A meta-analysis of dropout from evidence-based psychological treatment for post-traumatic stress disorder (PTSD) in children and young people

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Running Title: Dropout in psychological treatment of PTSD

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Abstract

Background: Despite the established evidence base of psychological interventions in treating PTSD in children and young people, concern that these trauma-focused treatments may 'retraumatise' patients or exacerbate symptoms and cause dropout, has been identified as a barrier to their implementation (Finch et al., 2020a). Dropout from treatment is indicative of its relative acceptability in this population.

Objective: Estimate the prevalence of dropout in children and young people receiving a psychological therapy for PTSD as part of a randomised controlled trial (RCT).

Methods: A systematic search of the literature was conducted to identify RCTs of evidence-based treatment of PTSD in children and young people. Proportion meta-analyses estimated the prevalence of dropout. Odds Ratios compared the relative likelihood of dropout between different treatments and controls. Subgroup analysis assessed the impact of potential moderating variables.

Results: Forty RCTs were identified. Dropout from all treatment or active control arms was estimated to be 11.7%, 95% CI [9.0, 14.6]. Dropout from evidence-based treatment (TFCBTs and EMDR) was 11.2%, 95% CI [8.2, 14.6]. Dropout from non-trauma focused treatments or controls was 12.8%, 95% CI [7.6, 19.1]. There was no significant difference in the odds of dropout when comparing different modalities. Group rather than individual delivery, and lay versus professional delivery, were associated with less dropout.

Conclusions: Evidence based treatments for children and young people with PTSD do not result in higher prevalence of dropout than non-trauma focused treatment or waiting list conditions. Trauma-focused therapies appear to be well tolerated in children and young people.

Introduction

Many children and adolescents are exposed to traumatic events throughout the world, with around 15.9% of those exposed going on to develop Post Traumatic Stress Disorder (PTSD) (Alisic et al., 2014). PTSD is characterised by the re-experiencing of traumatic events, avoidance of reminders of the trauma, hypervigilance to threat and increased physiological arousal (International Classification of diseases for mortality and morbidity statistics (11th revision) (ICD-11) World Health Organisation, 2018). Untreated, PTSD can result in severely impaired social, academic and occupational functioning, which can persist into adulthood (Yule & Bolton, 2000). It is fortunate, therefore, that a number of psychological treatments have demonstrated efficacy in this area. In particular, a range of trauma-focused cognitive behavioural interventions, and to a slightly lesser extent, Eye Movement Desensitisation and Reprocessing Therapy (EMDR) have well established empirical support confirmed by numerous meta-analyses (e.g. Gutermann et al., 2016; Mavranezouli et al., 2020; Morina et al., 2016). As such they are the recommended treatment in a number of national treatment guidelines, e.g. the UK National Institute for Health and Care Excellence (NICE) which recommends trauma focused cognitive behaviour therapies as the first line intervention, with EMDR to be considered for those who do not respond (NICE, 2018); and the International Society for Traumatic Stress Studies (ISTSS) who recommend both trauma focused cognitive behaviour therapy and EMDR as first line interventions. (Bisson et al., 2019)

It has been widely noted, however, that despite this strong evidence base, there continues to be an under-utilisation of these approaches in clinical settings (Bortrager et al., 2013; Clark et al., 2010; Eslinger et al., 2020; Finch et al., 2020a; Finch et al., 2020b). Rates of young people dropping out from treatment for PTSD are significant (Dorsey et al., 2017). A number of authors have linked these two phenomena to suggest that concerns that some treatments may precipitate dropout may lead clinicians to avoid trauma-focused interventions (Borntrager et al., 2013; Feeny et al., 2003; Foa et al., 2002; Ruzek et al., 2014; Ruzek et al., 2017; van Minnen et al., 2010).

A definition of trauma-focused cognitive behavioural interventions can be found within the UK's NICE guidance, which considers elaboration and processing of trauma-related memories and emotions, restructuring of trauma-related meanings for the child or young person, and help to overcome avoidance as key features (NICE Guideline NG116; 2018). This definition encompasses a range of treatments including Trauma-Focused Cognitive Behaviour Therapy (TFCBT), Cognitive Processing Therapy (CPT), Narrative Exposure Therapy (NET) and Prolonged Exposure Therapy (PE). The same guidelines recommend that clinicians consider EMDR for children and young people, if they do not respond to, or engage with, TFCBT (NICE Guideline NG116; 2018). Both approaches involve explicit exposure to the trauma memory, be it through 'trauma narration' (a detailed re-telling of event and accompanying thoughts and feelings), *in vivo* exposure to trauma-relevant objects or places, or imaginal exposure (bringing to mind and focusing on the details of the event). It is exposure techniques in particular, that have been most frequently implicated in the suggestion that some treatments can exacerbate symptoms and are particularly poorly tolerated in people with PTSD (Feeny et al., 2003; Foa et al., 2002; Lancaster et al., 2019; Larsen et al., 2016; Olatunji et al., 2009; Ruzek et al., 2014).).

To date six meta-analyses have considered dropout from PTSD treatments in adults, with mixed results. Bradley et al. (2005) reported some data that implied there was a difference in dropout rate between treatments that included exposure techniques and those that did not, however this was not subject to formal analysis. Hembree et al. (2003) found no evidence of differential dropout rates from different treatments. Bisson et al. (2007) did find that there was more dropout from TFCBT than from usual care, but this difference no longer held once lower quality studies were removed. Goetter et al. (2015) conducted a meta-analysis studies related to US veterans in particular, finding that there was no difference in dropout between those treatments that involved exposure and those that did not. Imel et al. (2013) found that most direct comparisons between active treatments did

not demonstrate significantly different dropout rates, except where trauma-focused treatment was compared with Present Centred Therapy (PCT), with PCT having a reduced likelihood of dropout. Finally, Lewis et al. (2020) found that there was a statistically significant relationship between dropout and treatments with a greater trauma focus than those without, although the difference was small and dropout rates were still comparatively low (18% and 14% respectively). Taken together, it remains far from clear whether there is definitive evidence to conclude that some treatments carry a greater risk of dropout. To the authors' knowledge, there has not yet been a meta-analysis which has considered this important question in relation to children and young people. This is important if clinicians are to make informed decisions about which treatment approach to select to promote the retention of children and young people in treatment, giving them the best chance of benefitting from the intervention.

The purpose of the current review is therefore to obtain an estimate of dropout rates for evidence-based PTSD treatments in children and young people, and to ascertain whether there are different dropout rates across different treatment approaches (and in particular whether trauma-focused treatments are associated with increased rates of dropout among children and young people).

Methods

An overview of the proposed review was registered *a priori* with PROSPERO (CRD42019154257; 14th November 2019).

Search Strategy

Three databases were systematically searched: PsycINFO, MEDLINE and Published International Literature on Traumatic Stress (PILOTS; now PTSDpubs). The following search terms were used:

(Post-traumatic Stress OR "Posttraumatic Stress" OR Trauma* OR PTSD OR "Post Traumatic Stress"

OR P.T.S.D.) AND (child* OR young OR adolescen* OR youth OR pupil OR student OR teenage*) AND

(psychotherapy OR therapy OR treat* OR therap* OR cognitive OR CBT OR C.B.T. OR EMDR OR "Eye

Movement" OR E.M.D.R. OR Reprocess* OR Desensiti* OR "Narrative Exposure" OR "Exposure

Therapy") AND (control* OR clinical trial OR randomised OR randomized or Randomized Controlled).

Eligibility Criteria

Results were limited to those in the English language and those published since 1980. This reflects

the inclusion of PTSD in the third edition of the Diagnostic and Statistical Manual of Mental

Disorders (APA, 1980).

Included studies were randomised controlled trials (RCTs) of evidence-based therapeutic

interventions recommended by NICE i.e. trauma-focused cognitive/behavioural or cognitive

behavioural therapies or EMDR. Participants were required to have a diagnosis of PTSD (according to

the DSM, the World Health Organization (WHO) International Classification of Diseases (ICD)) or

clinically significant PTSD symptoms (baseline PTSD symptom scores above threshold on a validated

scale). Studies had to have a mean age for participants that was 18 years old or younger. . The event

the symptoms relate to was required be a least one month prior to the start of treatment. To be

included studies had to report sufficient data to compute dropout rates.

Studies were excluded if none of the treatment arms constituted a NICE recommended intervention

(e.g. play therapy, family therapy, child-parent psychotherapy, parent training (alone), or supportive

counselling). Studies were excluded if the interventions under consideration were not primarily

treating trauma symptoms or had been delivered to a whole a group who had not been individually

clinically assessed as having PTSD symptoms (e.g. to a whole class). Preventative studies were

excluded on the basis that they occur in a different context (i.e. in close proximity to the trauma) to

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treatment studies and may therefore elicit a different response that found in the context of symptoms that may have been present for a sustained period of time. Moreover, there is currently less evidence to support the efficacy of preventative interventions than that for treatment interventions (Marsac et al., 2014).

Study Selection

Searches produced a total of 4076 results. Once duplicates had been removed, there were 2747 records. Excluding those studies not in the English language further reduced the number of results by 147, leaving 2600. These were then screened by title and abstract with reference to the eligibility criteria. This process removed 2339 records. The full text for the remaining 261 were then retrieved for detailed screening. Concerns about eligibility were resolved through consensus discussion between the first and third author. This process produced a selection of 40 studies. All 40 included studies were then separately assessed for eligibility by the third author. A PRISMA flowchart detailing the screening and selection process is presented in Figure 1.

Study Quality

Study quality was assessed with reference to a ten-point scale adapted from that which was used by Hoppen and Morina (2020) – itself an adaptation of that used by Cuijpers et al. (2010) – for their meta-analysis investigating study quality in the field of paediatric PTSD. One point was given for each of the following: i) participants' PTSD symptomology assessed personally via a clinical interview, ii) the use of a treatment manual either published or specifically designed for the study, iii) treatment delivered by therapists trained in the specific intervention either as part of the study or having had substantial prior experience, iv) treatment integrity checked by e.g. regular supervision, adherence checklists or recordings of treatment sessions being subjected to review, v) intent-to-treat analysis, vi) independent randomisation process when allocating participants to different arms, vii) post-treatment assessment carried out by blind assessors.

Three further criteria were added to reflect the focus on dropout in the current study: i) presentation of a CONSORT diagram (Schulz, Altman and Moher, 2010), ii) defined and explicit criteria for distinguishing dropout and treatment completion i.e. the minimum number of sessions required to be considered to have received the treatment, and iii) inclusion of details of the stage and/or reasons for dropout or where there was no dropout, that this was clearly stated.

Where there was insufficient information to determine whether the criterion was met, no point was awarded. All included studies were assessed for their quality by CS. A randomly generated subset of 50% of the studies was then assessed by HB. Cohen's kappa was calculated to determine the degree of inter-rater reliability of the quality assessment as 0.72, suggesting substantial agreement (Landis & Koch, 1977). Differing scores were then resolved through discussion.

Data Extraction

The following data was extracted from all included studies: authors, date and the country where study took place, whether the study concerned a specific event or category of trauma (e.g. an earthquake, or mass conflict); whether participants had experienced a single event trauma, or multiple trauma, or a mixture of the two; the age range and mean age of participants and the percentage of male and female participants, the treatment arms, including the number and length of sessions involved in each, the format (individual or group treatment), who delivered treatment, the proportion of participants who met diagnostic threshold for PTSD and the percentage of people who had dropped out from all arms in the study from the point of randomisation.

Data Analysis

The statistical analysis package Jamovi (Version 1.2) was used to carry out the analyses (The Jamovi Project, 2020. Retrieved from https://www.jamovi.org). Proportion meta-analyses were used to

estimate the prevalence of dropout for all intervention arms and for subgroups of interventions. A random effects model was used in reflection of the anticipated heterogeneity between studies (Borenstein et al., 2009). Estimates of prevalence of PTSD were arcsine square root transformed to prevent the confidence intervals of studies with low prevalence falling below zero (Barendregt et al., 2013). Heterogeneity of effect sizes was assessed using Cochrane's Q and Higgins' I^2. The first of these examines whether the variability of effect sizes is greater than would be expected by chance. The latter represents the proportion of the overall variability that is beyond sampling error (Borenstein et al., 2009).

Odds ratios were used to determine whether there was a greater likelihood of dropout for different classes of intervention (e.g. trauma-focused cognitive behavioural therapies) and different types of control (i.e. active or inactive). Subgroup analyses (meta-regressions) were conducted to explore potential moderator variables: number of sessions, group or individual format, whether participants had experienced single incident or multiple traumas or a mixture of the two. Further meta-regressions were used to group interventions by modality (e.g. all TFCBT arms) and then compare them to all other intervention arms.

The above analyses were repeated using only those studies that provided an explicit definition of what constituted dropout. In light of the finding by Bisson et al. (2007) that an apparent relationship between treatment and dropout disappeared once lower quality studies were removed, sensitivity analyses repeated the above analyses having removed the studies that scored six or fewer in the quality assessment (9 studies removed).

Results

Forty studies met the inclusion criteria. A summary of the included studies is presented in Table 1.

Sample Characteristics

A total of 3413 children and young people were included in the identified studies, with sample sizes varying from 24 to 403. The approximate mean age of participants was 12.5 years old, with the youngest age of eligibility being three years old and the oldest being 25. An average 41.5% of participants were male and 58.5% were female. Seven studies included a single gender exclusively (two had only male participants and five had only female participants). Studies came from 18 different countries including the State of Palestine. Eleven studies were from the USA. Eight Low- and Middle- Income Countries (LMIC; World Bank) and the State of Palestine, were represented accounting for 15 studies (37.5% of included studies).

Seven studies (17.5%) looked at single incident trauma (for example, motor vehicle accident, house fire, single event sexual or non-sexual assault) . Five (12.5%) specifically only included participants who had experienced multiple traumas (e.g. child sexual abuse, domestic violence, former child soldiers), while the majority (*n*= 28; 70%) included participants with a mixture of multiple and single incident traumas.

Nature of Interventions Delivered

Twelve (30%) studies primarily reported interventions delivered in a group format, although three of these studies also included adjunctive individual child and/or parent sessions.

Most interventions were delivered by professional therapists, social workers or trainees. Six studies (15%) involved interventions delivered by lay members of the community.

The shortest intervention (Pityaratstian et al., 2014) took place over three consecutive days;

however this was then followed by daily homework to complete over the subsequent month. The

longest interventions took place over 20 weeks (Rosner et al., 2019; King et al., 2000). The mean

number of sessions was 11.8 (*SD,* 5.2). The intervention with the fewest number of sessions was

three (again Pityaratstian et al., 2014 as noted above) the highest maximum number of sessions was

30 (Rosner et al., 2019). Considering all arms of each study, including waiting list, the mean dropout

was 12.7%. The highest reported dropout was 39%. Eight studies reported that they did not have any

dropout at all (i.e. a rate of 0%).

The most frequently studied intervention was TFCBT, featuring in 21 RCTs (52.5%). NET was included

in five studies (12.5%), PE, three (7.5%) and CPT two (5%). EMDR featured in seven trials (17.5%),

four of which were a direct comparison between EMDR and TFCBT. Fourteen trials (35%) compared

a trauma-focused treatment with an inactive, waiting list control arm alone. Fourteen trials (35%)

compared a trauma-focused treatment with a non-trauma focused active control such as Child

Centred Therapy, Supportive Counselling or Treatment as Usual. A further three studies compared

two conditions, one of which contained explicit exposure or trauma narrative and one of which was

the same but without this component (Deblinger et al., 2011; Nixon et al., 2011; and Salloum &

Overstreet, 2012). For the purposes of this analysis, these non-exposure or non-trauma narrative

arms were treated as active control conditions. Although they would involve implicit exposure

through the provision of, for example, psychoeducation about trauma reactions, they would not

meet the criteria set out in the NICE Guidelines set about above (NICE Guideline NG116; 2018)

Definitions of Dropout

Sixteen studies (40%) included a clear definition of dropout and/or the minimum number of

attended sessions that would constitute treatment completion. These can be found in Table 2.

Study Quality

The quality of all studies was assessed with reference to the ten criteria outlined above. A total quality score was calculated by summing the scores for each indicator. The average score was 7.8 (*SD* =1.6). The scores for each criterion in each study are presented in Supplementary Figure 1.

Proportion Meta-Analyses

The results from the proportion meta-analyses are presented in Table 2. Heterogeneity was large (I^2 > 59%) and significant in all instances. The estimated dropout across all treatment arms (any treatment or active control, excluding only waiting list conditions) was 11.7% (k=66, 95% CI 9.0, 14.6). The forest plot (Supplementary Figure 2) shows dropout rates with 95% confidence intervals. A second proportion meta-analysis considered treatment or control arms from only those studies that had defined dropout (k=32); this yielded an increase in dropout (15.9%; 95% CI 12.0, 20.2).

A series of further proportion meta-analyses examined dropout for particular modalities of treatment, and when using only those studies which defined dropout and when removing studies rated to have low quality (see Table 2). Drop rates were low in each case (<18%), increasing slightly when restricting results to studies when defined dropout. There appeared to be little impact of removing low quality studies.

Odds Ratios

Odds ratios were calculated to determine the relative likelihood of dropout between different classes of intervention and control arms. The results are presented in Table 3. There were no instances of statistically significant difference between experimental and control conditions. Moreover, these results were not accompanied by heterogeneity.

Sub-group and moderator analyses

Proportion meta-analyses were conducted for subgroups and then meta-regressions were conducted in order to explore whether any predictor of dropout could be identified. Results are presented in Table 4. Two moderators produced statistically significant results. The first was individual versus group format: group interventions were associated with fewer dropouts. This continued to be the case once lower quality studies were removed. It was not possible to examine if this held true when considering only those studies that had defined dropout because doing this removed all of the group arms. The second statistically significant association related to whether the intervention was delivered by lay people from local communities or by professional therapists; interventions delivered by lay people were associated with significantly fewer participants dropping out. This continued to be the case when lower quality studies were removed, and when considering only those studies that defined dropout. No relationship was found between dropout rate and type of trauma (single vs multiple), intervention (TFCBT vs other, TFCBT & EMDR vs other) or number of sessions.

Publication bias

Visual inspection of the funnel plots related to the above analyses did not show evidence of publication bias (Page, Higgins, & Sterne, 2020).

Discussion

There has been well-documented under-utilisation of trauma-focused treatments and exposure techniques to treat PTSD despite their significant evidence-base. This has been linked to perceptions among clinicians about the potential adverse effects of these approaches, their potential for worsening symptoms and a consequent increased risk of dropout from treatment (e.g. Finch et al., 2020a). This study pooled data from 40 RCTs regarding PTSD treatment in this population. Results found that dropout from RCTs has tended to be relatively low, with all dropout estimates below

15.5%. These compare favourably with the mean dropout rate (28.4%) found by de Haan et al. (2013) in their meta-analysis of children and young people dropping out from treatment in psychotherapy efficacy studies, and are in a similar order to the recent meta-analytic findings of dropout among children and young people from psychotherapeutic interventions for depression (14.9%) (Wright et al., 2021)They are also comparable to recent adult population meta-analyses that related specifically to PTSD: 16% (Lewis et al., 2020) and 18% (Imel et al., 2003). However, heterogeneity was large in all cases, suggesting that there was high degree of variability in dropout rates across studies.

Odds ratios were used to examine whether there were differences in the likelihood of dropout from different conditions when directly compared. In these analyses there was no evidence of significant heterogeneity across studies. No type of intervention or control condition was associated with significantly greater or lesser odds of dropout, including dropout from inactive control (waiting list) conditions.

Different potential moderators of dropout were considered. Of these, group or individual format, and who delivered the intervention were significant. In contrast to adult population studies which have found group treatments to be either associated with higher dropout (Goetter et al., 2015; Imel et al., 2013) or not to be significant (Lewis et al., 2020), this review found that children and young people were *less* likely to dropout from group treatment. This finding was unexpected, and we can only offer speculative explanations for this effect. Children and young people may be more used to, and comfortable in, group settings, and there may be less pressure to discuss their own trauma experiences in detail. They often accessed group treatment by virtue of their participation in other systems and apparatus such as their school or via Non-Governmental Organisations established in local communities. LMIC were over-represented in the group interventions, making up 50% of group interventions but only 37.5% of the total sample. There may be additional factors in these contexts

that promote attendance, such as access to other services and assistance or a paucity of alternative sources of support in situations of mass displacement, conflict or disaster. Alternatively, the peer-oriented support that may be available may through group intervention may be of particular value to children and adolescents; indeed, this would reflect the wider literature that speaks to the protective effects of peer support in youth (e.g. Yearwood et al., 2019). It may be important to note that this finding is in contrast to the lack of difference between individual and group-based interventions observed for dropout from psychological treatments for depression in children and adolescents (Wright et al., 2021).

Delivery of interventions by lay members of the community who had been trained to deliver the treatment was also associated with lower dropout. Lay-delivered interventions all took place in LMIC contexts. Lay people may bring cultural knowledge and credibility that enhances participation. This finding is promising in that it supports the vision espoused by the World Health Organisation (WHO) of nonspecialised healthcare workers being critical in meeting the demand for mental health interventions around the world (mhGap Intervention Guide for mental, neurological and substance use disorders in non-specialized health settings; WHO, 2010). It is encouraging to note that while professionals have identified the need for additional training as a potential barrier to implementing trauma-focused treatments (Finch et al., 2020b), these needs may be met with relatively modest input given the success of these studies in utilising lay facilitators.

Study quality did not appear to affect the results. However, using only those studies which had explicitly defined dropout consistently yielded a higher dropout rate. One might expect that defining dropout could reduce the number of participants considered to have dropped out, as compared to inferring dropout rate from the difference between the number randomised and the number who participated in post-treatment assessment. In the first instance, someone could be considered to have completed treatment after only having taken part in a relatively fewer sessions and in the

latter, someone could have attended all or almost all planned sessions but be absent only from post-assessment and still designated as having dropped out. Instead, our analysis found the reverse. If a lot of dropout occurs at the beginning of treatment, one might expect that there would be little difference between studies that defined dropout and those that did not, as early leavers from treatment would be captured in either instance. Therefore, these findings may imply that dropout tended to occur later in treatment, but this would require further research to explore. It may be that the fact dropout was considered *a priori* indicated a greater level of attention was given to the issue of dropout and therefore a more stringent approach to identifying dropouts was adopted.

Strengths and Limitations

There are a number of limitations to this study. As noted above, inferring dropout from the numbers of participants that were randomised and at post-treatment assessment is imperfect. There may be people who were present at post-treatment assessment who had not attended all or most of the treatment sessions. Conversely there may be people missing from post-treatment assessment who did attend the treatment sessions and were missing from post-assessment for some other reason. Dropout at an early stage might be associated with quite different factors to that which accompany dropout at a later stage in therapy, including that some later dropout might represent some 'early responders' (Szafranski et al., 2017).

Moreover, it has been consistently found that dropout from RCTs is less than in naturalistic settings (de Haan et al., 2013). This has been linked to the exclusion criteria for participation in RCTs which is frequently seen to skew the sample away from comorbidity or complexity (Schottenbauer et al., 2008). This may limit the applicability of these findings to other settings. Studies concerned with 'real world' settings have found evidence of high rates of dropout from trauma-focused treatment, an outcome that is frequently found to be just as likely as the possibility of completing treatment (e.g. Steinberg et al, 2019, Murphy et al, 2014). One explanation for these differences would be that

the samples enrolled into clinical trials are more homogenous than those who utilize standard community services, with RCTs exclusion criteria tending to skew the sample away from comorbidity or complexity (Schottenbauer et al., 2008). There are methodological, practical and ethical reasons for this. Importantly, the more homogenous the sample, the easier it is to draw conclusions about treatment efficacy, which is rightfully the business of RCTs to address (see Schnurr, 2007 for a more detailed discussion of this). However, it is important to recognise that the range of contexts and populations covered by the trials reviewed here does include diverse, complex and challenging contexts, including people who have encountered multiple and profound trauma on a mass scale or over long periods. Given what we understand about the impact of these experiences (Dorsey et al., 2017), one might suspect that comorbidity was high in some of these samples, whether or not there was a mental health infrastructure to identify it, or cultural schema to construe it, as such.

The diversity of included studies may be a further limitation, in that the statistical heterogeneity between studies was high. This reflects the wide-ranging locations, treatments, format, duration and facilitators, and necessitates caution when pooling data in this way. The advantage of this pooling is that it allows for well-powered analysis in a context where there are often low numbers from individual studies.

When it comes to retention however, RCTs may have numerous advantages compared to usual care settings. There may be incentives to families to remain in the study, and there may be greater resources available to follow up absences or prompt attendance. Knowledge that one is involved in a trial may engender greater hope for change, motivating engagement. Other potential differences are greater fidelity to protocols and access to focused, timely supervision that supports this; differences in the skill, experience or confidence of those delivering interventions; differences in time and resources available or presence and promotion of explicit strategies to retain people in treatment; or

differences in the profile of the people being treated (for example, symptom severity, co-morbidity, economic and social resources, attitudes and cultural identity).

Encouragingly, there is some evidence to suggest that even quite modest retention strategies can be effective. For example, Dorsey et al. (2014) augmented TFCBT for children placed in foster homes, with an initial phone-call to foster carers which directly discussed potential barriers, caregiver concerns and problem solving around barriers; these matters were revisited with the family at the initial face to face appointment. This engagement strategy was not found to make a difference to the likelihood of first appointment attendance or to the number of cancelled sessions. However, families who received the additional engagement strategy phone call were more likely to receive four or more sessions than those who did not (96.0% vs. 72.7% respectively) and a startling 80% of completed treatment, compared to 40.9% those in the standard condition.

Research in this area would benefit from a consistent definition being adopted which would allow for greater confidence in drawing comparisons across studies. If trials reported as standard the definition used for treatment completion (whether expressed as a number of sessions or as the core components of the protocol that are required to have been delivered), and the known reasons for any dropout and the stage at which it occurred, the robustness of future analyses of this kind will much bolstered.

This study designated interventions as either being trauma-focused and NICE consistent (i.e. involving explicit exposure) or not. It is likely that rather than dichotomous categories, the degree of exposure utilised by different trauma-focused approaches varies along a spectrum in a way that is not captured here. Reporting greater detail about the degree of explicit exposure contained within treatment conditions would also support further research in this area. Similarly, 'catch-all' categories for control conditions are also imperfect. 'Treatment as usual' controls often vary considerably, and

these were then grouped with other active psychotherapeutic approaches. Categorising studies in this way is likely to obscure real differences in the type and intensity of the interventions provided and therefore risks missing important information about the treatment experiences of these young people.

Conclusion

Whilst it is difficult to be confident about the reasons for dropout, the picture found here overall is one of high levels of retention in psychological therapies for PTSD in children and young people, suggesting that these treatments are broadly well tolerated. Our absolute estimates of dropout were accompanied by a large degree of heterogeneity, limiting the generalisability of this conclusion. Nevertheless, our analyses of RCTs that suggested that there was no evidence for different dropout rates when making comparison to control conditions.

Highlights (188 characters):

Dropout from RCTs is not more likely for trauma-focused treatments than for non-trauma-focused arms or control conditions.

Trauma-focused treatments for PTSD are acceptable to most youth.

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Figure 1. PRISMA Flowchart of Study Identification Process

Identification

Records identified through database searching
(*n* = 4076)

Additional records identified through other sources
(*n* = 0)

Records after duplicates removed
(*n* = 2747)

Screening

Records screened
(*n* = 2747)

Records excluded
(*n* = 2494)

Eligibility

Full-text articles assessed for eligibility
(*n* = 253)

Full-text articles excluded, with reasons
(*n* = 213)

Not Randomised &/or not Controlled (*n* = 45)

Neurological, Pharmacological (*n* = 16)

Preventative intervention (*n* = 3)

Participant age (*n* = 9)

Meta-analysis (*n* = 41)

Secondary analysis of RCT published elsewhere (*n* = 19)

No NICE consistent arms (*n* = 9)

PTSD symptoms not necessary for participation (*n* = 22)

Protocols, Guidelines, Reviews, Comment (*n* = 40)

Not available in English (*n* = 2)

Dropout unclear (*n* = 7)

Included

Studies included in quantitative synthesis (meta-analysis)
(*n* = 40)

Table 1. *Characteristics of Included Studies*

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Ahmad et al., 2007	Sweden	Various	Mixed	EMDR v WL	33	Individual	8, 8 (45)	Therapists (authors)	6 – 16 (10)	100	41.2/ 58.8	9.1
Ahrens & Rexford, 2002	USA	Violence	Mixed	CPT v WL	38	Group	8, 8 (60)	Experienced doctoral candidate and qualified psychologist	15 - 18 (16.4)	100	100/ 0	0
Baron et al., 2016	Palestine	Mass Conflict	Mixed	TRT v WL	154	Group	n.r., 5 (60)	School Counsellors	11 – 18 (13.5)	100	36.4/ 63.6	16.9
Catani et al., 2009	Sri Lanka	Civil unrest, Tsunami	Mixed	KidNET v MED-RELAX	31	Individual	2, 6 (60-90)	Teachers trained as 'master counsellors'	8 - 14 (11.9)	n.r.	54.8/ 45.2	0
Cohen et al., 2004	USA	Sexual abuse	Mixed	TFCBT v CCT	229	Individual (with parent involvement)	12,12 (45)	Experienced therapist (social workers and psychologists)	8 - 14 (10.7)	89	21.2/ 78.8	11.4
Cohen et al., 2011	USA	Intimate Partner Violence	Mixed	TFCBT v CCT	124	Individual (with parent involvement)	8, 8 (45)	Social workers	7 – 14 (9.6)	25	49.2/ 50.8	39.5

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Dawson et al., 2018	Indonesia	Civil conflict	Mixed	TFCBT v PS	64	Individual (with care-giver involvement)	6, 6 (60)	Lay counsellors	7 – 14 (10.4)	75	51.5/ 48.5	0
de Roos et al., 2011	Netherlands	Firework Factory explosion	Single incident	TFCBT v EMDR	52	Individual (with parent involvement)	8, 4 individual plus 4 parent (60)	Licenced therapists	4 - 18 (10.1)	17.3	55.8/ 44.2	25.9
de Roos et al., 2017	Netherlands	Various	Single incident	CBWT v EMDR v WL	103	Individual	Up to 6, 6 (45)	Clinical Psychologists	8 – 18 (13.1)	61.2	42.7/ 57.3	3.9
Deblinger et al., 2011	USA	Child sexual abuse	Mixed	TFCBT (with TN) v TFCBT (without TN)	210	Individual (with caregiver involvement)	Either 8 or 16, 8 or 16, (90)	Graduates with 3+ years of clinical experience	4 – 11 (7.7)	n.r.	39/ 61	24.8
Diehle et al., 2015	Netherlands	Various	Mixed	TFCBT v EMDR	48	Individual (with parent involvement)	8, 8 (60)	Experienced therapists	8 – 18 (13)	33	38/ 62	25
Ertl et al., 2011	Uganda	Former child soldiers	Multiple	KidNET v Academic catchup with SC	85	Individual	3, 8 (90 – 120)	Lay Counsellors	12 – 25 (18)	100	44.7/ 55.3	7.6

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Foa et al., 2013	USA	Child sexual abuse	Mixed	PE v SC	61	Individual	14,14 (60 - 90)	Masters level counsellors	13 -18 (15.3)	100	0/ 100	13.1
Ford et al., 2012	USA	Various	Mixed	TARGET v ETAU	59	Individual	n.r., 12 (50)	Experienced therapists with professional qualifications	13 – 17 (14.7)	62.8	0/ 100	27.1
Gilboa-Schechtman et al., 2010	Israel	Various	Single Incident	PE-A v TLDP	38	Individual	PE-A: 15,15 (90) TLDP: n.r., 18 (50)	'MA level clinicians'	12 – 18 (14.1)	100	37/ 63	21.1
Goldbeck et al., 2016	Germany	Various	Mixed	TFCBT v WL	159	Individual (with parent involvement)	12, 12 (90)	Therapist with advanced clinical training	7 – 17 (13.0)	75.5	28.3/ 71.7	1.9
Jaberghadri et al., 2004	Iran	Sexual abuse	Mixed	TFCBT v EMDR	18	Individual (with parent involvement)	12, 12 (45)	Clinical Psychologist	12 – 13 (n.r.)	n.r.	0/ 100	21.1
Jaberghadri et al., 2019	Iran	Domestic Violence	Multiple	TFCBT v EMDR	40	Individual (with parent involvement)	12, 12 (60)	Experienced therapists (including author)	8 – 12 (n.r.)	100	50.4/ 49.6	23.8

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Jensen et al., 2014	Norway	Various	Mixed	TFCBT v TAU	156	Individual (with parent involvement)	n.r., 15 (45)	Experienced therapist from mix of professions	(15.1)	66.7	20.5/ 79.5	25
Kemp et al., 2009	Australia	Motor vehicle accidents	Single incident	EMDR v WL	27	Individual	6, 4 (60)	Doctoral level psychologist with advance training	6 – 12 (8.9)	n.r.	55.6/ 44.4	11.1
King et al., 2000	Australia	Child sexual abuse	Multiple	Child CBT v Family CBT v WL	36	Individual (child only)/ Individual parent & child)	20, 20 (50)	Registered Psychologist	5 – 17 (11.5)	69.4	31/ 69	22.2
McMullen et al., 2013	DR Congo	War	Mixed	TFCBT v WL	50	Group	n.r., 15 (45)	Authors and experienced Congolese counsellors	13 – 17 (15.8)	n.r.	100/ 0	4
Meiser-Stedman et al., 2017	UK	Various	Single incident	CT-PTSD v WL	29	Individual	10, 10 (90)	Clinical Psychologists (including authors)	8 - 17 (13.3)	100	27.8/ 72.2	10.3
Murray et al., 2014	Zambia	Various	Mixed	TFCBT v TAU	257	Individual	16, 16 (90)	Lay counsellors	5 – 18 (13.7)	n.r.	50.2/ 49.8	9.7

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Nixon et al., 2011	Australia	Various	Single incident	TFCBT v Cognitive Therapy (no exposure)	34	Individual (with parent involvement)	9, 9 (90)	Trainee Clinical Psychologists	7 – 17 (10.8)	100	63.3/ 36.7	38.2
O'Callaghan et al., 2013	DR Congo	War	Mixed	TFCBT v WL	52	Group (plus x3 individual sessions & x3 caregiver sessions)	5, 15, (120)	Social workers	12 – 17 (16.1)	60	0/ 100	11.5
O'Callaghan et al., 2015	DR Congo	War	Mixed	TFCBT v CFS	50	Group	3, 9 (90)	Lay facilitators	8 – 17 (14.8)	92	58/ 42	0
Peltonen & Kangaslampi, 2019	Finland	Various	Mixed	NET v TAU	50	Individual	10, 10 (9)	Experienced MH professionals	9 – 17 (13.2)	n.r.	58/ 42	14
Pityaratstian et al., 2014	Thailand	Tsunami	Mixed	TRT (adapted) v WL	36	Group	0.4, 3 (120)[b]	Certified Child Psychiatrists (incl. author)	10 – 15 (12.3)	100	27.8/ 72.2	0
Robjant et al., 2019	DR Congo	Former Child Soldiers	Multiple	FORNET v TAU	92	Individual (plus x1 group session per week)	6, 12 (120)	Lay people	16 – 25 (18)	100	0/ 100	0

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Rosner et al., 2019	Germany	Various	Mixed	D-CPT v WL/TA	88	Group	20, 30 (50)	Masters level or postdoctoral therapists	14 – 21 (18.1)	100	15/ 85	21.6
Ruf et al., 2010	Germany	Refugees	Multiple	KidNET v WL	26	Group	8, 8 (120)	Clinical Psychologists	7 – 16 (11.5)	100	54/ 46	3.9
Salloum & Overstreet, 2012	USA	Various	Mixed	GTI-CN v GTI-C	72	Group (plus x1 individual & x1 parent session)	10, 12 (60)	Social workers, social work interns, psychology doctoral student	6 – 12 (9.6)	n.r.	55.7/ 44.3	5.6
Santiago et al., 2014	USA	Community Violence	Mixed	CBITS v CBITS + Family	64	Group (plus 1 - 3 individual & 1 – 2 group sessions for parents)	n.r., 12 (50)	Social workers	10 – 14 (11.7)	100	41/ 59	0
Scheeringa et al., 2011	USA	Various	Mixed	TFCBT v WL	64	Individual (with parent involvement)	12, 12 (50)	Social workers	3 – 6 (5.3)	24	66.2/ 33.8	29.7
Schottelkorb et al., 2012	USA	Refugees	Mixed	TFCBT v CCPT	31	Individual (with parent involvement)	TFCBT: 12, 20 (30) C0+: 12, 24 (30)	Masters level student counsellors	6 – 13 (9.1)	58	54.8/ 45.2	16.1

Authors, Year	Country	Trauma Type	Single Incident, Multiple or Mixed	Interventions	Number of Participants	Format	Maximum Duration Weeks, Sessions, (Minutes)	Delivered By	Age Range (mean)	Met PTSD Diagnostic Threshold at Pre-treatment (%)	Male (%)/ Female (%)	Dropout (%)[a]
Shein-Szydlo et al., 2016	Mexico	Various	Mixed	TFCBT v WL	100	Individual	12, 12 (60)	Psychologists (Authors)	12 – 19 (14.9)	100	44/ 56	1
Smith et al., 2007	UK	Various	Single incident	TFCBT v WL	24	Individual (with parent involvement)	10, 12 (n.r.)	Clinical Psychologists	8 – 18 (13.8)	100	50/ 50	0
Stein et al., 2003	USA	Violence	Mixed	CBITS v WL	126	Group	10, 10 (60)	School clinicians	n.r. (11)	n.r.	43.7/ 56.3	9.5
Tol et al., 2008	Indonesia	Civil conflict	Mixed	CBT-CBI v WL	403	Group	5, 15 (n.r.)	Local lay people	(9.9)	n.r.	51.4/ 48.6	2.5

Note. EMDR = Eye Movement Desensitisation and Reprocessing; WL = Waiting List; CPT = Cognitive Processing Therapy; TRT = Teaching Recovery Techniques; KidNET = Narrative Exposure Therapy for Children; MED-RELAX = Meditation and Relaxation intervention; TFCBT = Trauma-Focused Cognitive Behaviour Therapy; CCT = Child Centred Therapy; PS = Problem Solving intervention; CBWT = Cognitive Behavioural Writing Therapy; TN = Trauma Narrative; SC = Supportive Counselling; PE = Prolonged Exposure; TARGET = Trauma Affect Regulation: Guide for Education and Therapy; ETAU = Enhanced Treatment as Usual (relationship supportive therapy); PE-A = Prolonged Exposure for Adolescents; TLDP = Time Limited Psychodynamic Therapy; TAU= Treatment as Usual; CBT = Cognitive Behavioural Therapy; CT-PTSD = Cognitive Therapy for Post-Traumatic Stress Disorder; CFS = Child Friendly Spaces; NET = Narrative Exposure Therapy; FORNET = Narrative Exposure Therapy adapted for Offenders; WL/TA = Waiting List with Treatment Advice; GTI-CN = Grief and Trauma Intervention with coping skills and trauma narrative processing; GTI-C = Grief and Trauma Intervention – coping skills only; CCPT = Child

Centred Play Therapy; CBITS = Cognitive Behavioural Intervention for Trauma is Schools; CBT-CBI = Cognitive Behavioural Therapy Classroom-based Intervention; n.r. = not reported.
[a]dropout from all arms including waiting list. [b]intervention delivered over three consecutive days followed by homework over the following month.

Table 2. Studies with explicit definitions of dropout or completion

Study	Definition of completion
Ahmad et al, 2007	Three or more sessions of a possible eight
Cohen et al, 2004	Three or more sessions of a possible 12
Cohen et al, 2011	Completion of all eight sessions
Dawson et al, 2018	Completion of all five sessions
de Roos et al, 2011	Completion of four sessions unless asymptomatic
de Roos et al, 2017	Completion of six sessions or fewer if units of distress reduced to zero
Deblinger et al, 2011	Three or more sessions of a possible eight or 16
Diehle et al, 2015	Eight sessions but treatment could be concluded earlier if cured
Ertl et al, 2011	Completion of all eight sessions
Foa et al, 2013	Eight or more sessions of a possible 14
Ford et al, 2012	Five or more sessions of a possible 12
Goldbeck et al, 2016	Eight or more sessions
Jaberghaderi et al, 2004	Ten or more sessions of TFCBT No minimum for EMDR
Jaberghaderi et al, 2019	Five or more sessions of a possible 12
Jensen et al, 2014	Six or more sessions
Peltonen & Kangaslampi, 2019	Seven or more sessions

Table 3. Results of Proportion Meta-Analyses

Analysis	k	N	Prevalence (%)	95% CI		Heterogeneity statistics			
				LI	UL	Q	df	p	I^2 (%)
Dropout from all treatment arms excluding WL	66	2658	11.7	9.0	14.6	326.5	65	<0.001	79.0
Lower quality removed	53	2383	11.6	8.8	14.8	286.7	52	<0.001	80.7
Defined dropout	32	1386	15.9	12.0	20.2	132.0	31	<0.001	76.1
Dropout from all TFCBT arms	41	1696	10.6	7.5	14.2	206.1	40	<0.001	79.3
Lower quality removed	31	1457	10.1	6.7	14.0	166.8	30	<0.001	80.1
Defined dropout	16	778	14.7	9.4	20.9	70.1	15	<0.001	78.7
Dropout from all TFCBT & EMDR arms	48	1869	11.2	8.2	14.6	226.5	47	<0.001	77.6
Lower quality removed	36	1608	10.8	7.6	14.5	186.7	35	<0.001	79.2
Defined dropout	22	891	15.2	10.6	20.4	85.3	21	<0.001	74.9
Dropout from all EMDR arms	7	173	15.5	7.8	25.3	15.7	6	0.015	59.0
Lower quality removed	5	151	16.2	6.9	28.5	14.7	4	0.005	70.1
Defined dropout	6	160	16.7	8.0	27.8	15.1	5	0.010	63.6
Dropout from all non-trauma focussed arms[a]	18	789	12.8	7.6	19.1	90.1	17	<0.001	82.4
Lower quality removed	17	775	13.4	7.9	20.0	87.8	16	<0.001	83.1
Defined dropout	10	495	17.4	10.5	25.6	43.4	9	<0.001	79.2

Note. WL = Waiting List; TFCBT = Trauma-Focused Cognitive Behavioural Therapies; EMDR = Eye Movement Desensitisation and Reprocessing

[a] All active control arms, non-NICE recommended psychotherapies and the arms from component studies with exposure or trauma narrative elements removed

Table 4. Odds Ratios of Dropout From Different Types of Intervention

Analysis	k	*N*	Odds Ratio	95% CI		*p*	Heterogeneity statistics			
				LL	UL		Q	df	*p*	*I²* (%)
TFCBT vs any active control	22	1848	0.89	0.68	1.17	0.398	12.2	21	0.935	0
Lower quality removed	20	1799	0.87	0.66	1.14	0.398	9.1	19	0.972	0
Defined dropout	15	1337	0.85	6.23	1.15	0.398	8.0	14	0.889	0
EMDR vs any active control	5	283	1.03	0.54	1.93	0.938	1.3	4	0.870	0
Lower quality removed	4	265	1.03	0.53	1.99	0.938	1.3	3	0.741	0
Defined dropout ᵃ	-	-	-	-	-	-	-	-	-	-
TFCBT or EMDR vs WL	17	1417	1.01	0.50	2.04	0.975	25.9	16	0.055	42.3
Lower quality removed	12	1153	1.22	0.33	2.03	0.975	17.7	11	0.088	42.2
Defined dropout ᵇ	-	-	-	-	-	-	-	-	-	-
TFCBT or EMDR vs active control[c]	14	1299	0.88	0.63	1.21	0.424	7.7	13	0.863	0
Lower quality removed	13	1268	0.85	0.61	1.18	0.424	4.6	12	0.971	0
Defined dropout	8	800	0.83	0.57	1.21	0.424	4.5	7	0.720	0
Component studies[d]	4	314	0.81	0.42	1.55	0.518	2.0	3	0.581	0
Lower dropout removed ᵃ	-	-	-	-	-	-	-	-	-	-
Defined dropout ᵇ	-	-	-	-	-	-	-	-	-	-

Note. LL = Lower limit; UL = Upper limit; CBT = Cognitive Behavioural Therapies; EMDR = Eye Movement Desensitisation and Reprocessing; WL = Waiting List

[a]analysis not conducted because there were too few eligible arms (k = 2). [b]same as the analysis above. [c]excludes component studies and EMDR v TFCBT studies. [d] Arms with exposure/trauma narrative component v arms with those elements removed.

Table 5. Proportion Dropout Meta-Analyses for Each Active Arm: Subgroup and moderator analyses

Analysis	k	N	Dropout Prevalence (%)	95% CI LL	UL	Q	df	p	I^2 (%)
Individual vs group									
Individual arms[a]	53	2067	14.2	11.0	17.6	218.3	52	<0.001	76.9
Group arms[a]	13	591	4.0	1.8	7.1	34.9	12	<0.001	59.7
Test of moderation, p<.001; defined drop only, n/a[b]; lower quality studies removed, p=.005									
Multiple vs single trauma									
Multiple/mixed trauma arms	55	2410	11.1	8.4	14.2	286.0	54	<0.001	79.9
Single trauma arms	11	248	15.1	7.6	24.7	38.9	10	<0.001	72.3
Test of moderation, p=.345; defined drop only, p=.322; lower quality studies removed, p=.269									
Lay vs professional therapist									
Lay delivered arms	13	628	4.1	1.8	7.4	40.0	12	<0.001	64.3
Professional delivered arms	53	2030	14.0	11.0	17.4	212.1	52	<0.001	76.2
Test of moderation, p=.003; defined drop only, p=.027; lower quality studies removed, p=.001									
Number of sessions									
Test of moderation, p=.461; defined drop only, p=.434; lower quality studies removed, p=.914									
CBT vs other[c]									
Test of moderation, p=.317; defined drop only, p=.548; lower quality studies removed, p=.214									
CBT or EMDR vs other[c]									
Test of moderation, p=.612; defined drop only, p=.624; lower quality studies removed, p=.446									

Note. [a]Experimental or control arms. [b]Not applicable, as no eligible arms. [c]Subgroup data available in Table 2.

Supplementary Material 1

Study Quality Assessment

Adapted from Hoppen & Morina (2020) and Cuijpers et al (2010)

Q1. Participants PTSD symptomology assessed with a personal assessment interview

Q2. Use of a treatment manual – published or designed for the study

Q3. Therapists specifically trained for the given therapy, or only included trained therapists

    with substantial prior experience

Q4. Treatment integrity was checked (i.e. regular supervision and/or independent,

    systematic, quantitative analysis of protocol adherence measures)

Q5. Intent-to-treat analysis

Q6. Independent and random allocation

Q7. Blind outcome assessments

Q8. Presentation of CONSORT

Q9. Dropout clearly defined

Q10. Details about the stage or reasons for dropout

Quality ratings for each study

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total score
Ahmad et al 2007	1	1	0	0	1	0	1	1	1	1	8
Ahrens & Rexford 2002	1	1	1	0	0	0	1	0	0	1	5
Barron et al 2016	0	1	1	1	1	1	1	1	0	1	8
Catani et al 2009	1	1	1	1	1	1	1	1	0	1	9
Cohen et al2004	1	1	1	1	0	0	1	1	1	1	8
Cohen et al2011	1	1	1	1	1	1	1	1	1	0	9
Dawson et al 2018	1	0	1	0	1	1	1	1	1	1	7
de Roos et al 2011	0	1	1	1	1	1	1	1	1	1	9
de Roos et al 2017	1	1	1	1	1	1	1	1	1	1	10
Deblinger et al 2011	1	1	0	1	1	1	1	1	1	1	9
Diehle et al 2015	1	1	1	1	1	1	1	1	1	1	10
Ertl et al 2011	1	1	1	1	1	0	1	1	1	1	9
Foa et al 2013	1	1	1	1	1	1	1	1	1	0	9
Ford et al 2012	1	1	1	1	1	1	0	1	1	1	9
Gilboa-Schechtman et al 2010	1	1	1	1	1	1	1	1	0	1	9
Goldbeck et al 2016	1	1	1	1	1	1	1	1	1	1	10
Jaberghaderi et al 2004	0	1	1	1	0	0	1	0	1	1	6
Jaberghaderi et al 2019	0	1	1	0	1	0	1	1	1	1	7
Jensen et al 2014	1	1	1	1	1	1	1	1	1	0	9
Kemp et al 2009	1	1	1	1	0	0	0	0	0	0	4
King et al 2000	1	1	1	1	1	0	0	0	0	1	6
McMullen et al 2013	1	1	1	1	0	1	1	1	0	1	8
Meiser-Stedman et al 2017	1	1	1	1	1	0	1	1	0	1	8
Murray et al 2015	1	1	1	1	1	1	1	1	0	1	9
Nixon et al 2011	1	1	1	1	1	1	1	1	0	1	9
O'Callaghan et al 2013	0	1	1	1	1	1	1	1	0	1	8
O'Callaghan et al 2015	1	1	1	1	1	1	1	1	0	1	9
Peltonen & Kangaslampi 2019	0	1	1	1	1	1	0	1	1	1	7
Pityaratstian et al 2014	1	1	1	0	0	0	1	1	0	1	6
Robjant et al 2019	1	1	1	1	0	1	1	1	0	1	8
Rosner et al 2019	1	1	1	1	1	1	1	1	0	1	9
Ruf et al 2010	1	1	1	0	1	0	1	1	0	1	7
Salloum and Overstreet 2012	0	1	1	1	1	1	1	1	0	1	8
Santiago et al 2014	0	1	1	0	1	1	0	0	0	1	5
Scheeringa et al 2011	1	1	0	1	0	1	0	1	0	0	5
Schottelkorb et al 2012	1	1	1	1	0	1	0	0	0	0	5
Shein-Szydlo et al 2016	1	1	1	1	0	1	1	1	0	1	8
Smith et al 2007	1	1	1	1	1	1	1	1	0	1	9
Stein et al 2003	0	1	1	1	0	1	1	1	0	0	6
Tol et al 2008	1	1	1	1	1	1	0	1	0	1	8

Supplementary Figure 2. Forest plot, grouped by treatment modality