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Psychotherapeutic interventions for the prevention of suicide re-attempts: a systematic review

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Review Article

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Abstract

A history of suicide attempt (SA) is a strong predictor of future suicide re-attempts or suicide. The aim of this systematic review is to evaluate the efficacy of psychotherapeutic interventions specifically designed for the prevention of suicide re-attempts. A systematic search from 1980 to June 2020 was performed via the databases PubMed and Google Scholar. Only randomized controlled trials were included which clearly differentiated suicidal self-harm from non-suicidal self-injury in terms of intent to die. Moreover, psychotherapeutic interventions had to be focused on suicidal behaviour and the numbers of suicide re-attempts had to be used as outcome variables. By this procedure, 18 studies were identified. Statistical comparison of all studies revealed that psychotherapeutic interventions in general were significantly more efficacious than control conditions in reducing the risk of future suicidal behaviour nearly by a third. Separate analyses revealed that cognitive-behavioural therapy as well as two different psychodynamic approaches were significantly more efficacious than control conditions. Dialectical behaviour therapy and elementary problem-solving therapy were not superior to control conditions in reducing the number of SAs. However, methodological reasons may explain to some extent these negative results. Considering the great significance of suicidal behaviour, there is unquestionably an urgent need for further development of psychotherapeutic techniques for the prevention of suicide re-attempts. Based on the encouraging results of this systematic review, it can be assumed that laying the focus on suicidal episodes might be the key intervention for preventing suicide re-attempts and suicides.

Introduction

Suicide is a major cause of death and health impairment. According to a report of the United Nations, more people die by suicide every year than by both homicide and war (UN, 2009). The World Health Organization announces that worldwide around 800 000 people commit suicide each year, highlighting the reduction in suicide-related mortality as a 'global imperative' (WHO, 2019). The number of individuals who attempt suicide every year is a multiple of suicides.

Unfortunately, prediction and prevention of future suicide attempts (SAs) or suicides are complicated notably due to a lack of valid diagnostic instruments and insufficient knowledge regarding their complex pathophysiological mechanisms (Sobanski, Bär, & Wagner, 2015; Woodford et al., 2019). Nevertheless, one of the strongest clinical predictors of an SA or suicide is a history of prior SAs (Franklin et al., 2017). A recent meta-analysis of 100 studies has clearly shown that in the first 3 months after discharge from psychiatric facilities, the suicide rate was approximately 100 times higher than the global suicide rate (Chung et al., 2017). Also, many years after discharge, the suicide rates are still 30 times higher than typical global rates. Furthermore, there is a substantial risk of dying by a subsequent attempt for individuals surviving an index attempt (Bostwick, Pabbati, Geske, & McKean, 2016; Nordentoft, Mortensen, & Pedersen, 2011). Thus, these studies underscore the urgent need for implementing treatment strategies specifically tailored for suicide attempters to reduce the risk of a re-attempt or suicide.

An important issue in suicidology is the inconsistency of terms used to describe suicidal behaviour. The Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) proposed criteria for 'suicidal behaviour disorder' (SBD) to establish a common language for researchers and clinicians as well as to set the basis for improved identification and definition (Oquendo & Baca-Garcia, 2014). SBD has been defined as a 'Condition for Further Study', thus considering it as a possible category of its own and not solely as a symptom of a mental disorder. In this way, the DSM-5 may forward the development of approaches for better integration of SBD

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into clinical routine and for the development of more specific and effective psychotherapeutic as well as pharmacological treatments.

In DSM-5, SBD is characterized by attempted suicide within the past 2 years. A key feature of this definition is an expectation that the SA is lethal, from which the 'intention to die' could be inferred. Suicidal ideations (SIs) as well as the preparations for SA are not included in the diagnostic criteria. Furthermore, by explicitly differentiating SBD from the non-suicidal self-injury (NSSI), the authors of the DSM-5 have put a strong emphasis on the intention of the individual at the time when the behaviours occur. This differentiation is crucial since affective/cognitive processes such as, e.g. the relief of negative feelings associated with NSSI are typically quite different from those related to SBD (Klonsky, Victor, & Saffer, 2014). Furthermore, Klonsky (2011) showed that NSSI is most often performed in the absence of SI. Therefore, this distinction has clinical relevance for designing interventions, specifically targeting subjects with SBD and on the other side subjects with NSSI (Turner, Austin, & Chapman, 2014), due to different psychological functions underlying both behaviours. Moreover, co-occurring mental illnesses could make the differentiation between SBD and NSSI difficult because it might be challenging to clearly assess the intent to die. Especially, borderline personality disorder (BPD), substance use and eating disorders are exhibiting greater rates of NSSIs, thus potentially confounding the diagnosis of SBD (Cipriano, Cella, & Cotrufo, 2017; Ose, Tveit, & Mehlum, 2021).

Beyond this, it is important to note that in the UK and other countries of the Commonwealth of Nations, the term regularly used in the guidelines is 'self-harm' (Excellence, 2020), which is usually defined as 'self-poisoning or injury, irrespective of the apparent purpose of the act'. This definition confounds SBD with NSSI and thus obviously lacks the differentiation of self-injury with an intent to die or without. This is indeed a problematic issue when reviewing studies focusing on psychotherapeutic treatments of individuals with SBD.

A further critical issue, when comparing psychotherapeutic studies on SBD, is related to the outcome variables and to the differentiation between SI and SA. Although SIs are the first step on the pathway to SA, most individuals with SI do never attempt suicide (Klonsky, May, & Saffer, 2016). Clinical risk factors of SI and SA include many common but also some distinct features (Franklin et al., 2017; May & Klonsky, 2016; Nock, Hwang, Sampson, & Kessler, 2010). In other words, it is relevant to consider suicidal ideas and suicidal acts as linked but different phenotypes and therefore to focus on treatment studies using suicide re-attempts/suicides as a primary outcome criterion.

Previous systematic reviews on the efficacy of prevention strategies combined psychosocial and psychotherapeutic treatments and reported divergent findings. Whereas the results of Gotzsche and Gotzsche (2017) suggest that such strategies reduced the number of subsequent SAs in the observation period, there was no evidence for such a conclusion in two other studies (Hawton et al., 2016; Riblet, Shiner, Young-Xu, & Watts, 2017). Another concern is that several studies included in these reviews investigated subjects with self-harm without clearly assessing the intent to die or including subjects with deliberate self-harm (DSH) without intent to die. Both issues may have contributed to the inconsistency of prior results.

The aim of the present systematic review and meta-analysis is therefore to identify and evaluate psychotherapeutic treatments for SBD which were explicitly designed to reduce the risk of a suicide re-attempt or suicide. In contrast to psychosocial interventions, only studies were included which explicitly used psychotherapeutic interventions to prevent future SA or suicide, according to the following definition of psychotherapy (Meltzoff & Kornreich, 1970): (1) psychological treatments stem from psychological theories about pathological processes causing specific mental impairments in individuals, (2) most of the applied psychotherapeutic methods are developed from the laboratories of psychological science based on those theories and (3) the purpose of psychotherapy is assisting people to modify their behaviours, cognitions, emotions in the functional direction.

Based on these above-mentioned issues, only randomized controlled trials (RCT) were included in this systematic review, which clearly differentiated suicidal self-harm from NSSI in terms of intent to die, applied psychotherapeutic interventions focusing on suicidal behaviour and finally used the suicide re-attempts as an outcome variable. The searching algorithm was also restricted to adults only (i.e. patients aged 18 years and older). Previous reviews focusing on suicidal behaviour in adolescents (e.g. Ougrin, Tranah, Stahl, Moran, & Asarnow, 2015) have pointed out significant clinical distinctions between adolescent and adult patients.

Methods

Search strategy

A systematic search from 1980 to June 2020 was performed via the PubMed database. The following search terms were used: Psychotherapy OR acceptance-and-commitment-therapy OR cognitive-behavioral-therapy OR cognitive-behavioural-therapy OR cognitive-therapy OR dialectical-behavior-therapy OR dialectical-behaviour-therapy OR interpersonal-psychotherapy OR mentalization-based-treatment OR mindfulness-based-cognitive-therapy OR problem-solving-therapy OR schema-focused-therapy OR transference-focused-psychotherapy AND suicid*. By using the asterisk (*) as a wildcard, we were able to find all the terms that were relevant for our search, e.g. 'suicidal behavio(u)r', 'suicidal ideation' and 'suicide attempts'. In addition to our search algorithm, reference lists of previous relevant systematic reviews (e.g. Gotzsche and Gotzsche, 2017; Hawton et al., 2016; Riblet et al., 2017) were examined to identify further eligible studies that may have remained undetected by the employed search algorithm. However, we did not find any further eligible studies by this procedure.

Study inclusion

Studies were eligible for inclusion when they met the following criteria: (1) random allocation was used to assign participants to the intervention and control groups; (2) participants fulfilled the criteria of SBD as defined by DSM-5, (3) participants with self-harm were only included, if the intent to die or an expectation of the lethality of a SA was identifiable in the study definition of self-harm, (4) the trial evaluated the efficacy of a psychotherapeutic intervention, as defined above, relative to a control treatment, (5) SAs were used as an outcome measure, and (6) participants were 18 years or older at the point of randomization.

Additionally, eligible studies had to be published in a peer-reviewed journal indexed by PubMed database and/or Google Scholar. Case studies were excluded. The same applied to reviews and meta-analyses because a comprehensive presentation and discussion of these publications would have gone beyond the scope of this systematic review.

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By this procedure, 6044 studies were identified. Fifteen additional publications were identified through other sources (reference lists of prior review articles). The further selection process is illustrated in Fig. 1 according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) checklist (Moher, Liberati, Tetzlaff, Altman, & Group, 2009). After evaluation of these articles based on abstracts by two independent reviewers, the full-text articles of eligible studies were independently selected and reviewed by two investigators (TS and GW).

Using the predefined inclusion criteria, 33 eligible RCTs were finally assessed. Eleven studies (Blum et al., 2008; Davidson, Brown, James, Kirk, & Richardson, 2014; Gregory et al., 2008; Hawton et al., 1987; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Raj, Kumaraiah, & Bhide, 2001; Rudd et al., 1996; Slee, Garnefski, van der Leeden, Arensman, & Spinhoven, 2008; Tarrier et al., 2006; van Spijker, van Straten, & Kerkhof, 2014; Weinberg, Gunderson, Hennen, & Cutter, 2006) were excluded because the authors did not distinguish self-harm regarding the intent to die or included subjects with 'intentional self-inflicted injury without intent to die' or did not apply psychotherapeutic interventions. The study of Wei et al. (2013) was excluded because only five patients out of 82 randomly assigned patients to psychotherapeutic intervention actually received psychotherapy in that study. Other patients refused psychotherapy (PT), so that no reliable conclusions can be drawn for the effect of psychotherapy on the risk for a suicide re-attempt. Furthermore, the study of Morley, Sitharthan, Haber, Tucker, and Sitharthan (2014) was excluded, because it was not stated in the publication in which of the two conditions [cognitive-behavioural therapy (CBT) or treatment as usual (TAU)] the two reported SAs occurred. Unfortunately, the authors did not clarify this issue upon request. When the results of one study were published in more than one article (i.e. Davidson, Tyrer, Norrie, Palmer, & Tyrer, 2010; Davidson et al., 2006), the results are presented here only once.

Thus, finally 18 studies were included in the present systematic review. The quality of studies was assessed independently by two authors (SJ and GW) according to the Cochrane Handbook for Systematic Reviews of Intervention. The primary outcome measure in this systematic review is the occurrence of suicide re-attempts and suicides.

Statistical analysis

The meta-analysis was conducted with Review Manager V5.3 combining results from the eligible studies, which reported our predefined primary outcome. To be comparable with other reviews, the pooled risk ratio (RR) using random-effects model and its accompanying 95% confidence interval as well as the odds ratio were calculated. The I^2 statistic was used to assess the between-study heterogeneity which indicates the percentage of variance between-study attributable to genuine differences between studies rather than the play of chance. The Cochrane Handbook (Higgins & Green, 2008) suggested the following interpretation of I^2 values regarding the relevance of heterogeneity: 0–40% (unimportant), 30–60% (moderate), 50–90% (substantial) and 75–100% (considerable), which was followed in the present review.

Results

Eighteen eligible studies were identified according to our criteria, a detailed description is presented in Table 1. In total 1990 patients were included in the present analysis. The greater part of the studies ($n = 10$) used a cognitive-behavioural approach, whereas two studies employed psychodynamic approaches [mentalization-based treatment (MBT), brief psychodynamic interpersonal therapy] and three studies were based on dialectic-behavioural therapy (DBT). Three studies investigated problem-solving therapy (PST; a form of psychotherapy that relies on basic CBT strategies). The study of Stewart, Quinn, Plever, and Emmerson (2009) had two research arms (CBT and PST) and therefore was put in both categories (see above). The study of Celano et al. (2017) used a telephone-based psychotherapeutic intervention based on positive psychology (PP). Because this method was not comparable to the other psychotherapeutic approaches, this study was included in the pooled analysis from all studies together, but excluded from separate analyses.

As depicted in Table 1, psychiatric diagnoses differed substantially across the included studies. In the CBT studies as well as in the studies using the psychodynamic approaches, the following disorders were reported: major depressive disorder (MDD), bipolar disorder, anxiety disorders, eating disorders (ED), post-traumatic stress disorder, acute stress disorder, BPD and substance use disorders (SUD). In the DBT studies, patients mainly suffered from BPD that was partly combined with MDD, anxiety disorders, SUD and ED. In the PST studies, no psychiatric diagnoses were reported (please see Table 1). Sample sizes ranged from eight (Salkovskis, Atha, & Storer, 1990) up to 222 (McAuliffe et al., 2014). In all included studies, non-parametric statistics were used for analysing differences in the number of re-attempts in the defined follow-up period, i.e. survival analyses, Fisher's exact test or logistic regression.

The mean age of the patients in the psychotherapy as well as in the control groups ranged from 20.40 (s.d. 0.76) years (Lin et al., 2019) to 44.8 (s.d. 16.4) years (Celano et al., 2017). In most studies, more females than males have been enrolled (see Table 1) and participants were diagnosed with one or more psychiatric diseases. Husain et al. (2014) and Pratt et al. (2015) did not provide information about the psychiatric diagnoses. Also, McAuliffe et al. (2014) included subjects with previous history of self-harm without reporting a potentially co-occurring psychiatric disease. The length of the follow-up periods ranged from zero up to 24 months (please see Table 1). Unfortunately, we were not able to perform specific subgroup analyses based on demographic or clinical characteristics due to the lack of this information for the suicide re-attempters in the follow-up period in the included studies.

As shown in the forest plot in Fig. 2, pooled analysis from 18 studies altogether yielded a significant difference in terms of numbers of suicide re-attempts between psychotherapeutic interventions in total and TAU or other control conditions, RR = 0.66; 95% CI 0.48–0.90; $Z = 2.63$, $p = 0.008$; OR 0.56, CI 0.36–0.84; $p = 0.006$. The between-study heterogeneity was moderate ($I^2 = 51\%$).

In addition, separate analyses were performed for studies using different psychotherapeutic approaches. As shown in the forest plot in Fig. 3, pooled analysis from 10 CBT studies yielded a significant difference in terms of numbers of suicide re-attempts between PT and TAU, RR = 0.66; 95% CI 0.48–0.90; $Z = 2.61$, $p = 0.009$; OR 0.53, CI 0.34–0.83; $p = 0.005$. The between-study heterogeneity was low and unimportant ($I^2 = 28\%$). The two psychodynamic interventions (MBT, brief psychodynamic interpersonal therapy) also showed a significant impact on the number of suicide re-attempts, RR = 0.21; 95% CI 0.08–0.57; $Z = 3.08$, $p = 0.002$; OR 0.17, CI 0.06–0.45; $p = 0.0004$. The between-study heterogeneity was unimportant ($I^2 = 30\%$). Studies using DBT and PST

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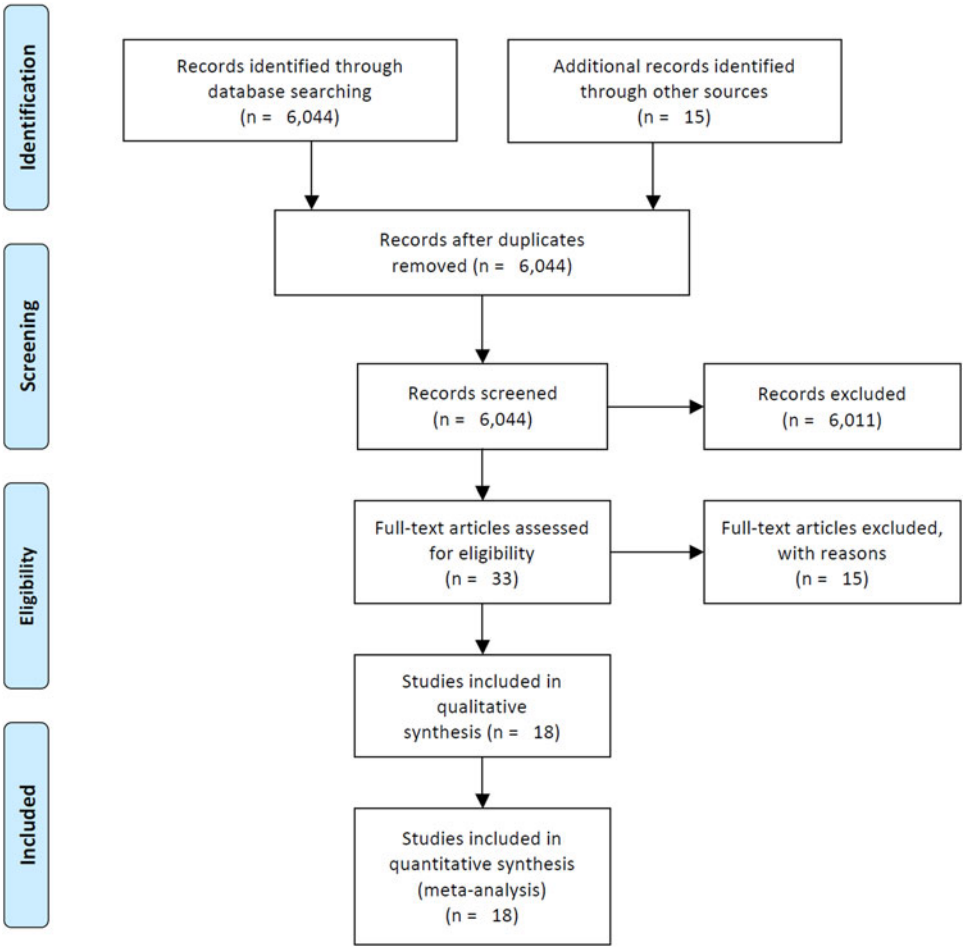

Fig. 1. PRISMA flow diagram.

were not significantly more efficacious in reducing the number of suicide re-attempts than the control conditions.

A symmetric funnel plot as depicted in Fig. S1 (please see online Supplementary material) indicated that a publication bias is unlikely.

Some recently published studies included both, suicide attempters as well as ideators without a history of SA (Celano et al., 2017; Davidson et al., 2006; Lin et al., 2020; Pratt et al., 2015; Rudd et al., 2015). However, most of the included subjects fulfilled the criteria of SBD. Thus, due to the high methodological quality of these studies, we decided to keep these studies in the main analysis of the present review.

To evaluate a potential bias due to the inclusion of patients with SI only, we performed an additional statistical analysis with studies only including patients with SBD. As shown in the forest plot in the online Supplementary Fig. S2, this analysis based on 13 selected studies with $n = 1462$ patients still showed a significant difference between PT and TAU or other control conditions favouring PT (RR 0.55; 95% CI 0.34–0.90; $Z = 2.39$, $p = 0.02$; OR 0.46, CI 0.25–0.85; $p = 0.01$). However, the between-study heterogeneity was substantial ($I^2 = 62\%$).

Moreover, we conducted the same statistical analysis on CBT studies only. As depicted in online Supplementary Fig. S3, pooled analysis from six studies on CBT ($n = 500$ patients) showed a significant difference in the number of suicide re-attempts between PT interventions and TAU (RR 0.48; 95% CI 0.28–0.85; $Z = 2.54$, $p = 0.01$; OR 0.36, CI 0.17–0.77; $p = 0.009$). The between-study heterogeneity was unimportant ($I^2 = 18\%$).

Based on these six studies, CBT decreased the risk of a suicide re-attempt nearly by a half.

Additionally, we performed a subgroup analysis regarding the duration of the follow-up period. In order not to confound the results by the type of PT, we performed this analysis for the CBT studies only. Short follow-up period was defined as $\leqslant 6$ months and long follow-up as $\geqslant 12$ months. As presented in Fig. 4, there was a non-significant effect of CBT (RR 0.85, $Z = 0.52$, $p = 0.52$) compared to TAU focusing on five studies with a short follow-up period (Ghahramanlou-Holloway et al., 2020; Husain et al., 2014; LaCroix et al., 2018; Pratt et al., 2015; Stewart et al., 2009). But, there was a significant effect (RR 0.60, $Z = 2.38$, $p = 0.02$) in favour of CBT, when the studies with a long follow-up period (between 1 and 2 years) were compared to TAU (see Fig. 4; Brown et al., 2005; Davidson et al., 2006; Gysin-Maillart, Schwab, Soravia, Megert, & Michel, 2016; Lin et al., 2020; Rudd et al., 2015). The RR was comparable to that when including all studies.

Discussion

The best predictor for a suicide re-attempt or suicide is a past history of an SA (Beghi, Rosenbaum, Cerri, & Cornaggia, 2013). For this reason, the present systematic review has focused on

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Table 1. Characteristics of the included randomized controlled trials (RCTs) reporting the effects of psychotherapeutic interventions *v.* control conditions on suicide attempts (SA)

Selected characteristics of studies examining the effects of psychotherapy on suicidal behaviour																
															Outcome measures	
Study	Psychotherapeutic treatment	Number of subjects in conditions, *N*	Psychiatric diagnosis (%)	Content of PT	Setting; duration	Therapist	Treatment as usual	Target group regarding SA	Mean age (s.d.) in years	Gender	Cases with multiple SA, *N* (%)	Follow-up period	Mean number of attended sessions (s.d.)	Number of drop-outs in PT in *N* (%)	Number of suicide attempt in *N* (%)	Number of suicides in *N* (%)
Brown et al. (2005)	CBT	CT-SP: 60; TAU: 60	CT-SP: MDD (78.3) and/or SUD (73.3); TAU: MDD (75) and/or substance use disorder (61.7)	Brief CBT specifically focusing on SB	Individual, outpatient; 10 cognitive therapy sessions on a weekly or biweekly basis or as needed	Doctoral-level clinician	Usual care from clinicians in the community as well as tracking and referral services from the study case managers.	Subjects with SA within 48 h prior to being evaluated at the emergency department	CT-SP: 35.1 (10.1); TAU: 34.9 (10.5)	CT-SP: 24M/36F; TAU: 23M/37F	In total: 87 (72.5); CT-SP: 44 (73.3); TAU: 43 (71.7)	1.5 years	8.9 (5.97)	2 (3%)	CT-SP: 13 (24.1%); TAU: 23 (41.6%)	CT-SP: 0 (0%); TAU: 1 (1.67%)
Davidson et al. (2006, 2010)	CBT	CBT–PD + TAU: 54; TAU: 52	All: BPD; CBT-PD: SA (70.4); TAU: SA (71.2)	CBT for Cluster B personality disorder, specifically targeting SB and NSSI	Individual; 30 sessions of CBT over one year, each session lasting an hour	Registered mental nurses OR occupational therapist with completed 10-month CBT training course AND certificate in cognitive therapy OR CBT training in psychosis OR with experience of managing individuals with personality disorder	Inpatient and outpatient hospital services, community-based services, primary and community care services	Subjects with BPD, who had received either in-patient psychiatric services or an assessment at accident and emergency services or an episode of deliberate self-harm in the previous 12 months	CBT-PD: 32.4 (9.0); TAU: 31.4 (9.4)	CBT-PD: 9M/45F; TAU: 8M/44F	In total: 75 (70.8); CBT-PD + TAU: 38 (70.4); TAU: 37 (71.2)	One year after CBT (2006); 5 years (2010)	16 (12)	2 (3.7%)	One year follow-up: CBT-PD: 23 (43%); TAU: 26 (54%); five years follow-up: CBT-PD: 24 (56%); TAU: 24 (73%)	Five years follow-up: CBT: 1 (2%); TAU: 1 (3%)
Ghahramanlou-Holloway et al. (2020)	CBT	PACT + EUC: 12; EUC: 12	MDD (67)	Manualized, inpatient adaptation of Brown et al. 2005 outpatient CBT protocol	Individual; approximately six sessions of CBT lasting 1–1.5 h delivered over the course of 3 days during psychiatric hospitalization	Clinicians with doctoral degree in clinical psychology	Usual care received by patients during hospitalization varied but could include individual- and group-based therapy, art therapy, recreation therapy, and medication management	Military service members and adult beneficiaries, psychiatrically hospitalized due to either a recent SA or SI with history of prior SA	PACT: 30.3 (11.4); EUC: 27.8 (9.3)	PACT: 7M/5F; EUC: 7M/5F	In total: 15 (62.5)	1, 2, 3 months	5.3 (2.1)	0 (0%)	Three months follow-up: PACT + EUC: 2 (17%); EUC: 3 (25%)	Three months follow-up: PACT + EUC: 0 (0%); EUC: 0 (0%)
Gysin-Maillart et al. (2016)	CBT	ASSIP: 60 TAU: 60	Multiple psychiatric diagnosis: F1X, F3X, F4X F6X	Manual-based brief therapy with major focus on development of an early therapeutic alliance, combined with psychoeducation, cognitive case conceptualization, safety planning, continued long-term outreach contact	Individual; three 60–90 min sessions on a weekly basis. Fourth session if necessary. Regular, personalized letters to the participants for 24 months	Experienced clinical psychologists and a psychiatrist	Tau included inpatient, day patient and individual outpatient care as considered necessary by the clinicians in charge of patient management	Patients with recent SA	ASSIP: 36.5 (14.3); TAU: 39.2 (14.6)	ASSIP: 24M/36F; TAU: 30M/30F	In total: 31 (25.8); ASSIP: 10 (16.7); TAU: 21 (35.0)	6, 12, 18 and 24 months	Not reported	4 (7%)	One year follow-up: ASSIP: 2 (3.4%); TAU: 10 (23.3%); two years follow-up: ASSIP: 5 (8.3%); TAU: 16 (26.7%)	Two years follow-up: ASSIP: 1 (1.7%); TAU: 1 (1.7%)

(*Continued*)

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Husain et al. (2014)	CBT	C-MAP: 108; TAU: 113	Not reported	Manual-assisted brief problem-focused therapy, including evaluation of self-harm attempt, crisis skills, problem-solving and CBT techniques to manage emotions, negative thinking, interpersonal relationships and relapse prevention strategies	Individual; six sessions within 3 months	Qualified master-level psychologists, who had a minimum of 3 years' post-qualification experience	Local medical, psychiatric and primary care services provided standard routine care	Subjects after an episode of self-harm	C-MAP: 23.2 (5.8); TAU: 23.1 (5.3)	C-MAP: 32M/76F; TAU: 37M/76F	Not reported	3 months	5.1 (1.16)	3 (2.7%)	C-MAP: 1 (0.93%); TAU: 1 (0.89%)	C-MAP: 2 (1.85%); TAU: 2 (1.77%)
LaCroix et al. (2018)	CBT	PACT + EUC: 18; EUC: 18	PTSD or ASD	Manualized, inpatient adaptation of Brown et al. 2005 outpatient CBT protocol	Individual; approximately six sessions of CBT lasting 1–1.5 h delivered over the course of 3 days during psychiatric hospitalization	Clinicians with doctoral degree in clinical psychology	Usual care received by patients during hospitalization varied but could include individual- and group-based therapy, art therapy, recreation therapy, and medication management	Military service members and adult beneficiaries, psychiatrically hospitalized due to either a recent SA or SI with history of prior SA	PACT: 28.9 (8.6); EUC: 33.0 (10.8)	PACT: 12M/6F; EUC: 13M/5F	In total: 31 (85.7)	1, 2, 3 months (phone)	Not reported	4 (22%)	Three months follow-up: PACT + EUC: 3 (17%); EUC: 2 (11%)	Three months follow-up: PACT: 0 (0%); EUC: 1 (5.56%)
Pratt et al. (2015)	CBT	CBSP: 31; TAU: 31	Suicidal male prisoners	Included attention broadening, cognitive restructuring, mood management and behavioural activation, problem-solving training, improving self-esteem and positive schema	Individual; up to 20 sessions à 1 h, delivered twice weekly during the initial phases of therapy, reducing to once-weekly sessions when therapeutic engagement had been established	Clinical psychologists (doctoral-level) with 2–5 years experience of CBT	Usual care and support available to any prisoner identified under the ACCT system, including assessment of risk and risk management plan	Male prisoners at risk of suicidal behaviour within the past month	CBSP: 38.5 (11.3): TAU: 32.0 (10.1)	Only males	In total: 35 (56.5)	4 months	8.9 (7.42)	10 (32%)	CBSP: 7 (23%); TAU: 7 (23%)	Not reported
Stewart et al. (2009)	CBT and PST	CBT: 11; PST: 12; TAU: 9	Recent suicide attempt with reported suicidal intent	CBT: combination of Beck's CBT and Albert Ellis's rational emotive therapy; PST: based on the six-step D'Zurilla and Goldfried Model (1971)	Individual; CBT: seven sessions à 1 h; PST: four sessions à 1 h	Experienced clinical psychologists and a psychiatrist	Treatment by the hospital acute care team (0–6 sessions).	Subjects with recent suicide attempt	Not reported (ages of participants ranged from 20 to 58 years)	Overall: 15M/17F	Not reported	Only pre-post assessment, no follow-up	CBT: 8.73 (1.04); PST: 4.75 (1.42)	Not reported	CBT: 0 (0%); TAU: 2 (22%); PST: 4 (33%)	Not reported

(*Continued*)

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Lin et al. (2020)	CBT	CBT: 72; TAU: 75	CBT: BD (18.3), DD (36.6), alcohol use disorder (32.8); SCM: BD (9.7), DD (38.9), alcohol use disorder (43.1)	Included suicide risk assessment, control of emotions in a crisis, problem-solving and coping strategies, increasing social support, facilitating treatment adherence by exploring barriers (Stanley & Brown, 2008; Brown et al., 2005)	Individual; at least six sessions in-person or through telephone in the following four months	Experienced clinical psychologists and social worker	Routine care provided by emergency department physician and consultation psychiatrist; and standard case management provided by clinical psychologists and social worker	Patients with SB and SI during the past week	CBT: 29.5; TAU: 34.0	CBT: 22M/50F; TAU: 19M/56F	Not reported	6- and 12 months	5.92 (3.87)	23 (31.9%)	At 12-month follow-up: CBT: 15 (30.6%); TAU: 18 (30.5%)	At 12-month follow-up: CBT: 2 (2.8%); TAU: 1 (1.3%)
Rudd et al. (2015)	CBT	CBT: 76; TAU: 76	CBT: MDD (72.4), PTSD (34.2), substance dependence (31.6), anxiety disorder (19.8); TAU: MDD (82.9), PTSD (44.7), substance dependence (18.4%), anxiety disorder (13.1)	Brief CBT based on Brown et al. (2005)	12 outpatient individual psychotherapy sessions on a weekly or biweekly basis, with the first session lasting 90 min and subsequent sessions lasting 60 min	Clinical providers in the military hospital with 2-week training program with one of the treatment developers	Individual and group psychotherapy, psychiatric medication, substance abuse treatment and/or support groups, as determined by participants' primary mental health care providers, who were licensed military psychologists and psychiatrists	Active-duty soldiers with SI with strong intent to die during the past week and/or a SA within the past month	CBT: 27.2 (6.6); TAU: 27.6 (6.2)	CT-SP: 64M/12F; TAU: 69M/7F	In total: 58 (38.2); CT-SP: 35 (46.1); TAU: 23 (30.3)	2 years	11.8 (4.01)	8 (11%)	CBT: 8 (13.8%); TAU: 18 (40.2%)	CBT: 1 (1.3%); TAU: 1 (1.3%)
Andreasson et al. (2016)	DBT	DBT: 57; CAMS: 51	DBT: BPD (47.5), MDD (75.4), anxiety disorder (64.9); CAMS: BPD (52), MDD (72.5), anxiety disorders (48.6)	DBT: based on DBT-A manual from Rathus and Miller's, adjusted to adult target group	Individual and group; DBT: included 1 h individual session and 2 h group skills training per week over 16 weeks	DBT: two clinical psychologists, one psychiatric nurse and one occupational therapist with over 10 years clinical psychiatric experience, and 2, 18, 7 and 6 years of experience working with psychotherapy; CAMS: three clinical psychologists, two nurses and one social worker, with varying amount of clinical and therapeutic experience	CAMS: Suicide Status Form, CAMS therapeutic worksheet, crisis response plan, problem-focused interventions that target and treat the identified suicidal drivers and ultimately eliminate suicidal coping. Individual therapy sessions of approximately 1 h once a week in the therapist's office, but lasted a maximum of 16 weeks	Subjects with recent SA	DBT: 32.4 (13.2); CAMS: 30.8 (12.1)	DBT: 16M/41F; CAMS: 12M/39F	In total: 73 (67.6); DBT: 39 (68.4); CAMS: 34 (66.7)	28 weeks	Reported individual sessions: DBT: 8.91 (5.3); CAMS: 10.3 (5.3)	DBT: 34 (60%); CAMS: 5 (9.8%)	DBT: 12 (19.3%); CAMS: 5 (9.8%)	DBT: 0 (0%); CAMS: 0 (0%)

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Table 1. (*Continued.*)

Selected characteristics of studies examining the effects of psychotherapy on suicidal behaviour																
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Study	Psychotherapeutic treatment	Number of subjects in conditions, *N*	Psychiatric diagnosis (%)	Content of PT	Setting; duration	Therapist	Treatment as usual	Target group regarding SA	Mean age (s.d.) in years	Gender	Cases with multiple SA, *N* (%)	Follow-up period	Mean number of attended sessions (s.d.)	Number of drop-outs in PT in *N* (%)	Number of suicide attempt in *N* (%)	Number of suicides in *N* (%)
Linehan et al. (2015)	DBT	DBT: 33; DBT-S: 33; DBT-I: 33	DBT: MDD (64), anxiety disorder (88), SUD (46), ED (15); DBT-S: MDD (75), anxiety disorder (84), SUD (38), ED (16); DBT-I: MDD (78), anxiety disorder (78), SUD (31), ED (16), All: BPD	DBT: individual therapy, group skills training, therapist consultation team and as-needed between-session telephone coaching; DBT-I: individual therapy plus activities group. DBT-S: skills training plus case management	Individual and group; DBT: over one year 1 h per week DBT individual therapy, 2.5 h per week DBT group skills training; DBT-I: over one year 1 h per week DBT individual therapy. DBT-S: over one year 2.5 h per week	Fifteen therapists delivering individual DBT (93%) had a doctoral degree compared with one therapist delivering group DBT (33%) and none of the case managers	DBT-I; DBT-S	At least 2 SA and/or NSSI episodes in the past 5 years, at least one SA or NSSI act in the 8-week period before entering the study, and at least one SA in the past year	DBT: 31.1 (8.2); DBT-I: 30.1 (9.6); DBT-S: 29.8 (8.9)	Only females	Not reported	1.5 years	Reported median (interquartile range) for individual sessions: DBT: 42.0 (32.0–52.5); DBT-I: 33.0 (12.0–48.0); DBT-S: 20.0 (12.5–34.5)	DBT: 6 (18%); DBT-I: 11 (33%); DBT-S: 9 (27%)	DBT: 2 (7%); DBT-I: 7 (22%); DBT-S: 6 (17%)	DBT: 1 (3%); DBT-I: 0 (0%); DBT-S: 0 (0%)
Lin et al. (2019)	DBT	DBTSTG: 42; CTG: 40	BPD	DBTSTG: manualized group intervention, adapted from the Skills Training Manual for Treating Borderline Personality Disorder (Linehan, 1993)	DBTSTG: 2 h group sessions per week over 8 weeks	One registered clinical psychologist with over 2 years of training in leading group therapy, DBT and CBT, and 6 years of practice in clinical psychological services	CTG: manualized group intervention, adapted from Free (2007); based on the cognitive theory of depression, modifying emotion regulation strategies, 2 h group sessions per week over 8 weeks	College students with SA within the past 6 months	DBTSTG: 20.40 (0.76); CTG: 20.47 (0.71)	DBTSTG: 4M/38F; CTG: 6M/34F	Not reported	20 and 32 weeks	DBTSTG: 7.78 (0.42); CTG: 7.56 (0.50)	DBTSTG: 6 (14.28%); CTG: 8 (20%)	32 weeks follow-up: DBTSTG: 0 (0%); CTG: 0 (0%)	32 weeks follow-up: DBTSTG: 0 (0%); CTG: 0 (0%)
Bateman & Fonagy (2009)	PD-PT	MBT: 71; SCM: 63	MBT: MDD (57.7), DD (78.9), PTSD (12.7), anxiety disorder (59.2), SUD (54.9), ED (28.2), SFD (11.3); SCM: MDD(54.0), DD(74.6), PTSD (15.9), anxiety disorder (63.5), SUD (52.4), ED (27.0), SFD (14.3)	Manualized psychodynamic treatment rooted in attachment and cognitive theory	Individual and group; 18 months of weekly PT sessions provided by two different therapists	Seven therapists were nurses, three were trainee psychiatrists, and one was an accredited counsellor. All therapists had a minimum of 2 years' experience of treating patients in general psychiatric services, and a minimum of 1 year's experience treating patients with personality disorder	SCM: regular individual and group sessions were offered with appointments every 3 months for psychiatric review. Based on a counselling model closest to a supportive approach with case management, advocacy support and problem-oriented psychotherapeutic interventions	Subjects with SA or episode of life-threatening self-harm within last 6 months	MBT: 31.3 (7.6); SCM: 30.9 (7.9)	MBT: 14M/57F; SCM: 13M/50F	Not reported	Only pre-post assessment, no follow-up	MBT: 92 (38); SCM: 84 (40)	MBT: 19 (27%)	After one year of treatment (12–18 months): MBT: 2 (2.8%); SCM: 16 (25.4%)	Not reported

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Table 1. (*Continued.*)

Selected characteristics of studies examining the effects of psychotherapy on suicidal behaviour																
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Study	Psychotherapeutic treatment	Number of subjects in conditions, *N*	Psychiatric diagnosis (%)	Content of PT	Setting; duration	Therapist	Treatment as usual	Target group regarding SA	Mean age (s.d.) in years	Gender	Cases with multiple SA, *N* (%)	Follow-up period	Mean number of attended sessions (s.d.)	Number of drop-outs in PT in *N* (%)	Number of suicide attempt in *N* (%)	Number of suicides in *N* (%)
Guthrie et al. (2001)	PD-PT	PDIT: 58 TAU: 61	PDIPT: Psychiatric History (48.3); TAU: Psychiatric History (60.7)	Psychodynamic interpersonal therapy developed by Hobson (1985)	Individual; four individual sessions of psychodynamic interpersonal therapy within one week deliverd in the patients home.	Nurse therapists	In most cases TAU consists of an assessment by a casualty doctor or a junior psychiatrist in the emergency department, on the basis of which about one-third patients are referred for follow up as a psychiatry outpatient, a small number are referred to addiction services, and the remainder are advised to consult their own general practitioner.	Patients who presented with an episode of deliberate self-poisoning at the emergency department of a university hospital	Overall: 31.2 (1.5)	PDIPT: 25M/33F; TAU: 28M/33F	In total: 71 (59.7); PDIPT: 33 (56.9); TAU: 38 (62.3); 'history of deliberate self-harm'	Six months	Not reported	PDIPT: 23 (40%)	PDIPT: 5 (9%); TAU: 17 (28%)	PDIPT: 0 (0%) TAU: 0 (0%)
McAuliffe et al. (2014)	PST	PST: 222; TAU: 211	PST: previous self-harm (64); TAU: previous self-harm (63)	Interpersonal problem-solving skills training based on a model of maintenance factors of self-harm	Group; six 2 h closed group sessions, held weekly	Trained therapist and a co-therapist	TAU involved assessment by mental health professional staff and by crisis nurses. A collaborative management plan of care, including a problem-solving approach and relapse prevention techniques, was agreed between the crisis nurse and the patient	Patients with self-harm during the previous 3 days	PST = 33.4 (11.5); TAU = 33.6 (12.1)	PST: 80 M/142F; TAU: 74 M/137F	In total: 127 (29.3); PST: 64 (28.8); TAU: 63 (29.9); 'previous self-harm'	12 month	46.4% attended all six therapy sessions; 68.9% attended three or more treatment sessions	31 (14%)	PST: 54 (24%); TAU: 50 (24%)	PST: 1 (0.5%) TAU: 2 (0.9%)
Salkovskis et al. (1990)	PST	CBPS: 12; TAU: 8	CBPS: previous psychiatric study (91); TAU: previous psychiatric study (100)	Problem-solving approach based on Hawton & Kirk (1989)	Individual; five sessions of treatment of at least 1 h within 1 month	Community psychiatric nurse.	TAU, not further described	Subjects with at least 2 previous suicide attempts	CBPS: 26.4 (6.0); TAU: 28.5 (7.9)	CBPS: 5M/7F; TAU: 5M/3F	Not reported	Six months	Not reported	0 (0%)	CBPS: 0 (0%); TAU: 3 (25%)	Not reported
Celano et al. (2017)	PP	PP: 32; CF: 33	All: MDD; PP: SUD (43.8); CF: SUD (51.5)	PP: telephone-based intervention targeting optimism, gratitude, use of personal strengths and altruism	Individual; six individual telephone sessions and associated exercises	Psychiatrists, psychologists or licensed social workers, trained by the study principal investigator on both study conditions	CF: one individual in-hospital session and 5 individual telephone sessions with focus on emotionally neutral memory recall	Adults with a current major depressive episode reporting SI or a recent SA	PP: 43.2 (17.1); CF: 44.8 (16.4)	PP: 10M/22F; CF: 10M/23F	In total: 27 (41.5); PP: 14 (43.8); CF: 13 (39.4)	12 weeks	Completed at least 4 out of 6 exercises: PP: 63%; CF: 82%	PP: 12 (37.5%); CF: 6 (18%)	PP: 1 (3%); CF: 0 (0%)	Not reported

ASD, acute stress disorder; ASSIP, attempted suicide short intervention program; BD, bipolar disorder; BPD, borderline personality disorder; CBSP, cognitive-behavioural suicide prevention – therapy for suicidal behaviour; CBT, cognitive behavioural therapy; CF, cognition focused intervention; C-MAP, culturally adapted manual-assisted problem-solving training; CTG, cognitive therapy group program; CT-SP, cognitive therapy for suicide prevention; DBT, dialectical behaviour therapy; DBT-I, individual dialectical behaviour therapy; DBT-S, dialectical behaviour therapy, skills training; DBTSTG, dialectical behaviour therapy, skills training group program; DD, depressive disorder; ED, eating disorder; EUC, enhanced usual care; h, hour; MDD, major depressive disorder; NSSI, non-suicidal self-injurys; PACT, post-admission cognitive therapy; PDIPT, psychodynamic interpersonal therapy; PP, positive psychology; PST, problem-solving therapy; PTSD, posttraumatic stress disorder; SA, suicide attempt; SB, suicidal behaviour; SCM, standard case management; SFD, somatoform disorder; SI, suicidal ideation; SUD, substance use disorder; TAU, treatment as usual.

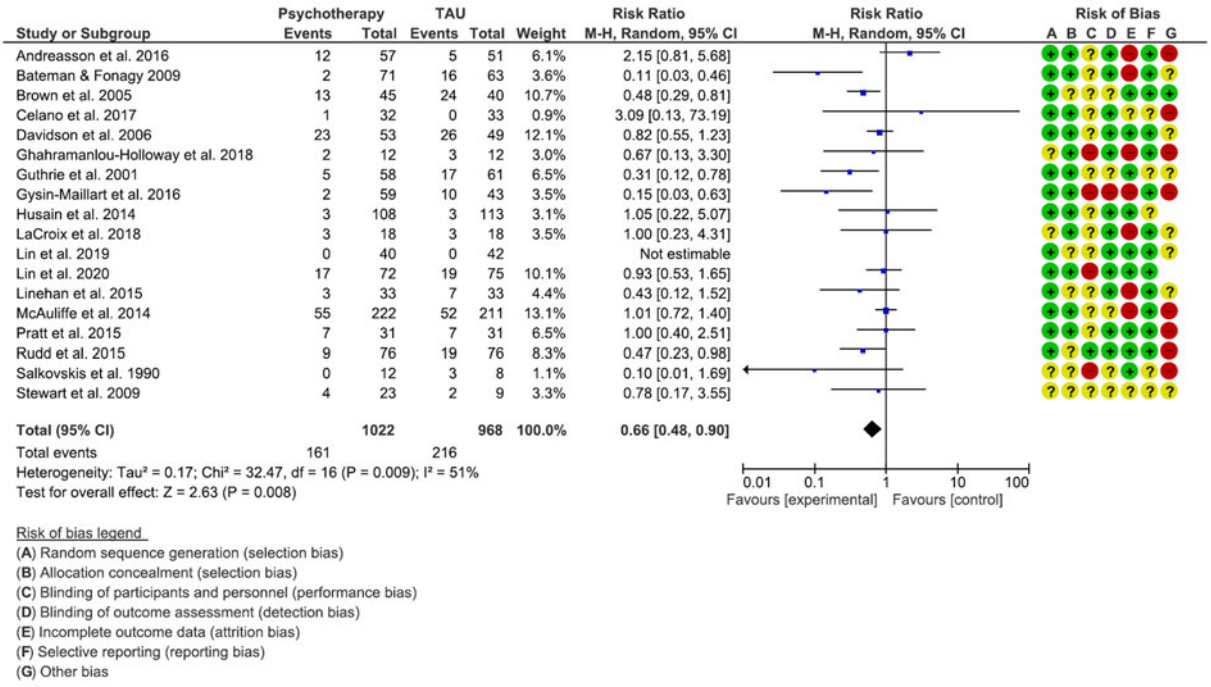

Fig. 2. Forest plot and risk of bias evaluation of trials comparing the effect of psychotherapeutic treatments and control treatments [TAU (treatment as usual)] on suicide attempts and suicides.

psychotherapy studies specifically tailored for patients with SA. Only studies were eligible, which used the number of suicide re-attempts and suicides in a defined period as an outcome measure. Thus, 18 studies with close to 2000 patients were included.

The main result of our study was that psychotherapeutic interventions were significantly more efficacious than TAU or other control conditions in reducing the risk for a suicide re-attempt nearly by a third.

Modest heterogeneity was observed potentially reflecting some differences between the types of applied psychotherapeutic interventions. Therefore, in a second analysis, the efficacy of different psychotherapeutic interventions was separately investigated. CBT interventions as well as psychodynamic therapies were found to be significantly more efficacious than the applied control conditions in reducing the number of suicide re-attempts. Trials employing DBT or solely problem-solving strategies did not significantly impact the probability for suicide re-attempts.

Comparison with previous systematic reviews

Thus, the present systematic review confers and extends the results of previous studies of D'Anci, Uhl, Giradi, and Martin (2019); Gotzsche and Gotzsche (2017) as well as of Calati and Courtet (2016) showing that psychotherapeutic interventions and specifically the CBT are efficacious to reduce the risk for suicide a re-attempt. The prior reviews of Hawton et al. (2016) and Riblet et al. (2017) on studies treating individuals with self-harm reported lower, but not significant odds for the probability of a suicide re-attempt after psychotherapeutic interventions compared to TAU.

Reasons for this discrepancy could be that the latter two reviews included studies, which used 'self-harm' as inclusion and outcome criteria defined according to the NICE criteria, thus irrespective of the intent to die. For example, Slee et al. (2008) defined self-harm as self-initiated behaviour with the intent to harm the body regardless of intent to die. Weinberg et al. (2006) focused specifically on deliberate self-harm in patients with BPD, defining it as an intentional self-inflicted injury without intent to die. Furthermore, previous reviews included studies that applied both psychotherapeutic, but also psychosocial interventions (e.g. Gibbons, Butler, Urwin, & Gibbons, 1978; Hawton et al., 1987), which may also have an impact on the efficacy estimation. Thus, by focusing only on an SBD definition according to DSM-5 and on trials using specific psychotherapeutic approaches for preventing future suicidal behaviour in the present review, the heterogeneity between trials was reduced and putatively provided more specific results.

What are the common features between the psychotherapeutic interventions?

Most interventions were based on the principles of CBT, the efficacy of which has been proven in several psychiatric disorders by large RCTs (Butler, Chapman, Forman, & Beck, 2006). Due to an increased biopsychosocial vulnerability, patients' feelings of hopelessness and automatic negative thought, e.g. suicidal thoughts, can turn to a state that Beck labelled the 'suicide mode' (Beck, 1976). In such 'suicide mode', the only option for solving life problems is to consider suicide. Thus, CBT for suicide prevention specifically aims at preventing the sliding into the 'suicidal mode'. The core elements are therefore the reduction of the likelihood of subsequent SAs or suicide by (1) helping the individual detect and understand the triggering conditions for one's prior SA (s), e.g. in terms of a cognitive-behavioural case conceptualization; (2) training the individual specific strategies for preventing and managing a future suicidal crisis, for example, via safety planning; and (3) testing the individual to manage future suicidal crises by employing a relapse prevention task (Brown et al., 2005; Ghahramanlou-Holloway et al., 2020; Rudd et al., 2015). Since

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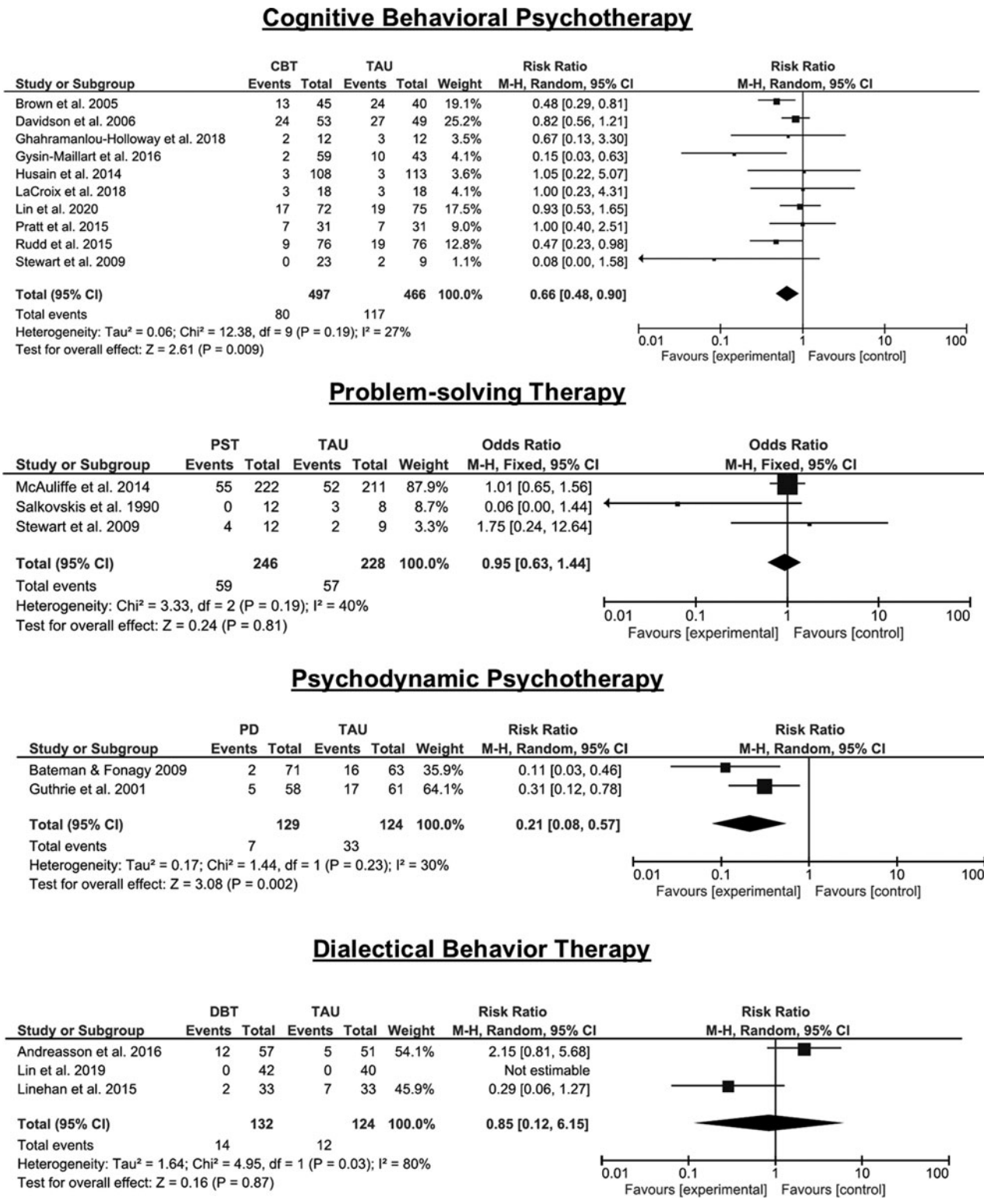

Fig. 3. Forest plot of trials comparing the effect of specific psychotherapeutic treatments and control treatments [TAU (treatment as usual)] on suicide attempts and suicides.

the major focus of the attempted suicide short intervention program (ASSIP; Gysin-Maillart et al., 2016) is similar regarding the above-mentioned treatment modules to CBT-based interventions, such as a cognitive case conceptualization, safety planning, relapse prevention, it was considered here as a CBT intervention.

Interestingly, by reanalysing the data from Rudd et al. (2015), Bryan, Peterson, and Rudd (2018) demonstrated that the benefit in favour of CBT was most pronounced in a group at high risk for suicide. Two studies (Davidson et al., 2006; Davidson et al., 2010) demonstrated a significant long-term effect of a

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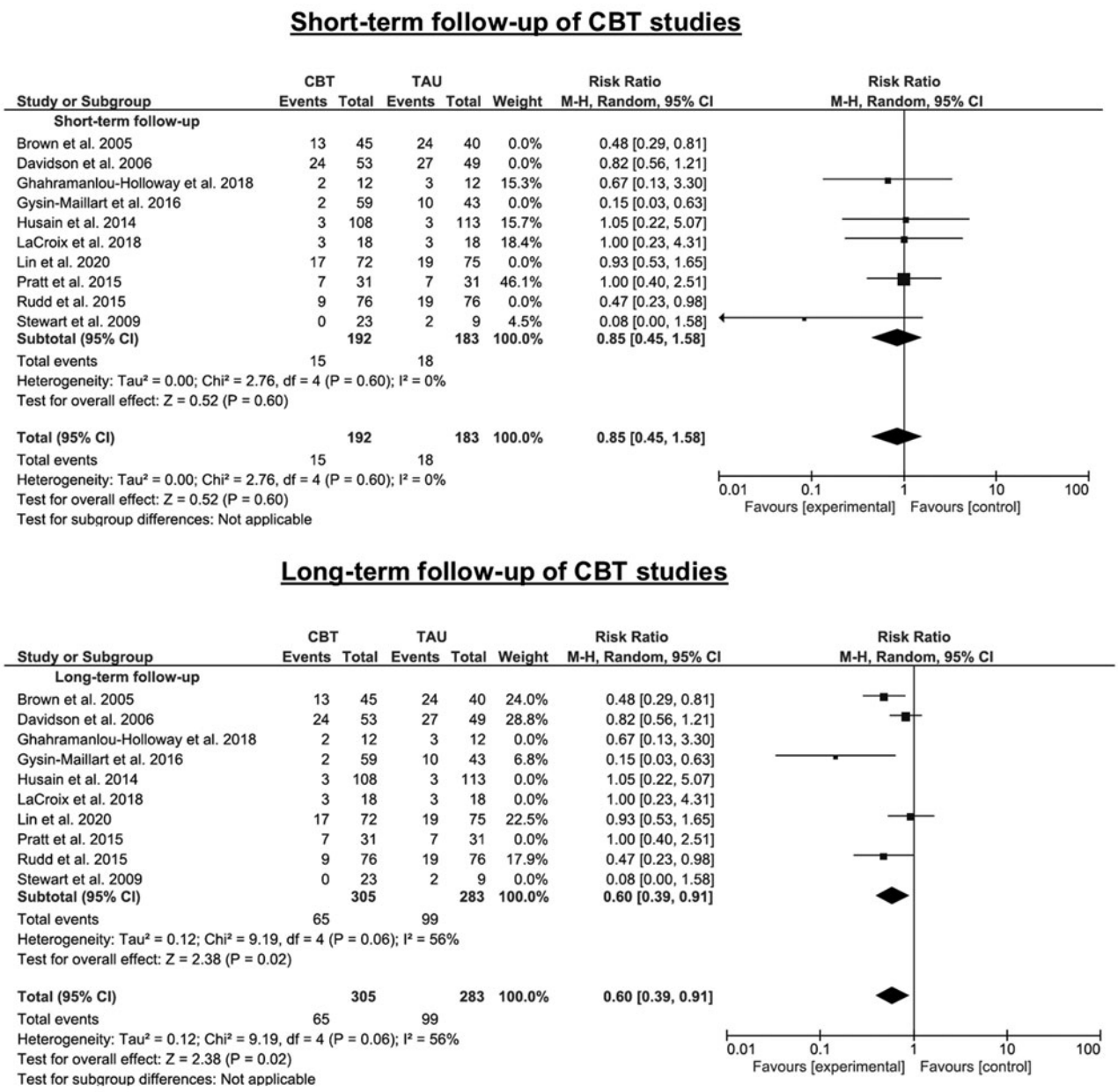

Fig. 4. Forest plot of trials comparing the effect of cognitive behavioural therapy (CBT) and control treatments [TAU (treatment as usual)] focusing on five studies with a short-term follow-up (⩾6 months; see upper diagram) and with a long-term follow-up (⩽12 months; see lower diagram).

12-month CBT intervention in the first year after treatment completion and a trend for a significant reduction of SAs relative to the TAU group over a period of 5 years after CBT, thus pointing towards sustainable effects of CBT.

In the present review, we additionally performed a subgroup analysis regarding the duration of the follow-up period and only observed a significant reduction in relative risk in studies using long follow-up period (12 months and more). This finding can be interpreted that a potential 'sleeper effect' (i.e. a delayed long-term effect of CBT) might have evolved (Tolin, 2010). However, the existence of the 'sleeper effect' is controversially discussed (Flückiger & Del Re, 2017) and the assumption of a delayed CBT effect cannot be justified based on the available data. A more plausible explanation is that a longer observation interval is necessary to obtain sufficient statistical power to detect significant differences between two interventions because suicide and SAs are relatively rare events.

Two studies used psychodynamic psychotherapy (Bateman & Fonagy, 2009; Guthrie et al., 2001) and found a significant impact on suicide re-attempts in favour of the psychotherapeutic interventions. In contrast to other included studies, Bateman and Fonagy (2009) used an exceptionally long treatment period of 18 months with weekly therapy sessions. The authors also did not report any follow-up results, only the results of the pre-post comparison were reported, whereby the comparability with other studies is limited. Furthermore, differences between MBT and structured clinical management regarding the number of SAs become evident solely during the last 6 months of treatment (used here as outcome). In the study of Guthrie et al. (2001), the complex and multifaceted brief psychodynamic interpersonal

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therapy was delivered by nurse therapists. This does not comply with professional standards. In our opinion, the studies performed by Bateman and Fonagy (2009) and by Guthrie et al. (2001) do not allow for the final evaluation of the efficacy of psychodynamic treatments. The results, especially of Bateman and Fonagy (2009), might however be promising for the development of future interventions.

Three studies (Andreasson et al., 2016; Lin et al., 2019; Linehan et al., 2015) investigated the effect of DBT in reducing the risk for a suicide re-attempt. There was a non-significant treatment effect for DBT on the frequency of suicide re-attempts, which was also reported by Riblet et al. (2017). However, whereas there was a significant effect of DBT on the number of suicide re-attempts in the study of Linehan et al. (2015), Lin et al. (2019) did not report any suicide re-attempts in the DBT condition as well as in the control condition. In the third study by Andreasson et al. (2016), DBT was not superior to the control condition in the form of collaborative assessment and management of suicidality (CAMS) treatment in reducing the number of SAs. The modest performance of DBT was unexpected. Nevertheless, the available data on this issue are still sparse. Moreover, methodological reasons, in particular differences in the control conditions between CBT and DBT trials, varying from basic usual care to CAMS treatment (Andreasson et al., 2016) or to a CBT group program (Lin et al., 2019), may explain to some extent the reported differences in efficacy between DBT and CBT.

Further three trials (McAuliffe et al., 2014; Salkovskis et al., 1990; Stewart et al., 2009) investigated the effect of PST, which relies on basic CBT strategies and therefore is often considered as a partial CBT approach. However, these studies had a specific focus on the training of interpersonal problem-solving skills and thus PST was conceptualized as a form of self-control training. There was a non-significant treatment effect for PST on the frequency of suicide re-attempts compared to PST. This result is also consistent with Riblet et al. (2017).

Finally, Celano et al. (2017) applied a telephone-based psychotherapeutic intervention built on PP and compared it against a cognition-focused (CF) control intervention. In the CF condition, participants had to think of neutral events and to avoid assigning emotions to the events. There were no differences regarding suicide re-attempts between conditions. Surprisingly, the CF intervention was associated with greater improvements in depression, SIs and hopelessness at follow-up investigations after 6 and 12 weeks compared to the PP intervention.

Due to heterogeneous psychotherapy settings and study designs in the included studies, it is difficult to deduce general recommendations in terms of therapy format, duration, etc. Nevertheless, the main finding of the present review is that CBT with a specific focus on the last SA produced the most favourable results in terms of the reduction of suicide re-attempts. As shown by Gysin-Maillart et al. (2016), already three sessions of 90 min each could be sufficient to significantly reduce the risk for suicidal behaviour on the long term. However, more homogeneous RCT studies are needed to be able to make specific recommendations for psychotherapeutic treatment of patients after SA.

Finally, there are several published studies showing promising results of psychosocial interventions on reducing the risk for suicide re-attempts (Hvid et al., 2011; Mousavi, Amini, Mahaki, & Bagherian-Sararoudi, 2016). Jardon et al. (2019) presented the VigilanS program in north-eastern France with post-discharge monitoring after a SA including (1) delivering a crisis card for first attempters, (2) giving a phone call for re-attempters to reassess their situation after discharge, and (3) sending personalized postcards for 6 months. Plancke et al. (2020) reported in their retrospective multicentre study favourable results regarding the effects of the VigilanS program on reducing suicide re-attempts. Stanley et al. (2018) compared a safety planning intervention plus telephone follow-up (SPI+) with a TAU control condition in a large-scale cohort comparison study. The authors reported that patients receiving SPI+ had a lower risk for suicide re-attempts than the TAU group.

In sum, there is growing evidence for specific psychosocial interventions targeting a reduction of suicidal re-attempts to become valuable clinical tools in health care. We therefore expect that in the future, hybrid approaches may prove particularly effective that combine the most efficient strategies of psychotherapeutic and psychosocial interventions.

Limitations of the present review

Firstly, we would like to point out that the studies included in this systematic review mainly have been published in high-income countries and therefore one should be careful about drawing general inferences regarding the developing and emerging countries. A recent bibliographic analysis of publications in suicidology in the last 30 years has shown that three-quarters of all publications were produced by Western countries, clearly dominated by the USA and the EU (Astraud, Bridge, & Jollant, 2020). For example, the publications' proportion of India, Turkey, Brazil and China is only 6%, although these countries add significantly to worldwide suicide numbers. Thus, a significant gap exists between the countries publishing the most about suicide and the countries where suicides are more often found (Astraud et al., 2020).

Secondly, the comparability of the studies included in this systematic review is affected by heterogeneous samples (see Table 1) with respect to psychiatric diagnoses, psychotropic medications and demographic characteristics (i.e. gender and age of participants).

Additional concerns are related to the treatment duration, the frequency of therapeutic sessions as well as to the therapeutic setting, i.e. individual *v.* group, which varies over the studies. For example, whereas Gysin-Maillart et al. (2016) or Salkovskis et al. (1990) implemented in their trials three 60–90 min therapy sessions on a weekly basis or five sessions in 1 month, respectively, Davidson et al. (2006) conducted 16 sessions on the average across 1 year (Table 1) and Bateman and Fonagy (2009) conducted weekly therapy sessions over 18 months. Finally, the TAU condition was often described insufficiently; it was considerably basic and differed across the studies, especially between CBT and DBT studies.

As presented in Table 1, there were also differences across studies regarding the qualification and the experience of the therapists. These ranged from mental health care nurses and licensed social workers to experienced master- or doctoral-levels clinicians, whereby part of the variability across studies may be explained. Systematic reviews consistently reported that across a range of therapies and diagnoses, a good alliance predicts positive treatment outcome (Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000). Moreover, therapist variability seems to have a higher impact on treatment outcome in clinical trials than patient variability (Del Re, Flückiger, Horvath, Symonds, & Wampold, 2012). In the study of Gysin-Maillart et al. (2016), the authors demonstrated a significant inverse relationship between the initial therapeutic alliance and the severity of SIs at 12 months follow-up. It is conceivable that the qualification and experience

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of the therapists have a major impact on both, the therapeutic alliance, and the efficacy of psychotherapeutic treatment. Thus, the significant effect of CBT studies observed in the present review could partly be explained by the higher number of studies but also possibly by the more homogeneous composition of therapists' qualification and experience.

Another related and important point is the low adherence of suicide attempters. In this regard, it is known that more than 50% of patients drop out after only one session (Lizardi & Stanley, 2010). For instance, in the study of Wei et al. (2013), which was excluded from the present review due to the adherence issue, 94% of individuals with a preceding SA refused the CBT treatment. Therefore, improving the adherence of individuals after an SA by specifically focusing on the therapeutic alliance and thus empowering the motivation of individuals to work on past SAs may enhance the probability to stay in the psychotherapeutic treatment until its completion.

Finally, an important clinical question is whether single suicide attempters *v.* re-attempters might differ regarding their response to psychotherapeutic interventions. Previous studies showed significant differences between single and multiple suicide attempters in terms of sociodemographic and psychopathological profiles (Lopez-Castroman et al., 2011; Mendez-Bustos, de Leon-Martinez, Miret, Baca-Garcia, & Lopez-Castroman, 2013) as well as poorer interpersonal functioning (Stoliker, 2020). Thus, it is conceivable that the response to PT interventions might differ between single attempters and re-attempters. In this systematic review, 11 out of 18 included studies reported the number of multiple attempters among participants (see Table 1). The overall proportion of multiple attempters ranged from 25.8% (Gysin-Maillart et al., 2016) to 85.7% (LaCroix et al., 2018). In two of the studies, the multiple attempters were unequally distributed across intervention group and TAU group (ASSIP: 16.7%, TAU: 21%; Gysin-Maillart et al., 2016; CT-SP: 46.1%, TAU: 30.3%; Rudd et al., 2015). Thus, given different clinical characteristics of single *v.* multiple attempters, a confounding effect of different group compositions might be expected on outcome measures. We therefore recommend for future studies the use of stratified randomization in order to avoid overrepresentation of patients with multiple SAs in treatment or control groups.

Conclusions

This systematic review has shown that psychotherapeutic interventions implementing CBT-related and potentially psychodynamic approaches and, moreover, specifically targeting previous suicidal behaviour are efficacious in the prevention of suicide re-attempts. Based on these encouraging results, it can be assumed that laying the focus on suicidal episodes might be the key intervention for preventing a suicide re-attempt. Considering the great significance of suicidal behaviour, there is unquestionably an urgent need for further development of psychotherapeutic techniques. It will be necessary to determine duration, frequency and intensity of specific psychotherapeutic interventions for optimal outcomes. Furthermore, there is a need for specific interventions targeting suicidal behaviour in elderly subjects, since the incidence of suicidal behaviour rises with increasing age (Nock et al., 2008). In comparison to that, most participants of the studies described in this review were in their 30s.

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Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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