→ Suitability of methodology/paradigm to the research question

→ Sampling (selection of participants/settings/documentation)

→ Clear description of context, data collection and data analysis

→ Rigour:

- i. Audit trail (authors have provided/kept record of sufficient evidence to show the process and data used to demonstrate that their interpretations were reasonable)
- ii. Some coding by 2 or more coders, if appropriate
- iii. Deviant case analysis (negative cases that do not fit the main findings/themes)
- iv. Respondent validation (member checking)

→ Triangulation (use of 2 or more research methods or sources to answer the same research question, the idea being that using different methods that draw the same interpretations add to the strength/integrity of the study)

→ Reflexivity (regarding researcher and the research process – the researcher’s reflections on their effect on the research and research process, and the effect of

the research on them and how both of these may have affected the outcome/findings)

→ Relevance (credibility, consistency, applicability, transferability) – these refer to the research being consistent with the context of the population being studied. Consistency in the application of methods and fieldwork is important. Transferability refers to the need to give enough detail about the context to allow others to make decisions about the applicability of that body of research to other populations.

Overall Coding for Q6:

For a review of quantitative studies, place a check mark in the Yes column if at least four of the seven criteria are assessed (study design, data collection methods and follow-up rate must be assessed). For a review of qualitative studies, place a check mark in the Yes column if at least four of the seven criteria are assessed (suitability; sampling; clear description of context, data collection and data analysis; and rigour must be assessed).

Q7 Are quality assessments transparent?

For quality assessments to be transparent a minimum of two review authors should assess each primary study, independently, for methodological quality and the method of conflict resolution described. A numerical level of agreement may be identified (i.e., Kappa), but is not required. If only inter-rater agreement scores are reported, however, review authors must report a Kappa score of at least 0.80 in order to score a Yes for this criterion.

Overall Coding for Q7:

Place a check mark in the Yes column if two (or more) independent reviewers assessed each primary study for methodological quality, with a method of conflict resolution identified.

Q8 Did review authors assess appropriateness of combining study results (i.e., test of homogeneity, or assess similarity of results in some other way)?

It is important that primary study results be assessed for similarity prior to combining them (both statistically and/or non-statistically).

If a **meta-analysis** is conducted, a test for homogeneity or heterogeneity is the minimum requirement that should be assessed across studies prior to determining the overall effect size. If significant heterogeneity is detected, the author(s) should indicate use of a Random Effects Model, as opposed to a Fixed Effects Model.

On occasion, an author may indicate the presence of significant heterogeneity and still combine data using a Fixed Effects Model. This IS appropriate if analyses have been conducted with both the inclusion and exclusion of data sets that may notably skew results. The results of these separate analyses, however, **MUST** be reviewed for the reader's consideration. This process, often called 'sensitivity analysis', assesses the moderators that may have contributed to the heterogeneity.

If a **systematic review** or a **narrative review** is conducted for which statistical analysis is not appropriate, the results of each study should be depicted in graph/table format in order to assess similarity across the primary studies. Often the results will be in the form of a table, but in the case of a narrative review the results of each study will be described at length within the body of the review.

In some cases confidence intervals/effect sizes are NOT required. For a **review of reviews**, a narrative presentation is appropriate (e.g. "the intervention had a positive effect on 20% of participants); ideally, with a table listing main features of each of the systematic reviews under review, or thorough, **CONSISTENT** discussion of the main features in the body of the review. If the review of reviews doesn't consistently present the actual numerical (or other qualitative) results (e.g. effect sizes from the original reviews) in the text, then it should score a **No**.

In general, trust the review author(s)' judgment of what is significant heterogeneity. A declaration of the specific number that was calculated (e.g. Chi-square score) is not mandatory.

NOTE: Despite extensive search strategies, some Cochrane reviews are unable to retrieve any applicable studies. In this case, a priori methodologies are often described. Subheadings alone, however, are sufficient to score a Yes, as Cochrane requires that they are filled in adequately before publication. Without a Yes for these criteria, these types of reviews will be of only Moderate quality, which may result in them being missed by

users who are looking only for Strong reviews.

Overall Coding for Q8:

Place a check mark in the Yes column if a test of homo/heterogeneity has been conducted and the corresponding model applied, or if the individual study results have been disclosed graphically or narratively. Please note that if study results are listed narratively, the information must have been provided consistently for all studies within the review text.

Q9 Weighting

Whether a meta-analysis or a systematic/narrative review, the overall measure of effect should be determined by assigning those studies of highest methodological quality greater weight. In the case of meta-analyses, weighting may be based on sample size, which is also acceptable.

If review authors have named a specific statistical software package (e.g. RevMan) they have used to combine data, this is sufficient for weighting, as the vast majority of this software incorporates the weighting of studies by a number of participants. Review authors may describe using the DerSimonian and Laird approach to random-effects meta-analysis which also incorporates weighting. Higgins and Green (2009) explain that:

"The random-effects method (DerSimonian 1986) incorporates an assumption that the different studies are estimating different, yet related,

intervention effects [...] The method is based on the inverse-variance approach, making an adjustment to the study weights according to the extent of variation, or heterogeneity, among the varying intervention effects."

Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.2., The Cochrane Collaboration, 2009. Available from <http://www.cochrane-handbook.org>

One may notice the inclusion of sensitivity analyses and/or funnel plot diagrams. These are useful for assessing the effect of study quality on results in the case of the former, and potential for publication bias in the case of the latter. While useful, these particular analyses are not mandatory for a review to acquire a **Yes** coding.

In a **narrative synthesis**, quality of EACH of the included studies must be discussed consistently throughout the conclusions/discussion section to receive a **Yes** for this criterion.

In some cases review authors disclose the QA scores of primary studies - in table format, for example - and discuss those scores, but do not actually 'weigh' them; essentially, allowing the readers to determine which ones have the most weight. This is NOT sufficient to score a **Yes** for this criterion, as the review authors should be doing all summative work. It IS appropriate, however, for review authors to state, for example: "only the studies with a quality score of 5 or above are included in the analysis."

Reviews that weight conclusions/discussion by primary study quality still receive a Yes even if < 3 quality parameters were assessed (as per QA criterion #6).

Overall Coding for Q9:

Place a check mark in the Yes column if a weighting system has been used in determining the overall impact.

Q10 Interpretation of results

Consider the reported data and assess whether the review author's interpretation of the results of the primary studies are supported by the data. If no numerical values or p values/confidence intervals are given, then the reviewer cannot determine whether any conclusions are supported by the data and should respond No to criteria #10. In addition, if review authors failed to adequately assess methodological quality of the primary studies (i.e. criteria #6 is No), and also failed to weight the studies by quality or sample size (for meta-analyses) in their synthesis of results (i.e. criteria #9 is No), then the response to #10 should also be No, since it is difficult to determine agreement with review authors' conclusion(s) if no quality assessment has taken place, since it is possible that agreement with authors' overall conclusion(s) would differ if studies were of weak quality compared to very strong quality.

Overall Coding for Q10:

Place a check mark in the Yes column if the data for the primary studies supports the interpretations outlined in the review.

Overall coding for the review

An overall assessment of the methodological quality of the review will be determined based on the results from each question. The total score is out of 10. Add all the check marks in the Yes column and add to the Total column under **Yes**. Do the same for the **No** column. Use the following decision rule to determine the overall assessment for the review based on the numbers in the Total columns.

- Reviews with a score of **8 or higher** in the **Yes** column will be rated as Strong
- Reviews with a score between **5-7** in the Yes column will be rated as Moderate
- Reviews with a score of **4 or less** in the Yes column will be rated as Weak

In the case that a score does not necessarily reflect your impression of the actual quality of a review (i.e., Strong/Moderate/Weak), consider revisiting some of the criteria and Yes and/or No scores, or discuss with a second reviewer, so that the corresponding quality category is a reflection of the review's overall methods and the score will be an accurate reflection for use by public health decision-makers.

What to do if a criterion is Not Applicable:

If a response to a question is N/A the final denominator for determining the overall assessment will be reduced by one

Appendix 4 Quality ratings

Table 9: Papers by intervention type with quality rating

		Quality Assessment Criteria									
Interventions	Quality Assessment	1	2	3	4	5	6	7	8	9	10
Means restriction											
Hahn et al. (2005)	Strong	x	✓	✓	✓	✓	✓	✓	x	x	✓
Cox et al. (2013)	Moderate	✓	✓	x	✓	✓	x	x	x	x	x
Pirkis et al. (2013)	Moderate	✓	✓	x	x	✓	x	x	✓	✓	✓
Krysinska and De Leo (2008)	Weak	x	✓	x	✓	x	x	x	x	x	x
Sarchiapone et al. (2011)	Weak	x	✓	x	x	x	x	x	x	x	x
Yip et al. (2012)	Weak	x	✓	x	✓	x	x	x	x	x	x
Media											
Bohanna and Wang (2012)	Moderate	✓	x	✓	✓	✓	x	x	✓	x	✓
Gatekeeper training											
Isaac et al. (2009)	Strong	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening											
Gaynes et al. (2004) ^b	Strong	✓	✓	✓	✓	✓	x	✓	✓	x	x
O'Connor et al. (2013) ^a	Strong	✓	✓	✓	✓	✓	x	x	✓	✓	✓
Oyama et al. (2008)	Strong	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
Pena and Caine (2006)	Moderate	✓	✓	✓	✓	✓	x	x	✓	x	x
Psychosocial											
Bahraini (2013)	Strong	✓	✓	✓	x	✓	✓	✓	x	x	✓
Crawford et al. (2007)	Strong	✓	✓	x	✓	✓	x	✓	✓	✓	x
Hawton et al. (1998)	Strong	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hawton et al. (1999)	Strong	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
O'Neil et al. (2012)	Strong	✓	✓	✓	✓	✓	✓	✓	✓	x	✓
Robinson et al. (2011)	Strong	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tarrier et al. (2008)	Strong	✓	✓	✓	✓	x	x	x	✓	✓	✓
van der Sande et al. (1997)	Strong	✓	✓	x	✓	✓	x	x	✓	✓	✓
Winter et al. (2013)	Moderate	✓	✓	✓	✓	x	x	x	x	✓	x
Fountoulakis et al. (2009)	Weak	x	x	x	✓	x	x	x	x	x	x
Gray and Otto (2001)	Weak	✓	x	x	x	✓	x	x	x	x	x

		Quality Assessment Criteria									
Interventions	Quality Assessment	1	2	3	4	5	6	7	8	9	10
Tele mental health											
Hailey et al. (2008)	Moderate	✓	✓	x	✓	✓	x	✓	x	x	x
Lapierre et al. (2011)	Moderate	✓	✓	✓	✓	✓	x	x	x	x	x
Lester (1997)	Weak	x	x	x	x	✓	x	x	x	x	x
Web-based											
Lai et al., (2014)	Moderate	x	✓	x	✓	✓	x	✓	x	x	x
Emergency Department											
Newton et al. (2010)	Strong	✓	✓	✓	✓	✓	x	✓	x	x	✓
School-based interventions											
Cusimano and Sameem (2011)	Strong	✓	✓	x	✓	✓	✓	✓	✓	x	✓
Ploeg et al. (1999)	Strong	✓	✓	✓	✓	✓	✓	✓	x	x	✓
Guo and Harstall (2002)	Moderate	✓	✓	x	✓	x	✓	✓	x	x	x
Katz et al. (2013)	Moderate	✓	✓	✓	✓	✓	x	✓	x	x	x
Miller et al. (2009)	Moderate	✓	✓	✓	✓	✓	x	✓	x	x	x
Ploeg et al. (1996)	Moderate	✓	✓	x	✓	✓	✓	✓	x	x	x
Robinson et al. (2013)	Moderate	✓	✓	x	✓	✓	x	x	x	x	x
Szumilas and Kutcher (2011)	Moderate	✓	✓	✓	✓	✓	x	x	x	x	x
Gould et al. (2003)	Weak	x	x	x	x	x	x	x	x	x	x
Mujoomdar et al. (2009)	Weak	✓	✓	x	x	✓	x	x	x	x	x
Pompili et al. (2010)	Weak	x	x	x	✓	x	x	x	x	x	x
Veterans/Military											
Bagley et al. (2010)	Moderate	✓	x	✓	✓	x	x	x	✓	x	x
Shekelle et al. (2009)	Moderate	✓	✓	✓	x	✓	x	x	x	x	x
(Zamorski, 2011)	Weak (1)	x	x	✓	x	x	x	x	x	x	x
Specific conditions											
(Latalova et al., 2014)	Weak	x	✓	x	✓	x	x	x	x	x	x
(Links and Hoffman, 2005)	Weak	x	✓	x	✓	x	x	x	x	x	x
Follow up care											
Luxton et al. (2013)	Weak	✓	✓	x	x	✓	x	x	x	x	x

		Quality Assessment Criteria									
Interventions	Quality Assessment	1	2	3	4	5	6	7	8	9	10
Community-based											
(Fountoulakis et al., 2011)	Weak	x	x	x	✓	x	x	x	x	x	x
(Takada and Shima, 2010)	Weak	x	✓	x	✓	✓	x	x	x	x	x

Note. ✓ = criteria met; x = criteria not met; 1 = clearly focused question; 2 = appropriate inclusion criteria; 3 = research strategy; 4 = timeframe; 5 = Level of evidence; 6 = methodological quality; 7 = review transparency; 8 = suitability of combining studies; 9 = appropriate methods for combining or comparing studies; 10 = does data support author's interpretation; a = data also included in psychosocial section; b = data also included in psychosocial section.

Table 10: Summary of quality ratings

In summary	1	2	3	4	5	6	7	8	9	10
Number of reviews that met criteria	33	38	23	37	33	10	19	16	11	16
% of reviews that met criteria	70%	81%	49%	79%	70%	21%	40%	34%	23%	34%
Number of reviews that did not meet quality criteria	14	9	24	10	14	37	28	31	36	31
% of reviews that did not meet quality criteria	30%	19%	51%	21%	30%	79%	60%	66%	77%	66%

Note. 1 = clearly focused question; 2 = appropriate inclusion criteria; 3 = research strategy; 4 = timeframe; 5 = Level of evidence; 6 = methodological quality; 7 = review transparency; 8 = suitability of combining studies; 9 = appropriate methods for combining or comparing studies; 10 does data support author's interpretation.

References

References

- Alexopoulos GS, Reynolds CF, Bruce ML, Katz IR, Raue PJ, Mulsant BH *et al.* (2009) Reducing suicidal ideation and depression in older primary care patients: 24-month outcomes of the PROSPECT study. *Am J Psychiatry*, 166(8): 882-890.
- Appelhoff R. (2013) *School-based programmes to prevent suicide and build resilience among students A literature review and national stocktake*. Canterbury, New Zealand: Canterbury District Health Board.
- Aseltine RH and DeMartino R. (2004) An outcome evaluation of the SOS Suicide Prevention Program. *Am J Public Health*, 94(3): 446-451.
- Aseltine RH, James A, Schilling EA and Glanovsky J. (2007) Evaluating the SOS suicide prevention program: a replication and extension. *BMC Public Health*, 7: 161.
- Bagley SC, Munjas B and Shekelle P. (2010) A systematic review of suicide prevention programs for military or veterans. *Suicide Life Threat Behav*, 40(3): 257-265.
- Bahraini NH, Simpson GK, Brenner LA, Hoffberg AS and Schneider AL. (2013) Suicidal ideation and behaviours after traumatic brain injury: A systematic review. *Brain Impairment*, 14(1): 92-112.
- Beautrais AL, Gibb SJ, Faulkner A, Fergusson DM and Mulder RT. (2010) Postcard intervention for repeat self-harm: randomised controlled trial. *Br J Psychiatry*, 197(1): 55-60.
- Blum N, St John D, Pfohl B, Stuart S, McCormick B, Allen J *et al.* (2008) Systems Training for Emotional Predictability and Problem Solving (STEPPS) for outpatients with borderline personality disorder: a randomized controlled trial and 1-year follow-up. *Am J Psychiatry*, 165(4): 468-478.
- Bohanna I and Wang X. (2012) Media guidelines for the responsible reporting of suicide: a review of effectiveness. *Crisis*, 33(4): 190-198.
- Callahan J. (1996) Negative effects of a school suicide prevention program--a case example. *Crisis*, 17(3): 108-115.
- Cantor CH and Slater PJ. (1995) The impact of firearm control legislation on suicide in Queensland: preliminary findings. *Med J Aust*, 162(11): 583-585.
- Carter GL, Clover K, Whyte IM, Dawson AH and D'Este C. (2005) Postcards from the EDge project: randomised controlled trial of an intervention using postcards to reduce repetition of hospital treated deliberate self poisoning. *BMJ*, 331(7520): 805.

- Carter GL, Clover K, Whyte IM, Dawson AH and D'Este C. (2007) Postcards from the EDge: 24-month outcomes of a randomised controlled trial for hospital-treated self-poisoning. *Br J Psychiatry*, 191: 548-553.
- Cedereke M, Monti K and Ojehagen A. (2002) Telephone contact with patients in the year after a suicide attempt: does it affect treatment attendance and outcome? A randomised controlled study. *Eur Psychiatry*, 17(2): 82-91.
- Christensen H, Farrer L, Batterham PJ, Mackinnon A, Griffiths KM and Donker T. (2013) The effect of a web-based depression intervention on suicidal ideation: secondary outcome from a randomised controlled trial in a helpline. *BMJ Open*, 3(6).
- Comtois K, Jobes D, S O'Connor S, Atkins D, Janis K, E Chessen C *et al.* (2011) Collaborative assessment and management of suicidality (CAMS): feasibility trial for next-day appointment services. *Depress Anxiety*, 28(11): 963-972.
- Cotgrove A, Zirinsky L, Black D and Weston D. (1995) Secondary prevention of attempted suicide in adolescence. *Journal of Adolescence*, 18(5): 569-577.
- Cox GR, Owens C, Robinson J, Nicholas A, Lockley A, Williamson M *et al.* (2013) Interventions to reduce suicides at suicide hotspots: a systematic review. *BMC Public Health*, 13(1): 214.
- Crawford MJ, Thana L, Methuen C, Ghosh P, Stanley SV, Ross J *et al.* (2011) Impact of screening for risk of suicide: randomised controlled trial. *Br J Psychiatry*, 198(5): 379-384.
- Crawford MJ, Thomas O, Khan N and Kulinskaya E. (2007) Psychosocial interventions following selfharm. Systematic review of their efficacy in preventing suicide. *Br J Psychiatry*, 190(1): 11-17.
- Cummings P, Grossman DC, Rivara FP and Koepsell TD. (1997) State gun safe storage laws and child mortality due to firearms. *JAMA*, 278(13): 1084-1086.
- Cusimano MD and Sameem M. (2011) The effectiveness of middle and high school-based suicide prevention programmes for adolescents: A systematic review. *Inj Prev*, 17(1): 43-49.
- Davidson K, Norrie J, Tyrer P, Gumley A, Tata P, Murray H *et al.* (2006) The effectiveness of cognitive behavior therapy for borderline personality disorder: results from the borderline personality disorder study of cognitive therapy (BOSSCOT) trial *J Pers Disord*, 20(5): 450-465.
- Davidson K, Tyrer P, Norrie J, Palmer S and Tyrer H. (2010) Cognitive therapy v. usual treatment for borderline personality disorder: prospective 6-year follow-up. *Br J Psychiatry*, 197: 456-462.

- De Leo D, Dello Buono M and Dwyer J. (2002) Suicide among the elderly: the long-term impact of a telephone support and assessment intervention in northern Italy. *Br J Psychiatry*, 181: 226-229.
- De Leo D and Heller T. (2007) Intensive case management in suicide attempters following discharge from inpatient psychiatric care. *Aust J Prim Health*, 13(3): 49-58.
- Dedic G and Panic M. (2007) Suicide prevention program in the Army of Serbia and Montenegro. *Mil Med*, 172(5): 551-555.
- Deykin EY, Hsieh CC, Joshi N and McNamarra JJ. (1986) Adolescent suicidal and self-destructive behavior. Results of an intervention study. *J Adolesc Health Care*, 7(2): 88-95.
- DeZee MR. (1983) Gun Control Legislation: Impact and Ideology. *Law & Policy*, 5(3): 367-379.
- Diamond G, Wintersteen M, Brown G, Diamond G, Gallop R, Shelef K *et al.* (2010) Attachment-based family therapy for adolescents with suicidal ideation: A randomized controlled trial. *J Am Acad Child Adolesc Psychiatry*, 49(2): 122-131.
- Donaldson D, Spirito A and Esposito-Smythers C. (2005) Treatment for adolescents following a suicide attempt: results of a pilot trial. *J Am Acad Child Adolesc Psychiatry*, 44(2): 113-120.
- du Roscoät E and Beck F. (2013) Efficient interventions on suicide prevention: A literature review. *Rev Epidemiol Sante Publique*, 61 (4): 363-374.
- Eggert LL, Thompson EA, Herting JR and Nicholas LJ. (1995) Reducing suicide potential among high-risk youth: tests of a school-based prevention program. *Suicide Life Threat Behav*, 25(2): 276-296.
- Eggert LL, Thompson EA, Randell BP and Pike KC. (2002) Preliminary effects of brief school-based prevention approaches for reducing youth suicide--risk behaviors, depression, and drug involvement. *J Child Adolesc Psychiatr Nurs*, 15(2): 48-64.
- Feigelman W, Gorman BS, Beal KC and Jordan JR. (2008) Internet support groups for suicide survivors: a new mode for gaining bereavement assistance. *Omega*, 57(3): 217-243.
- Fleischmann A, Bertolote JM, Wasserman D, De Leo D, Bolhari J, Botega NJ *et al.* (2008) Effectiveness of brief intervention and contact for suicide attempters: a randomized controlled trial in five countries. *Bull World Health Organ*, 86(9): 703-709.
- Fountoulakis KN, Gonda X and Rihmer Z. (2011) Suicide prevention programs through community intervention. *J Affect Disord*, 130(1-2): 10-16.

Fountoulakis KN, Gonda X, Siamouli M and Rihmer Z. (2009) Psychotherapeutic intervention and suicide risk reduction in bipolar disorder: a review of the evidence. *J Affect Disord*, 113(1-2): 21-29.

Gallo J, Bogner H, Morales K, Post E, Lin J and Bruce M. (2007) The effect of a primary care practice-based depression intervention on mortality in older adults: a randomized trial. *Ann Intern Med*, 146(10): 689-698.

Gaynes BN, West SL, Ford CA, Frame P, Klein J, Lohr KN *et al.* (2004) Screening for suicide risk in adults: a summary of the evidence for the U.S. Preventive Services Task Force. *Ann Intern Med*, 140(10): 822-835.

Gould MS, Greenberg T, Velting DM and Shaffer D. (2003) Youth suicide risk and preventive interventions: a review of the past 10 years. *J Am Acad Child Adolesc Psychiatry*, 42(4): 386-405.

Gould MS, Marrocco FA, Kleinman M, Thomas JG, Mostkoff K, Cote J *et al.* (2005) Evaluating iatrogenic risk of youth suicide screening programs: a randomized controlled trial. *JAMA*, 293(13): 1635-1643.

Gray SM and Otto MW. (2001) Psychosocial approaches to suicide prevention: Applications to patients with bipolar disorder. *J Clin Psychiatry*, 62(Suppl. 25): 56-64.

Green J, Wood A, Kerfoot M, Trainor G, Roberts C, Rothwell J *et al.* (2011) Group therapeutic treatment for adolescents with repeated self harm (assist) – a randomised controlled trial with economic evaluation. *BMJ*, 342(682).

Greenfield B, Larson C, Hechtman L, Rousseau C and Platt R. (2002) A rapid-response outpatient model for reducing hospitalization rates among suicidal adolescents. *Psychiatr Serv*, 53(12): 1574-1579.

Guo B and Harstall C. (2002) *Efficacy of suicide prevention programs for children and youth*. Edmonton: Alberta Heritage Foundation for Medical Research.

Hacker K, Collins J, Gross-Young L, Almeida S and Burke N. (2008) Coping with youth suicide and overdose: one community's efforts to investigate, intervene, and prevent suicide contagion. *Crisis*, 29(2): 86-95.

Hahn RA, Bilukha O, Crosby A, Fullilove MT, Liberman A, Moscicki E *et al.* (2005) Firearms laws and the reduction of violence: a systematic review. *Am J Prev Med*, 28(2 Suppl 1): 40-71.

Hailey D, Roine R and Ohinmaa A. (2008) The effectiveness of telemental health applications: A review. *Can J Psychiatry*, 53(11): 769-778.

- Harrington R, Kerfoot M, Dyer E, McNiven F, Gill J, Harrington V *et al.* (1998) Randomized trial of a home-based family intervention for children who have deliberately poisoned themselves. *J Am Acad Child Adolesc Psychiatry*, 37(5): 512-518.
- Hawton K, Arensman E, Townsend E, Bremner S, Feldman E, Goldney R *et al.* (1998) Deliberate self harm: systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition. *BMJ*, 317(7156): 441-447.
- Hawton K, Rodham K, Evans E and Weatherall R. (2002) Deliberate self harm in adolescents: self report survey in schools in England. *BMJ*, 325(7374): 1207-1211.
- Hawton K, Townsend E, Arensman E, Gunnell D, Hazell P, House A *et al.* (1999) Psychosocial and pharmacological treatments for deliberate self harm. *Cochrane Database Syst Rev*, (4): 1-42.
- Hazell P and Lewin T. (1993) An evaluation of postvention following adolescent suicide. *Suicide Life Threat Behav*, 23(2): 101-109.
- Hazell PL, Martin G, McGill K, Kay T, Wood A, Trainor G *et al.* (2009) Group therapy for repeated deliberate self-harm in adolescents: failure of replication of a randomized trial. *J Am Acad Child Adolesc Psychiatry*, 48(6): 662-670.
- Health Evidence Canada. (2013) Quality assessment tool and dictionary
<http://www.healthevidence.org/our-appraisal-tools.aspx>
- Hegerl U, Althaus D, Schmidtke A and Niklewski G. (2006) The alliance against depression: 2-year evaluation of a community-based intervention to reduce suicidality. *Psychol Med*, 36(9): 1225-1233.
- Heisel MJ, Duberstein PR, Talbot NL, King DA and Tu XM. (2009) Adapting Interpersonal Psychotherapy for Older Adults at Risk for Suicide: Preliminary Findings. *Prof Psychol Res Pr*, 40(2): 156-164.
- Henriksson S and Isacson G. (2006) Increased antidepressant use and fewer suicides in Jamtland county, Sweden, after a primary care educational programme on the treatment of depression. *Acta Psychiatr Scand*, 114(3): 159-167.
- Ilgen MA, Jain A, Lucas E and Moos RH. (2007) Substance use-disorder treatment and a decline in attempted suicide during and after treatment. *J Stud Alcohol Drugs*, 68(4): 503-509.
- Isaac M, Elias B, Katz LY, Belik S-L, Deane FP, Enns MW *et al.* (2009) Gatekeeper training as a preventative intervention for suicide: A systematic review. *Can J Psychiatry*, 54(4): 260-268.

- Katz C, Bolton SL, Katz LY, Isaak C, Tilston-Jones T and Sareen J. (2013) A systematic review of school-based suicide prevention programs. *Depress Anxiety*, 30(10): 1030-1045.
- Killaspy H, Bebbington P, Blizard R, Johnson S, Nolan F, Pilling S *et al.* (2006) The REACT study: randomised evaluation of assertive community treatment in north London. *BMJ*, 332(7545): 815-820.
- King C, Klaus N, Kramer A, Venkataraman S, Quinlan P and Gillespie B. (2009) The Youth-Nominated Support Team-Version II for suicidal adolescents: A randomized controlled intervention trial. *J Consult Clin Psychol*, 77(5): 880-893.
- King C, Kramer A, Preuss L, Kerr D, Weisse L and Venkataraman S. (2006) Youth-Nominated Support Team for Suicidal Adolescents (Version 1): a randomized controlled trial. *J Consult Clin Psychol*, 74(1): 199-206.
- King KA, Strunk CM and Sorter MT. (2011) Preliminary effectiveness of surviving the teens((R)) suicide prevention and depression awareness program on adolescents' suicidality and self-efficacy in performing help-seeking behaviors. *J Sch Health*, 81(9): 581-590.
- Kleck G and Patterson EB. (1993) The impact of gun control and gun ownership levels on violence rates. *Journal of Quantitative Criminology*, 9(3): 249-287.
- Klingman A and Hochdorf Z. (1993) Coping with distress and self harm: the impact of a primary prevention program among adolescents. *J Adolesc*, 16(2): 121-140.
- Knox KL, Litts DA, Talcott GW, Feig JC and Caine ED. (2003) Risk of suicide and related adverse outcomes after exposure to a suicide prevention programme in the US Air Force: cohort study. *BMJ*, 327(7428): 1376.
- Koons CR, Robins CJ, Lindsey Tweed J, Lynch TR, Gonzalez AM, Morse JQ *et al.* (2001) Efficacy of dialectical behavior therapy in women veterans with borderline personality disorder. *Behavior Therapy*, 32(2): 371-390.
- Krysinska K and De Leo D. (2008) Suicide on railway networks: Epidemiology, risk factors and prevention. *Aust N Z J Psychiatry*, 42(9): 763-771.
- LaFromboise T and Howard-Pitney B. (1995) The Zuni life skills development curriculum: Description and evaluation of a suicide-prevention program. *J Couns Psychol*, 42: 479-486.
- Lai MH, Maniam T, Chan LF and Ravindran AV. (2014) Caught in the Web: A Review of Web-Based Suicide Prevention. *J Med Internet Res*, 16(1): e30.
- Lapierre S, Dube M, Bouffard L and Alain M. (2007) Addressing suicidal ideations through the realization of meaningful personal goals. *Crisis*, 28(1): 16-25.

- Lapierre S, Erlangsen A, Waern M, De Leo D, Oyama H, Scocco P *et al.* (2011) A systematic review of elderly suicide prevention programs. *Crisis*, 32(2): 88-98.
- Larkin GL, Smith RP and Beautrais AL. (2008) Trends in US emergency department visits for suicide attempts, 1992-2001. *Crisis*, 29(2): 73-80.
- Latalova K, Kamaradova D and Prasko J. (2014) Suicide in bipolar disorder: a review. *Psychiatr Danub*, 26(2): 108-114.
- Lester D. (1997) The effectiveness of suicide prevention centers: a review. *Suicide Life Threat Behav*, 27(3): 304-310.
- Lewin S, Oxman AD, Lavis JN and Fretheim A. (2009) SUPPORT Tools for evidence-informed health Policymaking (STP) 8: Deciding how much confidence to place in a systematic review. *Health Res Policy Syst*, 7 Suppl 1: S8.
- Linehan MM, Armstrong HE, Suarez A, Allmon D and Heard HL. (1991) Cognitive-behavioral treatment of chronically parasuicidal borderline patients. *Arch Gen Psychiatry*, 48(12): 1060-1064.
- Linehan MM, Comtois KA, Murray AM, Brown MZ, Gallop RJ, Heard HL *et al.* (2006) Two-year randomized controlled trial and follow-up of dialectical behavior therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Arch Gen Psychiatry*, 63(7): 757-766.
- Links PS and Hoffman B. (2005) Preventing suicidal behaviour in a general hospital psychiatric service: priorities for programming. *Can J Psychiatry*, 50(8): 490-496.
- Loftin C, McDowall D, Wiersema B and Cottey TJ. (1991) Effects of restrictive licensing of handguns on homicide and suicide in the District of Columbia. *N Engl J Med*, 325(23): 1615-1620.
- Lott J and Whitley JE. (2001) Safe Storage Gun Laws: Accidental Deaths, Suicides, and Crime. *Journal of Law and Economics*, 44(S2): 659-689.
- Ludwig J and Cook PJ. (2000) Homicide and suicide rates associated with implementation of the Brady Handgun Violence Prevention Act. *JAMA*, 284(5): 585-591.
- Luxton DD, June JD and Comtois KA. (2013) Can postdischarge follow-up contacts prevent suicide and suicidal behavior? A review of the evidence. *Crisis*, 34(1): 32-41.
- Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A *et al.* (2005) Suicide prevention strategies: a systematic review. *JAMA*, 294(16): 2064-2074.

- May PA, Serna P, Hurt L and Debruyne LM. (2005) Outcome evaluation of a public health approach to suicide prevention in an American Indian tribal nation. *Am J Public Health*, 95(7): 1238-1244.
- McDaniel WW, Rock M and Grigg JR. (1990) Suicide prevention at a United States Navy training command. *Mil Med*, 155:: 173-175.
- McDowall D, Loftin C and Wiersema B. (1996) Using Quasi-Experiments to Evaluate Firearm Laws: Comment on Britt et al.'s Reassessment of the D.C. Gun Law. *Law & Society Review*, 30(2): 381-392.
- McLeavey BC, Daly RJ, Ludgate JW and Murray CM. (1994) Interpersonal problem-solving skills training in the treatment of self-poisoning patients. *Suicide Life Threat Behav*, 24(4): 382-394.
- McMain S, Links P, Gnam W, Guimond T, Cardish R, Korman L *et al.* (2009) McMains SF, Links PS, Gnam WH, *et al.* A randomized trial of dialectical behavior therapy versus general psychiatric management for borderline personality disorder. *Am J Psychiatry*, 166(12): 1365-1374.
- Miller DN, Eckert TL and Mazza JJ. (2009) Suicide prevention programs in the schools: A review and public health perspective. *School Psych Rev*, 38(2): 168-188.
- Morgan HG, Jones EM and Owen JH. (1993) Secondary prevention of non-fatal deliberate self-harm. The green card study. *Br J Psychiatry*, 163: 111-112.
- Mujoomdar M, Cimon K and Nkansah E. (2009) *Dialectical Behaviour Therapy in Adolescents for Suicide Prevention: Systematic Review of Clinical-Effectiveness*. Ottawa: Canadian Agency for Drugs and Technologies in Health.
- Murray DR. (1975) Handguns, Gun Control Laws and Firearm Violence. *Social Problems*, 23(1): 81-93.
- Nelson FL. (1987) Evaluation of a youth suicide prevention school program. *Adolescence*, 22(88): 813-825.
- Newton AS, Hamm MP, Bethell J, Rhodes AE, Bryan CJ, Tjosvold L *et al.* (2010) Pediatric suicide-related presentations: a systematic review of mental health care in the emergency department. *Ann Emerg Med*, 56(6): 649-659.
- NICE. (2011) *Self-harm: longer-term management in adults, children and young people [Draft for Consultation]*. National Institute for Health and Clinical Excellence.

- Niederkröthaler T and Sonneck G. (2007) Assessing the impact of media guidelines for reporting on suicides in Austria: interrupted time series analysis. *Aust N Z J Psychiatry*, 41(5): 419-428.
- NOSP. (2012) *National Office for Suicide Prevention Annual Report*. Health Service Executive.
- O'Connor E, Gaynes BN, Burda BU, Soh C and Whitlock EP. (2013) Screening for and treatment of suicide risk relevant to primary care: a systematic review for the U.S. Preventive Services Task Force. *Ann Intern Med*, 158(10): 741-754.
- O'Donnell I, Arthur AJ and Farmer RD. (1994) A follow-up study of attempted railway suicides. *Soc Sci Med*, 38(3): 437-442.
- O'Donnell I and Farmer RD. (1992) Suicidal acts on metro systems: an international perspective. *Acta Psychiatr Scand*, 86(1): 60-63.
- O'Neil ME, Peterson K, Low A, Carson S, Denneson LM, Haney E *et al.* (2012) *Suicide Prevention Interventions and Referral/Follow-Up Services: A Systematic Review*. Washington (DC): Department of Veterans Affairs.
- Orbach I and Bar-Joseph H. (1993) The impact of a suicide prevention program for adolescents on suicidal tendencies, hopelessness, ego identity, and coping. *Suicide Life Threat Behav*, 23(2): 120-129.
- Oyama H, Sakashita T, Ono Y, Goto M, Fujita M and Koida J. (2008) Effect of community-based intervention using depression screening on elderly suicide risk: A meta-analysis of the evidence from Japan. *Community Ment Health J*, 44(5): 311-320.
- Oyama H, Watanabe N, Ono Y, Sakashita T, Takenoshita Y, Taguchi M *et al.* (2005) Community-based suicide prevention through group activity for the elderly successfully reduced the high suicide rate for females. *Psychiatry Clin Neurosci*, 59(3): 337-344.
- Pena JB and Caine ED. (2006) Screening as an approach for adolescent suicide prevention. *Suicide Life Threat Behav*, 36(6): 614-637.
- Pirkis J, Spittal MJ, Cox G, Robinson J, Cheung YT and Studdert D. (2013) The effectiveness of structural interventions at suicide hotspots: a meta-analysis. *Int J Epidemiol*, 42(2): 541-548.
- Ploeg J, Ciliska D, Brunton G, MacDonnell J and O'Brien MA. (1999) *The effectiveness of school-based curriculum suicide prevention programs for adolescents*. Hamilton, Ontario: Effective Public Health Practice Project (EPHPP).
- Ploeg J, Ciliska D, Dobbins M, Hayward S, Thomas H and Underwood J. (1996) A systematic overview of adolescent suicide prevention programs. *Can J Public Health*, 87(5): 319-324.

- Poijula S, Dyregrov A, Wahlberg KE and Jokelainen J. (2001a) Reactions to adolescent suicide and crisis intervention in three secondary schools. *Int J Emerg Ment Health*, 3(2): 97-106.
- Poijula S, Wahlberg KE and Dyregrov A. (2001b) Adolescent suicide and suicide contagion in three secondary schools. *Int J Emerg Ment Health*, 3(3): 163-168.
- Pompili M, Innamorati M, Vichi M, Masocco M, Vanacore N, Lester D *et al.* (2010) Suicide prevention among youths. Systematic review of available evidence-based interventions and implications for Italy. *Minerva Pediatr*, 62(5): 507-535.
- Portzky G and van Heeringen K. (2006) Suicide prevention in adolescents: a controlled study of the effectiveness of a school-based psycho-educational program. *J Child Psychol Psychiatry*, 47(9): 910-918.
- Randell BP, Eggert LL and Pike KC. (2001) Immediate post intervention effects of two brief youth suicide prevention interventions. *Suicide Life Threat Behav*, 31(1): 41-61.
- Rees RJ and Bellon ML. (2007) Post concussion syndrome ebb and flow: longitudinal effects and management. *NeuroRehabilitation*, 22(3): 229-242.
- Robinson J, Cox G, Malone A, Williamson M, Baldwin G, Fletcher K *et al.* (2013) A systematic review of school-based interventions aimed at preventing, treating, and responding to suicide-related behavior in young people. *Crisis*, 34(3): 164-182.
- Robinson J, Hetrick SE and Martin C. (2011a) Preventing suicide in young people: Systematic review. *Aust N Z J Psychiatry*, 45(1): 3-26.
- Robinson J, Pan Yuen H, Martin C, Hughes A, Baksheev GN, Dodd S *et al.* (2011b) Does screening high school students for psychological distress, deliberate self-harm, or suicidal ideation cause distress--and is it acceptable? An Australian-based study. *Crisis*, 32(5): 254-263.
- Robinson J, Yuen HP, Gook S, Hughes A, Cosgrave E, Killackey E *et al.* (2012) Can receipt of a regular postcard reduce suicide-related behaviour in young help seekers? A randomized controlled trial. *Early Interv Psychiatry*, 6(2): 145-152.
- Robinson KA, Whitlock EP, Oneil ME, Anderson JK, Hartling L, Dryden DM *et al.* (2014) Integration of existing systematic reviews into new reviews: identification of guidance needs. *Syst Rev*, 3: 60.
- Rotheram-Borus MJ and Bradley J. (1991) Triage model for suicidal runaways. *Am J Orthopsychiatry*, 61(1): 122-127.

- Rotheram-Borus MJ, Piacentini J, Cantwell C, Belin TR and Song J. (2000) The 18-month impact of an emergency room intervention for adolescent female suicide attempters. *J Consult Clin Psychol*, 68(6): 1081-1093.
- Rozanov VA, Mokhovikov AN and Stiliha R. (2002) Successful model of suicide prevention in the Ukraine military environment. *Crisis*, 23(4): 171-177.
- Rutz W, von Knorring L and Walinder J. (1992) Long-term effects of an educational program for general practitioners given by the Swedish Committee for the Prevention and Treatment of Depression. *Acta Psychiatr Scand*, 85(1): 83-88.
- Sarchiapone M, Mandelli L, Iosue M, Andrisano C and Roy A. (2011) Controlling access to suicide means. *Int J Environ Res Public Health*, 8(12): 4550-4562.
- Scott A and Guo B. (2012) *For which strategies of suicide prevention is there evidence of effectiveness*. Copenhagen: WHO Regional Office for Europe.
- Shekelle P, Bagley SC and Munjas B. (2009) *Strategies for suicide prevention in veterans*. Washington DC: Department of Veterans Affairs, Health Services Research & Development Service.
- Simpson GK, Tate RL, Whiting DL and Cotter RE. (2011) Suicide prevention after traumatic brain injury: a randomized controlled trial of a program for the psychological treatment of hopelessness. *J Head Trauma Rehabil*, 26(4): 290-300.
- Slee N, Garnefski N, van der Leeden R, Arensman E and Spinhoven P. (2008) Cognitive-behavioural intervention for self-harm: randomised controlled trial. *Br J Psychiatry*, 192(3): 202-211.
- Sloan JH, Rivara FP, Reay DT, Ferris JA and Kellermann AL. (1990) Firearm regulations and rates of suicide. A comparison of two metropolitan areas. *N Engl J Med*, 322(6): 369-373.
- Sonneck G, Etzersdorfer E and Nagel-Kuess S. (1994) Imitative suicide on the Viennese subway. *Soc Sci Med*, 38(3): 453-457.
- Sood S, Mbarika V, Jugoo S, Dookhy R, Doarn CR, Prakash N *et al.* (2007) What is telemedicine? A collection of 104 peer-reviewed perspectives and theoretical underpinnings. *Telemed J E Health*, 13(5): 573-590.
- Stewart C, Quinn A, Plevier S and Emmerson B. (2009) Comparing cognitive behavior therapy, problem solving therapy, and treatment as usual in a high risk population. *Suicide Life Threat Behav*, 39(5): 538-547.

- Szumilas M and Kutcher S. (2011) Post-suicide intervention programs: a systematic review. *Can J Public Health*, 102(1): 18-29.
- Takada M and Shima S. (2010) Characteristics and effects of suicide prevention programs: Comparison between workplace and other settings. *Ind Health*, 48(4): 416-426.
- Tang TC, Jou SH, Ko CH, Huang SY and Yen CF. (2009) Randomized study of school-based intensive interpersonal psychotherapy for depressed adolescents with suicidal risk and parasuicide behaviors. *Psychiatry Clin Neurosci*, 63(4): 463-470.
- Tarrier N, Taylor K and Gooding P. (2008) Cognitive-behavioral interventions to reduce suicide behavior: A systematic review and meta-analysis. *Behav Modif*, 32(1): 77-108.
- Teuton J, Platt S and Atkinson A. (2014) *Prevention of suicide and self-harm: Research briefing*. Edinburgh: NHS Health Scotland.
- Thompson EA, Eggert LL, Randell BP and Pike KC. (2001) Evaluation of indicated suicide risk prevention approaches for potential high school dropouts. *Am J Public Health*, 91(5): 742-752.
- Torhorst A, Möller HJ, Kurz A, Schmid-Bode W and Lauter H. (1988) Comparing a 3-Month and a 12-Month-Outpatient Aftercare Program for Parasuicide Repeaters. In Möller H-J *et al.* (eds) *Current Issues of Suicidology*. Springer Berlin Heidelberg. pp. 419-424.
- Tyrer P, Thompson S, Schmidt U, Jones V, Knapp M, Davidson K, *et al.* (2003) Randomized controlled trial of brief cognitive behaviour therapy versus treatment as usual in recurrent deliberate self-harm: the POPMACT study. *Psychol Med*, 33(6): 969-976.
- Tyrer P, Tom B, Byford S, Schmidt U, Jones V, Davidson K *et al.* (2004) Differential effects of manual assisted cognitive behavior therapy in the treatment of recurrent deliberate self-harm and personality disturbance: the POPMACT study. *J Pers Disord*, 18(1): 102-116.
- Unützer J, Tang L, Oishi S, Katon W, Williams JJ, Hunkeler E *et al.* (2006) Reducing suicidal ideation in depressed older primary care patients. *J Am Geriatr Soc*, 54(10): 15.
- van der Sande R, Buskens E, Allart E, van der Graaf Y and van Engeland H. (1997) Psychosocial intervention following suicide attempt: A systematic review of treatment interventions. *Acta Psychiatr Scand*, 96(1): 43-50.
- van Spijker BA. (2012) *Reducing the burden of suicidal thoughts through online self-help*. PhD Vrije Universiteit
- van Spijker BA, Majo MC, Smit F, van Straten A and Kerkhof AJ. (2012) Reducing suicidal ideation: cost-effectiveness analysis of a randomized controlled trial of unguided web-based self-help. *J Med Internet Res*, 14(5): e141.

Vieland V, Whittle B, Garland A, Hicks R and Shaffer D. (1991) The impact of curriculum-based suicide prevention programs for teenagers: an 18-month follow-up. *J Am Acad Child Adolesc Psychiatry*, 30(5): 811-815.

Waterhouse J and Platt S. (1990) General hospital admission in the management of parasuicide. A randomised controlled trial. *Br J Psychiatry*, 156: 236-242.

Watts S, Newby JM, Mewton L and Andrews G. (2012) A clinical audit of changes in suicide ideas with internet treatment for depression. *BMJ Open*, 2(5).

WHO. (2014) *Preventing suicide: a global imperative*. Geneva: World Health Organization.

Wilcox HC, Kellam SG, Brown CH, Poduska JM, Ialongo NS, Wang W *et al.* (2008) The impact of two universal randomized first- and second-grade classroom interventions on young adult suicidal ideation and attempts. *Drug Alcohol Depend*, 95 Suppl 1: S60-73.

Winter D, Bradshaw S, Bunn F and Wellsted D. (2013) A systematic review of the literature on counselling and psychotherapy for the prevention of suicide: 1. Quantitative outcome and process studies. *Counselling & Psychotherapy Research*, 13(3): 164-183.

Winter D, Sireling L, Riley T, Metcalfe C, Quaitte A and Bhandari S. (2007) A controlled trial of personal construct psychotherapy for deliberate self-harm. *Psychology and Psychotherapy: Theory, Research and Practice*, 80(1): 23-37.

Yip PS, Caine E, Yousuf S, Chang SS, Wu KCC and Chen YY. (2012) Means restriction for suicide prevention. *Lancet*, 379(9834): 2393-2399.

Zamorski MA. (2011) Suicide prevention in military organizations. *Int Rev Psychiatry*, 23(2): 173-180.

Zenere FJ and Lazarus PJ. (1997) The decline of youth suicidal behavior in an urban, multicultural public school system following the introduction of a suicide prevention and intervention program. *Suicide Life Threat Behav*, 27(4): 387-402.

hrb.ie

