

**A systematic review and meta-analysis of psychosocial interventions aiming to reduce risks of suicide and self-harm in psychiatric inpatients**

## **Abstract**

Psychosocial interventions, such as Cognitive Behavioural Therapy (CBT), are often recommended in UK clinical guidelines to reduce suicidality and self-harm in service users with serious mental health problems, but the effectiveness of these interventions in acute mental health inpatient settings is not established. The aim of this study is to examine the types, and effectiveness of psychosocial interventions in inpatients settings in reducing the risk of self-harm and suicidality. A systematic review and meta-analysis was conducted of randomised controlled trials (RCTs) examining the efficacy of suicide and self-harm focused inpatient psychosocial interventions on suicidality (primary outcome), depression, hopelessness and suicide attempts (secondary outcomes). A total of ten studies met eligibility criteria were included in this review. All had low to moderate risk of bias for majority of the indicators, except for blinding of participants where all studies had high risk of bias. All studies examined psychosocial interventions for suicide reduction and none examined a psychosocial intervention for self-harm. The majority of the psychosocial interventions were CBT and Dialectical Behavioural Therapy (DBT). The interventions were no more effective than control treatments in reducing suicidality, depression, hopelessness or suicide attempts post-therapy and at follow-up. However, the majority were small pilot or feasibility RCTs. In conclusion, the findings from this review suggests that psychosocial interventions are not any more effective in reducing suicidality in acute mental health inpatient settings than control interventions. However, a large-scale RCT examining a psychosocial intervention for suicide is needed to provide conclusive findings. There were also no identified RCTs examining self-harm interventions indicating a need to conduct research in this area.

Keywords: Psychosocial interventions; systematic review; psychiatric inpatient; mental health inpatients; self-harm; suicide

## **Introduction**

Reducing suicide and self-harm is a worldwide concern and a United Kingdom (UK) government priority (Mental Health Taskforce to the NHS in England, 2016). Suicide and self-harm are particularly prevalent issues in mental health inpatient settings, and are the most frequent reasons for admission (Bowers, 2005). It is well documented that rates of suicide and self-harm are heightened during and immediately after discharge from inpatient care compared to when service users are in community, and they are one of the main reasons for admission (James, Stewart, & Bowers, 2012). Some studies have demonstrated that rates of suicide and self-harm are up to four to seven times higher preceding and following an admission compared to people in the community (Goldacre, Seagroatt & Hawton, 1993; Ho, 2003; Park, Choi, Kyoung & Hong, 2013). The relationship between suicide and self-harm is complex and both can occur simultaneously where one commits self-harming acts with the intent to die, or they can also be independent experiences where one self-harms without the intent to die (Kapur, Cooper, O'Connor, & Hawton, 2013). Self-harming behaviour is also the biggest predictor of suicidal behaviour (Witt et al., 2021). Both are high risk behaviours which could result in serious harm for the individual and require intervention, particularly during an inpatient admission.

Service users experiencing suicide and self-harm are usually offered pharmacological treatment as a primary intervention to treat their underlying mental health difficulties to reduce the harmful behaviours. The use of antidepressant medications is one of the most common treatments however a recent large Cochrane systematic review found that the evidence on its efficacy of reducing suicide and self-harming behaviours is inconclusive (Witt et al., 2021). Psychosocial interventions, such as Cognitive Behaviour Therapy (CBT; Beck, 1976), Dialectical Behaviour Therapy (Linehan, 1987) and interpersonal problem-solving skills training (Crawford, Thomas, Khan, & Kulinskaya, 2007; Hawton et al., 2016), are also recommended as a treatment to help manage self-harm and suicide. Systematic reviews and meta-analyses suggested that psychosocial interventions have small to moderate effects in reducing suicide attempts and self-harm (Briggs et al., 2019; Hawton et al., 2016; McCabe, Garside, Backhouse, & Xanthopoulou, 2018). However, findings of these reviews focused on community settings, and not inpatient settings.

It is recommended that every acute hospital should provide a timely and comprehensive psychosocial assessment and intervention for self-harm and suicide in line with National Institute of Health and Clinical Excellence (NICE) guidelines, and have close liaison with community mental health services for follow-up (Royal College of Psychiatry, 2020). Despite this recommendation, there is only a small evidence base examining the efficacy of psychosocial interventions in treating suicide and self-harm in inpatient settings (Haddock et al., 2019). One possible explanation is that there are several

challenges to the delivery of psychosocial interventions in inpatient settings (Raphael et al., 2021). Psychosocial interventions often need to be adapted for this setting, for example, they need to be brief, targeted, and adapted to the restrictive environment and service users' acute presentations (Raphael et al., 2021; Wood, Williams, Billings, & Johnson, 2019). Two recent examples of psychosocial intervention for self-harm and suicide in inpatient settings include the post-admission cognitive therapy (PACT) intervention and motivational (MI) intervention which both focused on reducing risk of suicide (Ghahramanlou-Holloway, Cox, & Greene, 2012; Klonsky, Muehlenkamp, Lewis, & Walsh, 2011). A further example is the Collaborative Assessment and Management of Suicidality (CAMS) that develops a safety plans for service users' future crises (Ellis, Allen, Woodson, Frueh, & Jobes, 2009). These both demonstrated that it was feasible and acceptable to deliver such interventions in this setting.

To date, there has not been a systematic review of the psychosocial interventions used in inpatient settings to reduce self-harm and suicide. There is a need for such a review to synthesise the current evidence and inform practice given reducing suicide and self-harm are a priority for this setting. Therefore, the aim of this study is to conducted a systematic review and meta-analysis to examine the effectiveness of psychosocial interventions for suicide or self-harm in acute mental health inpatient settings on suicidality, self-harm (primary outcomes), depression, hopelessness, and suicide attempts (secondary outcomes).

## **Methods**

### **Study Protocol and Design**

The systematic review and meta-analysis was conducted following guidance from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Liberati et al., 2009). The protocol was pre-registered online on the PROSPERO website on 28<sup>th</sup> April 2020 prior to the searches being conducted

([https://www.crd.york.ac.uk/prospero/display\\_record.php?ID=CRD42020176314](https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020176314)). One deviation from protocol took place. We analysed data which examined number of suicide attempts as a secondary outcome following feedback from peer review.

### **Inclusion and exclusion criteria**

Studies were eligible for inclusion if they (a) included participants who were currently under the care of inpatient psychiatric settings, (b) examined a psychosocial intervention, defined as a non-pharmacological intervention targeting psychological or social factors that can reduce self-harm and suicide in people with mental health conditions (Barbui et al., 2020), (c) were randomised controlled trials (RCTs) with (d) samples of adults aged 18 or above. Exclusion criteria were (a) studies that examined children and adolescents aged 17 or below, (b) studies where the participants received psychosocial interventions that were not conducted in inpatient settings, and (c) studies not published in English.

### **Search strategy**

Three electronic databases – Embase (OVID), MEDLINE® (Ovid) and PsycINFO (Ovid) were searched. The ISRCTN Registry was also searched to identify relevant registered trials and reports. The initial search was carried out by the first author (HWY) in March 2020 and updated in January 2021 using the following keywords: ('inpatient' OR 'hospital inpatient' OR 'acute' OR 'hospita\*' OR 'psychiatric unit' OR 'psychiatric ward' OR 'mental hospital' OR 'mental ward') AND ('suicide' OR 'head bang\*' OR 'self-harm' OR 'suicide attempt' OR 'self-injury' OR 'cutting' OR 'self-mutilation') AND ('psychosocial intervention' OR 'psychosocial treatment' OR 'psychological intervention' OR 'psychological treatment' OR 'psychotherapy' OR 'cognitive behavio\* therapy' OR 'dialectical behavio\* therapy' OR 'analytical therapy').

Titles and abstracts of identified studies were screened by HWY, and a second reviewer crosschecked 20% of the identified studies. Inter-rater reliability between the first author (HWY) and the second reviewer was high with Cohen's kappa value of 0.955. Full texts were then reviewed for eligibility and study authors were contacted if there was insufficient information to determine eligibility. Uncertainties were discussed with LW. Authors of conference abstracts were contacted to identify full texts. References of included papers were examined to identify any further relevant

papers. Recent reviews examining psychosocial interventions for self-harm and suicide were also examined for relevant studies (Bornheimer, Zhang, Li, Hiller, & Tarrier, 2020; Briggs et al., 2019; Hawton et al., 2016; Hetrick, Robinson, Spittal, & Carter, 2016; Timberlake, Beeber, & Hubbard, 2020).

### **Data extraction**

Data from identified studies were extracted by HWY using a pre-defined data extraction sheet, uncertainties were discussed with LW. A number of study characteristics were extracted: type of psychosocial intervention (e.g. post-admission cognitive therapy), control condition (e.g. treatment as usual), duration of treatment period, the type of inpatient setting (e.g. psychiatric inpatient unit), outcome measures utilised, demographics (age, gender, diagnosis), follow-up time points, number of participants, and relevant statistical information (means, standard deviations, and N at certain assessment time points (e.g. post-therapy, follow-up points). Authors were contacted if there were missing data in their published reports.

### **Quality assessment**

The revised tool to assess risk of bias in randomized trials (RoB 2; Sterne et al., 2019) was used, as it is the recommended tool for RCT studies by the Cochrane Handbook (Higgins & Green, 2011). It examined five key domains of potential bias in each study: randomisation process (examines how and whether participants were appropriately randomised), blinding of participants (examines where participants were blinded to the intervention or not), blinding of outcome assessment (examines whether the assessor of the outcome measurement was blinded to participant's study condition), the amount and effect of missing outcome data, and selective reporting of results after analysis. Quality assessment was carried out by the first author (HWY) who rates studies at either low, moderate or high risk of bias. If studies were identified as having overall a high risk of bias they would not be included in the meta-analysis but would be included in the narrative synthesis.

### **Data analysis**

A narrative synthesis and meta-analysis was conducted to analyse data. A study characteristics table was developed to present the key characteristics of the primary studies, their quality, and the types of interventions were narratively summarised (Popay et al., 2008). A random effects meta-analysis was undertaken to examine the overall effect of psychosocial interventions in reducing (a) the primary outcomes – suicidality and self-harm, and (b) secondary outcomes – depression and hopelessness in the RCTs included in this review. Review Manager 5.4 (Review Manager, 2020) was used to conduct the meta-analyses. As all data was continuous, available data were combined using standardised mean difference (SMD). Effect sizes were calculated using data available from post-therapy and follow-up, these data include means, standard deviations, and sample

sizes extracted for each condition from each individual study. The data at the most conservative follow-up point was utilized (between three to six months) as recommended (Englund, Sarnelle, & Cooper, 1999). When there was more than one outcome measure of the same outcome in an individual study, the measure which was most in line with other individual studies was used. Heterogeneity was examined through the  $I^2$ , Tau, and Q statistics.

## **Results**

### **Study selection**

Study selection is outlined in the PRISMA diagram in Fig. 1. The initial search identified 2201 studies after removing duplicates. After screening titles and abstracts, 58 studies were left for full text examination. The full-text were sourced and examined against the inclusion and exclusion criteria of this review. This led to a total of eight studies retained to be included in this review. Two further studies were identified from, (a) the reference list of a recent related review (Hawton et al., 2016), and (b) the published study of a research protocol identified when screening titles and abstracts. A final ten studies were included in this review. Excluded full-text studies and reasons for exclusion are documented in the supplementary material. Data from two studies (O'Connor et al., 2015; Springer, Lohr, Buchtel, & Silk, 1996) were not usable for meta-analyses due to missing data (mean, standard deviation or n for outcomes of interest), but information from these two studies were still included for the narrative synthesis.

[INSERT FIGURE 1 HERE]

### **Study characteristics**

Study characteristics and baseline demographics of included studies are outlined in Table 1. All studies included in this review used a RCT design and sample sizes ranged from n= 12 to n=201 with the majority of studies utilizing smaller sample sizes. All studies examined a psychosocial intervention for suicide and none examined a psychosocial intervention for self-harm. The majority of participants were female and young to middle aged (ranging from 25.8 – 44 years of age). Nine studies were carried out in an inpatient psychiatric unit and one was carried out in a Community Crisis Stabilisation (CCS) Unit (short-term inpatient crisis intervention services). All studies were carried out in the United States of America (USA) except one (Haddock et al., 2019) that was carried out in the UK.

[INSERT TABLE 1 HERE]

### **Risk of bias**

All studies were examined for risk of bias using the RoB 2 tool (Sterne et al., 2019). Summary ratings are outlined in Table 2. The randomisation process was rated as low risk of bias for all studies as participants in all RCTs were randomly allocated to their treatment conditions. For blinding of participants, all studies had high risk of bias as participants were not blinded to their treatment condition. However, this is usually the case for psychosocial interventions due to the



collaboratively delivered nature of the intervention (Button & Munafò, 2015). All studies had low risk of bias regarding blinding of outcome assessment as outcome assessors were all blinded to participant's treatment condition. For missing outcome data, six studies were rated low risk of bias as they had little missing data (< 25%), the other four studies (Bentley et al., 2017; Ghahramanlou-Holloway et al., 2020; Haddock et al., 2019; LaCroix et al., 2018) were rated as high risk of bias as there were more than 25% of data missing at one or more assessment time points. Selective reporting had a moderate risk of bias in four studies (Bentley et al., 2017; Liberman & Eckman, 1981; Patsiokas & Clum, 1985; Springer et al., 1996) as there were no pre-specified data analysis plan reported, the remaining six studies had low risk of bias in this domain. Overall, except for blinding of participants, studies had low to moderate risk for majority of the indicators and therefore all were included in the synthesis and meta-analysis.

[INSERT TABLE 2 HERE]

### **Characteristics of interventions**

Individual study characteristics are outlined in Table 1. Six studies (Bentley et al., 2017; Ghahramanlou-Holloway et al., 2020; Haddock et al., 2019; LaCroix et al., 2018; Liberman & Eckman, 1981; Patsiokas & Clum, 1985) examined Cognitive Behavioural Therapy (CBT), which involved understanding and modifying thinking processes and behaviours in relation to suicidal crises (Beck, 1976; Skinner, 1953). In particular, the CBT studies aimed to identify underlying cognitions, for example automatic thoughts and distorted beliefs, that may lead to a suicidal crisis and to find ways of managing these. In addition, they also incorporated making safety plans and planning for future suicidal crises. Three of these six studies (Bentley et al., 2017; Haddock et al., 2019; Patsiokas & Clum, 1985) had modified contents of existing interventions, for example the Unified Protocol for Transdiagnostic Treatment of Emotional Disorders (UP; Barlow, 2011; Barlow, Ellard, Sauer-Zavala, Bullis, & Carl, 2014), into interventions that were more suicide-focused.

Two studies (O'Connor et al., 2015; Springer et al., 1996) utilised Dialectical Behavioural Therapy (DBT). In line with the DBT model, these studies focused on emotion regulation, interpersonal effectiveness and distress tolerance strategies to reduce suicide. Pfeiffer et al. (2019) used a combination of DBT strategies and peer support and aimed at improving hope and belongingness through fundamentals of peer support, for example supportive listening and sharing of the peer supporter's own experience. Relaxation and mindfulness techniques that focused on self-acceptance were also introduced by the peer interventionist to manage acute suicidal risk.

The remaining study (Ducasse et al., 2019) used gratitude journal which asked participants to complete a gratitude journal every evening for seven days by writing down the positive events or feelings occurred that day.

The duration of interventions varied from five sessions to twenty sessions and most of the

treatment windows ranged from three days to twelve weeks, except for one study which had the intervention spread out over six months (Haddock et al., 2019). Lengths of each session of intervention were usually within two hours, except one which was four hours per session (Lieberman & Eckman, 1981).

### **Characteristics of comparators**

The comparators of the included studies are outlined in Table 1. The comparator of four studies were treatment as usual (TAU), without any active psychological interventions. Two studies (Ghahramanlou-Holloway et al., 2020; LaCroix et al., 2018) used enhanced usual care (EUC), which received assessment services input in addition to usual care. Four studies (Ducasse et al., 2019; Lieberman & Eckman, 1981; Patsiokas & Clum, 1985; Springer et al., 1996) used alternative active treatment methods, including the nondirective discussion group, writing food diary, the wellness and lifestyles discussion group, and insight-oriented therapy.

### **Primary outcome**

The primary outcome of suicidality was examined by all studies included in this review. Suicidality was measured in all studies using the Beck Scale for Suicidal Ideation (BSSI, Beck, Kovacs, & Weissman, 1979), which is a 21-item measure examining the cognitive, behavioural and emotional components of suicide. Participants can score from 0 – 38 with increased scores indicating increased suicidality. Two meta-analyses were conducted as outlined in Table 3 based on available data from seven studies ( $n = 353$ ) at post-therapy and four studies ( $n = 115$ ) at follow-up (Figs. 2 and 3). The meta-analyses did not find significant difference between treatment conditions in reducing suicide both at post-therapy (SMD =  $-0.14$ , 95% CI =  $-0.38$  to  $0.10$ ,  $Z = 1.12$ ,  $p = .26$ ) and at follow-up (SMD =  $0.22$ , 95% CI =  $-0.15$  to  $0.59$ ,  $Z = 1.18$ ,  $p = .24$ ). Heterogeneity was also low ( $I^2 = 10\%$  and  $0\%$  respectively) for both analyses.

[INSERT TABLE 3 HERE]

[INSERT FIGURE 2 & 3 HERE]

### **Secondary outcomes**

Two meta-analyses were conducted for depression as outlined in Table 3. Six studies ( $n = 297$ ) had available data for meta-analysis to be conducted at post-therapy, no significant difference between treatment conditions was found (SMD =  $-0.17$ , 95% CI =  $-0.49$  to  $0.14$ ,  $Z = 1.09$ ,  $p = .28$ ,  $I^2 = 19\%$ ). Four studies had available data ( $n = 69$ ) for the follow-up analysis and no significant difference between treatment conditions was found (SMD =  $-0.49$ , 95% CI =  $-1.49$  to  $0.50$ ,  $Z = 0.97$ ,  $p = .33$ ;  $I^2 = 65\%$ ).

Two meta-analyses were also conducted for hopelessness as outlined in Table 3. At post-therapy, seven studies ( $n = 351$ ) had available data for meta-analysis but found no significant

difference between treatment conditions (SMD = - 0.14, 95% CI = - 0.35 to 0.07, Z = 1.30, p = .19, I<sup>2</sup> = 0%).. At three to six months follow-up, four studies (n = 112) had available data for meta-analysis but also found no significant difference between treatment conditions (SMD = - 0.10, 95% CI = - 0.47 to 0.28, Z = 0.50, p = .62, I<sup>2</sup> = 0%)..

One final meta-analysis was also conducted for suicide attempts at three to six month follow up but found no significant difference between treatment conditions (RR = 0.92, 95% CI = 0.41 to 2.06, Z = 0.18 p = .86, I<sup>2</sup> = 0%).

## **Discussion**

This meta-analysis demonstrated that psychosocial interventions for suicidality in inpatient settings did not show a favourable effect compared to alternative treatment methods at post-therapy or at follow-up on the primary outcome of suicidality. There was also no significant effect of the psychosocial interventions on the secondary outcomes of depression and hopelessness compared to the control groups. Only ten RCTs were identified examining psychosocial interventions for suicide in inpatient settings and none were identified for self-harm. Moreover, all studies except one had a sample size of less than 70 and the majority were pilot or feasibility studies. This demonstrates the limited evidence for suicide and self-harm interventions in inpatient settings and the need for a large-scale RCT to be conducted.

There are several important inpatient specific factors to consider to contextualise these findings. CBT and DBT interventions have been demonstrated to be effective in reducing self-harm and suicidality in community populations (Hawton et al., 2016), and therefore indicating that there may be inpatient specific factors that may have contributed to the lack of favourable effect. Recent systematic reviews have demonstrated a number of implementation barriers to the delivery of psychosocial interventions in inpatient settings including a disruptive and noisy environment, service users acute presentations and cognitive difficulties, and restrictive environments (Evlat, Wood & Glover, 2021; Raphael et al, 2021), and highlighted the importance of intervention adaptations to overcome these challenges. However, the included studies did not describe any inpatient specific adaptations to ensure an effective delivery, for example, they did not discuss how the intervention informed a wider inpatient care plan, incorporated joint working, or adapted to environmental restrictions. These types of adaptations and ways of working have been identified as crucial to the delivery of any multidisciplinary inpatient-based interventions (Bowers, Chaplin, Quirk, & Lelliot, 2009; Raphael et al., 2021), which potentially may partly explain the lack of effect found on primary and secondary outcomes in the meta-analysis.

The inclusion of only ten studies in this review suggests limited research examining psychosocial interventions for reducing suicidality in inpatients. More importantly, none of the included interventions aimed to reduce self-harm. This indicates a lack of robust research examining the efficacy of suicide, but particularly self-harm in inpatient settings. Self-harm is a highly prevalent

risk behavior on inpatient wards and is often managed using restrictive practices such as removing means of self-harm, physical restraint, medical restraint, special observation, seclusion and verbal de-escalation (James, Stewart, Wright, & Bowers, 2012). However, there is little research on the effectiveness of these strategies, and they are unpopular amongst staff and services users, who want a more therapeutic approach (Murphy, Keogh, & Doyle, 2019). This suggests that further research into psychosocial interventions in reducing self-harm in inpatient settings is needed. One recent study conducted an open non-randomised trial which showed that there is promise for self-harm focused psychological interventions (Fife, Blumenfeld, Williams, & Wood, 2019), but larger scale RCTs are needed to test the efficacy of these treatments. Seven of the included RCTs were conducted within the past ten years which suggests that research in this area may be on the rise.

This review has several limitations. First, sample sizes of included studies were generally small, only one study (Ducasse et al., 2019) had over one hundred participants. This may have led to the small study effect which may bias the results from meta-analyses and results interpretation (Sterne, Gavaghan, & Egger, 2000). Second, we did not undertake any sensitivity analyses or explore publication bias due to the small number (<10) studies included in the meta-analyses (Deeks, 2020). Third, using the method of vote counting to synthesise included studies tends to give an equal weight to every study despite different sample sizes and effect sizes (Popay et al., 2006), which may distort true relationships between studies. Fourth, all studies included focused on psychosocial interventions for suicide, therefore results and analysis from this review were only able to give an overall picture regarding the effectiveness of psychosocial interventions in reducing suicidality, no information about the reduction in self-harm can be provided in this review. Finally, almost all included studies were conducted in the USA, only one (Haddock et al., 2019) was conducted in the UK. Even with Haddock et al.'s (2019) paper included, the results from this review weigh heavily towards the western society, in which findings may not be generalisable to other cultures or countries.

In conclusion, the results of this review suggest that psychosocial interventions do not have a favourable effect over control conditions in reducing suicidality in inpatient settings. Moreover, most of the interventions were CBT and DBT, but these interventions were not adapted specifically for inpatient settings. Development of inpatient psychosocial interventions in the future can also use more innovative ways instead of limiting themselves to only adapting outpatient psychosocial interventions for inpatient use. More research, desirably RCTs, should also be done regarding psychosocial interventions in reducing risk of self-harm in psychiatric inpatients.

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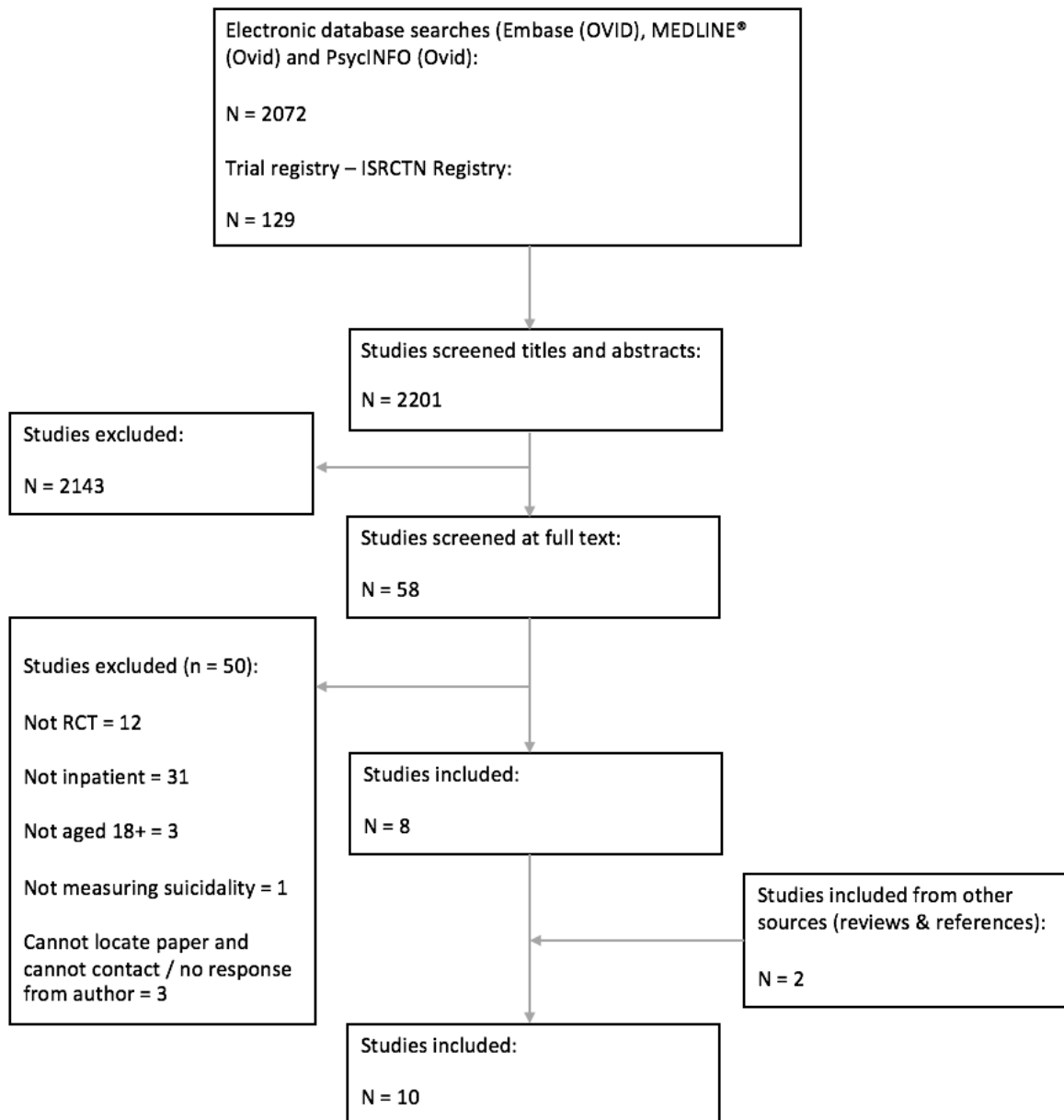
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**Figure 1: PRISMA diagram of study flow**



**Table 1.**

Study characteristics of included studies

Trial	Treatment	Therapy target	No. of sessions offered	Frequency	Treatment window	Number Randomised	Follow-ups	Country	Baseline characteristics	
									Age – Mean (SD)	Gender (n male)
Bentley et al., 2017	Modified UP + TAU TAU	STBs	5 1 h	1-2 / day	4 days	6 6	Post-therapy, 1, 6 months	USA	44 (11.73)	10/12
Ducasse et al., 2019	Gratitude journal Food diary	Suicide ideation or attempt	7 7	1 / day 1 / day	7 days 7 days	101 100	Post-therapy	USA	41.58 (12.97) 42.55 (11.82)	35/101 36/100
Ghahramanlou-Holloway et al., 2020	PACT + EUC EUC	Suicide ideation or attempt	6 1-1.5 h	NR	3 days	12 12	1, 2, 3 months	USA	30.3 (11.4) 27.8 (9.3)	7/12 7/512
Haddock et al., 2019	CBSP + TAU	STBs	20 1 h	NR	6 months	24	Post-therapy	UK	33.88 (12.18)	10/24

	TAU					27			37.04 (12.41)	12/27
LaCroix et al., 2018	PACT + EUC	Suicide attempt	6 1-1.5 h	NR	3 days	18	1, 2, 3 months	USA	28.9 (8.6)	12/18
	EUC					18			33.0 (10.8)	13/18
Lieberman and Eckman, 1981	BT	Suicide attempt	8 4 h	1 / day	8 days	12	2, 6, 12, 24, 36 weeks, 2 years	USA	29.50 (8.60)	3/12
	Insight- oriented therapy		8 4 h	1 / day	8 days	12			25.50 (9.10)	5/12
O'connor et al., 2015	TMBI + TAU	Suicide attempt	NR	NR	1 month	15	1 month	USA	43.67 (13.13)	14/15
	TAU					15			39.02 (14.43)	8/15
Patsiokas and Clum, 1985	Cognitive restructuring	Suicide attempt	10 1 h	NR	3 weeks	5	Post-therapy	USA	NR	NR
	Nondirective control		10 1 h	NR	3 weeks	5				

Pfeiffer et al., 2019	PREVAIL Peer Support Intervention for Suicide Prevention + TAU TAU	Suicide ideation or attempt	12-16 15-120 min	Not regular	12 weeks	34       36	Post-therapy, 3 months	USA	<b>34 (14)</b>	<b>29/70</b>
Springer et al., 1996	Creative Coping skills training group Wellness and Lifestyles discussion	PDs	10 45 min  10 45 min	1 / day  1 / day	2 weeks  2 weeks	16  15	Post-therapy	USA	<b>31.4 (9.24)</b>	<b>10/31</b>

BT – Behaviour Therapy, CBSP – Cognitive-Behavioural Suicide Prevention Therapy, EUC – Enhanced Usual Care, NR – Not Reported, PACT – Post-admission Cognitive Therapy, PDs – Personality Disorders, PREVAIL – Peers for Valued Living, STBs – Suicidal Thoughts and Behaviours, TAU – Treatment as Usual, TMBI – Teachable Moment Brief Intervention, UK – United Kingdom, USA – United States of America, UP – Unified Protocol for Transdiagnostic Treatment of Emotional Disorders. \*bold text indicates that the demographic details are for the whole sample.

**Table 2.**

## Assessment of Risk of Bias

Study	Randomisation process	Blinding of participants	Blinding of outcome assessment	Missing outcome data	Selective reporting
Bentley et al., 2017	L	H	L	H	L
Ducasse et al., 2019	L	H	L	L	L
Ghahramanlou-Holloway et al., 2020	L	H	L	H	L
Haddock et al., 2019	L	H	L	H	M
LaCroix et al., 2018	L	H	L	H	M
Liberman and Eckman, 1981	L	H	L	L	L
O'connor et al., 2015	L	H	L	L	M
Patsiokas and Clum, 1985	L	H	L	L	L
Pfeiffer et al., 2019	L	H	L	L	M
Springer et al., 1996	L	H	L	L	L

L – low risk of bias, M – moderate risk of bias, H – high risk of bias

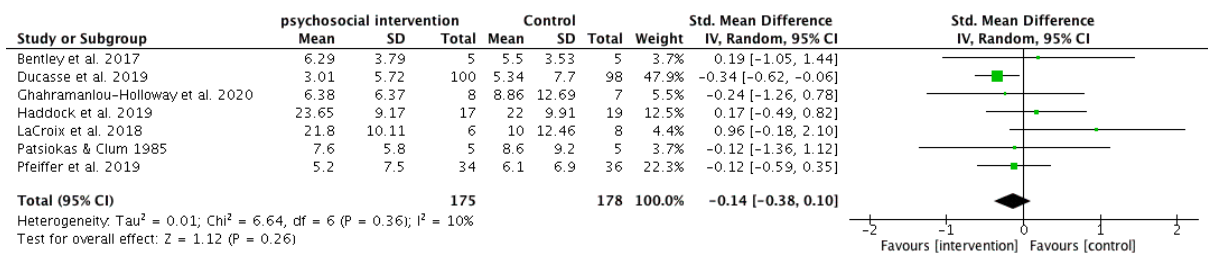
**Table 3.**

Meta-analysis of primary and secondary outcomes

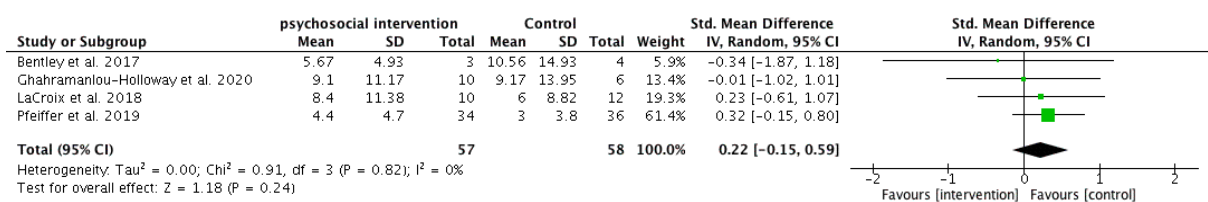
Outcome	Time point	Study N	Sample N	Statistical method	Effect size	95% CI	Z	P	Heterogeneity statistics
<b>Primary outcome</b>									
Suicidality	PT	7	353	SMD	-0.14	-0.38 to 0.10	1.12	.26	Tau <sup>2</sup> = 0.01; Q (6) = 6.64, p = .36; I <sup>2</sup> = 10%
	FU (3-6 mo)	4	115	SMD	0.22	0.15 to 0.59	1.18	.24	Tau <sup>2</sup> = 0.00; Q (3) = 0.91, p = .82; I <sup>2</sup> = 0.00%
<b>Secondary outcome</b>									
Depression	PT	6	297	SMD	-0.17	-0.49 to 0.14	1.09	.28	Tau <sup>2</sup> = 0.03; Q (5) = 6.18, p = .29; I <sup>2</sup> = 19%
	FU (3-6 mo)	4	69	SMD	-0.49	-1.49 to 0.50	0.97	.33	Tau <sup>2</sup> = 0.59; Q (3) = 8.67, p = .03; I <sup>2</sup> = 65%
Hopelessness	PT	7	351	SMD	-0.14	-0.35 to 0.07	1.30	.19	Tau <sup>2</sup> = 0.00; Q (6) = 1.91, p = .93; I <sup>2</sup> = 0.00%
	FU (3-6 mo)	4	112	SMD	-0.10	-0.47 to 0.28	0.50	.62	Tau <sup>2</sup> = 0.00; Q (3) = 0.86, p = .83; I <sup>2</sup> = 0.00%
Suicide attempts	FU (3-6 mo)	4		RR	0.92	0.41-2.06	0.19	.85	Tau <sup>2</sup> = 0.00; Q (3) = 0.51, p = .92; I <sup>2</sup> = 0.00%

FU – Follow-up, mo – months, PT – Post-therapy, SMD – standardised mean difference.





**Fig. 2.** Effect of inpatient psychosocial interventions on suicidality at post-therapy



**Fig. 3.** Effect of inpatient psychosocial interventions on suicidality at three to six months follow-up

## **Supplementary material**

### **References excluded at full text screening**

References excluded	Reason for exclusion
Atha, C., Salkovskis, P. M., & Storer, D. (1992). Cognitive-behavioural problem solving in the treatment of patients attending a medical emergency department: a controlled trial. <i>Journal of psychosomatic research</i> , 36(4), 299-307.	Not inpatient
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<p>Van Moffaert, M. (1989). Management of self-mutilation: Confrontation and integration of psychotherapy and psychotropic drug treatment. <i>Psychotherapy and Psychosomatics</i>.</p>	<p>Not RCT</p>
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